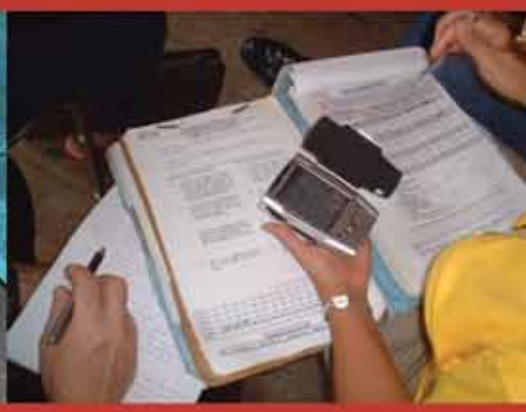
FINAL REPORT

Global Fund Five-Year Evaluation: Study Area 3

The Impact of Collective Efforts on the Reduction of the Disease Burden of AIDS, Tuberculosis, and Malaria

May 2009





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ISBN 92-9224-178-8

EXECUTIVE SUMMARY

1 BACKGROUND AND LESSONS LEARNED

BACKGROUND

1.1 A Unique Evaluation Study of Scaling Up in Countries

In November 2006, the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) Board made the decision, as part of its own five-year evaluation, to invest in a multicountry study that focused on assessing country progress and collective impact of all partners in scaling up the response against AIDS, tuberculosis (TB), and malaria.

In November 2006, the Global Fund Board agreed to fund an extensive, three-part evaluation of its first five years of operation. The first two parts of the evaluation focused on the Global Fund's organizational efficiency and effectiveness, and the effectiveness of the Global Fund partner environment. The third part, the subject of this report, focused on country progress in the fight against AIDS, TB, and malaria, with special attention to health systems.

There have been different types of multicountry evaluation studies in the health sector. Some, such as the Joint United Nations Programme on HIV/AIDS (UNAIDS) five-year evaluation, involve multiple-country assessments focusing almost entirely on the institutions' own role in the response. Others, such as the Institute for Health Metrics and Evaluation's analyses of the GAVI Alliance, completely rely on secondary analysis of existing data. Another type of evaluation deals with a specific set of interventions, such as the multicountry evaluation of the Integrated Management of Childhood Illness (IMCI), with extensive primary data collection and analysis in countries.

This evaluation study is distinct from previous evaluations in several ways. First, it focuses primarily on the collective impact of the Global Fund and its national and international partners through a comprehensive assessment of country progress. Second, the evaluation study does not focus on the health impact of a limited set of interventions, but all possible interventions in the battle against three major diseases: HIV/AIDS, TB, and malaria. Furthermore, the way in which the evaluation study was conducted was special in that it followed a set of key principles that are intrinsic to the Global Fund itself, including the fostering of country ownership and contribution to the strengthening of country capacity and systems.

Of the almost US$12 million made available by the Board for the evaluation study, 40% was allocated to data collection, 30% to capacity building and data analysis in countries, 15% to administration, and 15% to the development of instruments, tools, and reports.

1.2 Documenting Impact and Strengthening the Basis for Evaluation

Because the scaling up of the response against the three diseases began in 2003-2004 and the timing of the evaluation followed so soon after, it is unreasonable to expect that the

evaluation would capture the full impact of the scaling up, given the time it takes from funding approval to health impact.

The period of implementation that the evaluation study measured was relatively short and made it impossible to document the full health impact. Scaling up through the Global Fund, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), and other disbursements began in 2003 but only reached substantial levels of funding and numbers of countries in 2004-2005. The time between a Board decision on a proposal and actual implementation may easily reach 15-23 months (approximately 9-12 months between Board approval and grant signing, 2-3 months between signing and disbursement, and 4-8 months between disbursement and implementation in the country). The time between implementation of the interventions and reaching high coverage levels to subsequent population impact can also vary from a few months to years and is quicker for some interventions (e.g., treatment) than others (e.g., behavioral change programs). Finally, the time between actual population health impact and the ability to document these changes is also several years because of the delay between data collection and results (e.g., often 2-3 years for HIV surveillance, 2 years for TB treatment outcomes) and because of limitations of measurement instruments (e.g., HIV prevalence among young people to assess HIV incidence trends).

The evaluation study has initiated a process of strengthening country evaluation capacity through the engagement of country stakeholders and institutions, a critical evaluation of the current situation with new analyses of existing data, and the collection of new data to fill major gaps. These efforts will be supported by a model evaluation platform, which provides guidance and tools to countries for the evaluation of scaling up and should become a basis for collaborative efforts. In several countries (e.g., Burkina Faso, Tanzania, and Zambia), discussions about using district-based data collection to inform annual health sector reviews, assess data quality, and monitor progress are already ongoing.

1.3 Multiple Dimensions of a Complex Study

The evaluation study was a complex undertaking, involving a large number of international and country actors and a large number of countries, combined with a broad scope of the evaluation (three diseases) and a comprehensive participatory approach.

Of 20 countries selected by the Global Fund Technical Evaluation Reference Group (TERG), 18 participated in the evaluation. In each country, a special Impact Evaluation Task Force (IETF) was established before the evaluation study via a contract with UNAIDS. The IETF reported to the Country Coordinating Mechanism and was responsible for developing a work plan and overseeing evaluation of activities. In total, 49 local institutions and individuals were subcontracted to compile and analyze available data in all countries and collect new data in eight countries.

Following an international tender, the evaluation study was organized and overseen by a consortium of five organizations, led by Macro International Inc., with the African Population and Health Research Center, Harvard University School of Public Health, Johns Hopkins Bloomberg School of Public Health, and World Health Organization (WHO). Consultations with existing expert groups, global initiatives, and technical programs in international organizations were also part of the evaluation study.

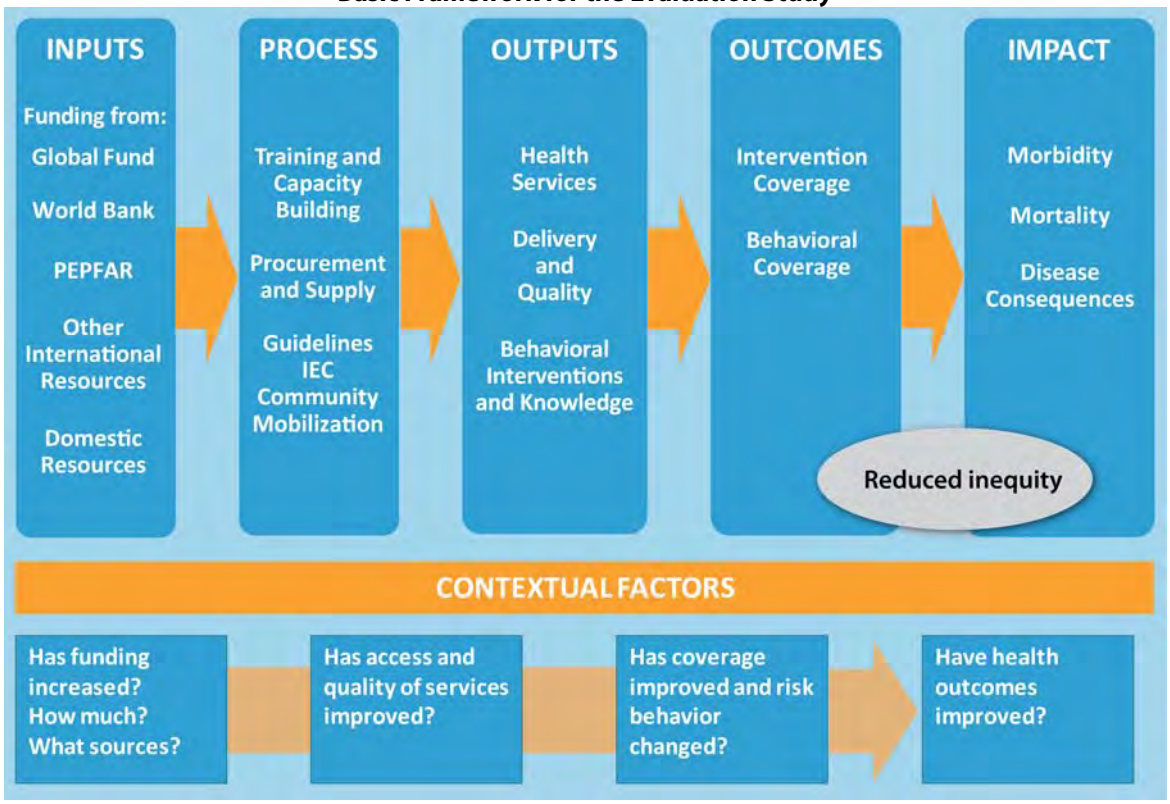
The TERG was tasked by the Board to organize and oversee the evaluation study and ensure its independence. The Global Fund Secretariat played a limited role through its support of the TERG and assistance to the Evaluation Study Consortium in making country connections.

1.4 An Analysis of Existing Data and New Data Collection

The evaluation study design used a stepwise approach to examine trends in health outcomes, coverage, and risk behaviors; access and quality of services; and funding. Secondary analysis and record reviews were conducted in 18 countries, and new data collection was carried out in eight of these countries.

The evaluation study focused on the collective efforts to scale up prevention and treatment programs, with special attention to the role of the Global Fund. The potential contribution of the Global Fund was assessed by focusing on its financial contribution relative to other players. The evaluation study was designed to adhere to scientific evaluation criteria while aligning to the processes and principles outlined in the International Health Partnership (IHP+) common evaluation framework, which is based on the tenets of the 2005 Paris Declaration on Aid Effectiveness. A stepwise approach to evaluation study was used, consisting of four sequentially linked questions on trends in funding, access to services, coverage of interventions and risk behaviors, and health outcomes. Within the limits set by contextual factors, improvements at each step can be plausibly ascribed to improvements in the previous step (see Figure 1).

Figure 1
Basic Framework for the Evaluation Study



Data collection in countries included national health accounts, district facility censuses, household surveys, civil society organization surveys, record reviews, and follow-up studies of patients. Special

efforts were made to evaluate data quality, analyze subnational data, and assess the state of health services.

LESSONS LEARNED IN IMPLEMENTATION

Experiences gained from the evaluation study design and the processes of its implementation provide important lessons for future large-scale evaluations. It is also important to keep in mind that one of the principal objectives of the evaluation study was to lay a foundation for stronger performance monitoring and evaluation in the future. This section assesses the extent to which the evaluation study was able to adhere to the principles of the IHP+ common evaluation framework.

1.5 Ensuring Collective Action in Evaluation

Efforts to engage partners were more successful at the global level than the country level, where the evaluation study was perceived by partners as a mostly Global Fund activity.

The evaluation study was partly successful in bringing partners on board. At the global level, the Global Fund Secretariat organized meetings to inform and discuss the evaluation with partners. In particular, PEPFAR showed an interest and agreed to fund capacity-building activities related to the evaluation study. At the country level, partners, such as PEPFAR, UNAIDS, the World Bank, and bilateral donors, have been interested. Some partners participated in the IETF in several countries, but they generally did not perceive it as a truly joint evaluation.

1.6 Alignment with Country Processes

The alignment with country processes was generally limited, as the tight timeline and the perceived Global Fund focus in countries did not allow for sufficient time to ensure that the data collection and analysis work would be streamlined and results used for annual in-country health sector reviews and other major planning and reporting cycles.

The timeline of the evaluation study was short. The contract with the consortium was signed in April 2007, work planning led by country IETFs occurred in May to November 2007, secondary analyses and fieldwork ran from November 2007 to August 2008 in most countries, and new data analyses were conducted beginning in June 2008. This left little time for alignment with country-led processes, such as annual health sector or midterm reviews. There was only partial alignment with these processes in some countries, and further efforts need to be made to maximize the country benefits of the evaluation study. In general this evaluation became an "added task" for most countries rather than an opportunity to strengthen their ongoing monitoring and evaluation work.

1.7 Balance between Country Participation and Independence

Creating special task forces for the evaluation was not a successful way for ensuring country ownership, but independence was maintained by subcontracting country institutions and individuals.

Evaluations should be driven by country needs and ensure active country participation without sacrificing scientific rigor and credibility while maintaining objectivity and independence. Common

protocols and standardized indicators and measurement tools, adapted by countries as needed, helped enhance data quality and comparability between countries and populations over time. Data collection and analysis were carried out by local institutions and researchers generally not affiliated with the disease programs using the locally adapted, standardized tools and methods. However, in several cases, capacity constraints led to the omission of evaluation study components and delays in the compilation and analysis of the data. Furthermore, several countries made changes to the study protocols, sometimes for valid reasons (e.g., Peru focused on cities only), which affected the ability to obtain comparable results. In a few instances, the results were considered invalid because of the strong program involvement in the evaluation (e.g., in follow-up studies of patients).

IETFs were set up to ensure stakeholder involvement and manage the potential tension between country ownership and independent assessment. The task force model, with its link to the Country Coordinating Mechanism, was only successful in a few countries. It would be more effective and more sustainable to build upon existing mechanisms of coordination and leadership within countries.

1.8 Harmonization of Approaches to Evaluation and Performance Assessment

The evaluation study avoided the duplication of data collection, but the lack of integration with country health information plans limited its ability to more thoroughly evaluate impact.

The evaluation study was somewhat successful in avoiding duplication of data collection efforts, but the lack of long-term planning implied that the data collection efforts were not part of country health information plans. In fact, in most countries such plans do not exist. For instance, in Tanzania six partly overlapping surveys with malaria modules were conducted in 2008. Data sharing by partners was generally good, although in some countries it was difficult for the local teams to obtain all the data that should have been easily accessible for the evaluation study.

1.9 Capacity Building and Health Information System Strengthening

Through workshops and technical assistance, the evaluation study significantly strengthened capacity to conduct evaluations, but systematic involvement of institutions and much larger investments are needed to make a difference.

Systematic involvement of key country institutions in evaluation activities is necessary to achieve country ownership of the data and ensure that weaknesses in health information systems are brought to the fore with a view to systems strengthening. In general, country capacity was strongest in *data collection through surveys* and weakest in the areas of *data quality assessment* and *data analysis*. Several workshops and on-the-job activities were conducted to build capacity in analysis. Several priority areas for capacity building were identified, particularly proper processing of survey data and the skills to assess data quality, conduct analysis, and write reports.

1.10 Funding for Evaluation

Investments by the Global Fund and its partners in evaluation have been limited during the past years and are part of the reason why the evaluation questions can only be partially answered.

As a general guide, between 5% and 10% of the overall scale-up funds need to be set aside for monitoring and evaluation. At the country level, only limited use has been made of Global Fund and other funding to improve monitoring and evaluation and to strengthen health information, which is discussed in the next section. Most progress has been made in funding household surveys for HIV/AIDS, primarily through PEPFAR, and for malaria, through multiple donors, and the development of reporting systems for antiretroviral treatment (ART), mainly through PEPFAR and other donors.

RECOMMENDATIONS

Recommendation 1.1 Improving evaluation of scaling up in the future

There is a need for more frequent evaluations that are planned with sufficient time to allow greater integration with country health information systems and the involvement of partners.

There is a need for more frequent and rigorous evaluation of scaling up based on accurate documentation of trends in key indicators and complementary special studies to address evaluation questions. Unfortunately, such evaluation is currently constrained by limited baseline and trend data at the national and subnational levels. Stronger health information systems are needed to permit future evaluations to build on ongoing data collection efforts used by countries to manage programs and monitor performance. Evaluations of scaling up would then be based on in-depth assessments of levels, trends, and equity from existing data. The accurate documentation of trends requires investments in health information systems, which are discussed in Recommendation 2.1.

These data should be paired with operational and complementary evaluation research to answer the complicated impact evaluation questions in the best possible ways. The Global Fund and its partners should aim to better integrate monitoring and evaluation with operations and implementation research.

Therefore, evaluation plans should make realistic provision for the time and effort needed to ensure the participation of key stakeholders as well as for making the necessary administrative and financial arrangements. This should allow sufficient time for the involvement of partners in the design phase and minimize the potential duplication and fragmentation of efforts. It would also allow that, within countries, the coordination and alignment with country health sector review and planning processes could be ensured and that country institutions could be involved and strengthened during the evaluation process.

Recommendation 1.2 Annual series of country evaluations

The Global Fund and its partners should build on the evaluation study and continue to support evaluations of scale up each year in a selected number of countries involving all relevant stakeholders with strong country institutional involvement.

Because evaluation would be much stronger if based on in-depth analysis of existing data complemented by special studies, it is desirable to establish a regular process of evaluation that is supported by major partners involved in scaling up to reach the Millennium Development Goals (MDGs).

Rather than embarking on large-scale multicountry efforts in a single year—which are difficult to manage because they involve large numbers of countries—the Global Fund and its partners should each year support evaluations in five to seven countries, and each year a different set of countries should be evaluated. The evaluations should use a standardized set of well-tested protocols, which are part of the model evaluation platform, adapted to country situations. They should start at least 18 months before the results are expected. In general, the evaluations should follow the Paris Declaration principles, as translated for health in the IHP+ common evaluation framework, and incorporate the lessons learned from this Five-Year evaluation study. The results of the evaluations should be reported to the Board and other relevant forums.

These country evaluations should be a joint effort of major partners involved in supporting HIV, TB, and malaria interventions and related health systems strengthening (HSS). The inclusion of evaluations focused on MDG4 (child mortality) and MDG5 (maternal health), however, should also be considered.

2 MONITORING AND EVALUATION

MAIN FINDINGS

2.1 ADDRESSING DATA GAPS

Despite increased data collection for the three diseases, there are major data gaps and weak health information systems in countries that seriously limit the ability to evaluate progress.

The solidity of the conclusions of an evaluation is critically dependent on the availability and quality of the underlying data. This applies not only to data needed to assess health impact, but also to data required for ongoing program monitoring and to data used by the Global Fund, PEPFAR, and other funding entities for performance-based disbursement.

In recent years there have been important improvements in data availability, especially in relation to malaria and HIV. These have generally been the result of the implementation of household surveys, focusing on HIV and malaria indicators. Some countries have also strengthened paper-based and/or electronic recording and reporting systems in order to improve the availability and quality of data on medical interventions such as ART.

Notwithstanding these positive developments, the evaluation study found significant deficiencies in data availability, quality, and comparability both at baseline and over time. This particularly pertains to data on health impact, where the ability to accurately document trends in new infections, prevalence, and mortality is limited, partly due to slow data collection and analysis and measurement issues. Countries also have significant gaps in the monitoring of access to and quality and coverage of services, where completeness and data quality are major challenges. Finally, data gaps concern the poor documentation of inputs and processes, such as funding and human resources, which is further complicated by the large number of civil society organizations that are involved in scaling up a wide range of difficult-to-measure interventions, such as home-based care and support.

2.2 HIV/AIDS: DATA AVAILABILITY AND QUALITY

Improved data availability has resulted from investments in data sources, mainly through U.S. government support with a much smaller contribution from other donors. Nonetheless, data availability and quality continue to fall short of what is needed for sound evaluation.

Thanks, for the most part, to investments made by the U.S. government with a small contribution from the Global Fund, scaling up has led to a number of improvements in the availability and quality of data on program outputs and health outcomes. These include the following:

- Monitoring of HIV prevalence through the implementation of population-based surveys with HIV testing, better antenatal clinic-based HIV surveillance systems, and limited improvements in surveillance among high-risk populations

- Information on risk behaviors and intervention coverage through more frequent population-based surveys with HIV/AIDS-related questions
- Data on HIV service provision through facility assessments sometimes carried out in combination with other health programs
- Clinic reporting systems for HIV, in some instances through electronic reporting of aggregate data and electronic health records
- Regular compilations of data from multiple sectors supported by UNAIDS, for global reporting in relation to the United Nations General Assembly Special Session (UNGASS) goals
- Availability of financial data on HIV/AIDS with the implementation of UNAIDS-supported AIDS spending assessments (including National AIDS Spending Assessments), although the quality is variable, and out-of-pocket expenses are not taken into account.

There are, however, a number of persistent data weaknesses that not only hamper the ability to evaluate programs but also affect program monitoring and management. These include the following:

- Lack of data on AIDS mortality due to a failure to invest in civil registration systems with cause of death certification in hospitals or verbal autopsy for nonhospital deaths.
- Long lag time between data collection and availability of results (e.g., 2-3 years for HIV surveillance) and lack of time trend data on most at-risk populations.
- Inadequate data on antiretroviral treatment outcomes, including adherence and survival.
- Poor quality of data on provision of interventions (ART, preventing mother-to-child transmission of HIV/AIDS [PMTCT], HIV testing and counseling) emanating from health facility reports and poorly maintained national databases with insufficient quality control.
- Fragmentation in information flows as different partners and donors track information on their own activities and services with a lack of standardized, transparent, and joint reporting systems.
- Incomplete and inaccurate data on community interventions (care and support, orphans) collected through administrative records involving large numbers of service delivery organizations. Such data are often used for performance-based disbursement but cannot be translated into population coverage estimates.
- Data quality-control mechanisms are not well established or institutionalized.

2.3 TB: Data Availability and Quality

TB programs have a well-functioning clinic-based diagnosis and treatment reporting system in most countries, but major gaps exist for other types of data.

The 18 evaluation study countries included six of the 22 countries designated by WHO as "high-burden countries" (HBCs) (Cambodia, Democratic Republic of the Congo [DR Congo], Ethiopia, Mozambique, Tanzania, and Vietnam). Four of the 18 countries have smear-positive TB notification rates greater than 100 per 100,000 population: Cambodia, DR Congo, Lesotho, and Zambia. However, the countries participating in the evaluation study should not be regarded as

being representative of a worldwide TB epidemic because many of them have well-established TB programs, which impose limits on opportunities for further advances.

A detailed analysis of the availability and quality of TB-related data in the evaluation study countries highlighted the strength of the standardized facility and district-based recording and reporting systems in most countries. The analysis specifically looked at quarterly, subnational reporting of case notification and treatment success rates. Subnational data for the last 10 years were obtained and analyzed for 16 evaluation study countries (Ethiopia and Kyrgyzstan did not provide reports) to assess completeness and accuracy of reporting.

- Two of the 16 countries (DR Congo and, to a lesser extent, Burundi) have major gaps in their data, which is indicative of poor reporting systems.
- Completeness of reporting was assessed using subnational case notification reports for districts (10 countries) or provinces (six countries). Of the 10 countries providing data at the district level, seven had complete or nearly complete information from all reporting units. Countries requiring significant adjustments for missing information included DR Congo, Rwanda (in two years only), and Zambia.
- Overall quality of reporting data was evaluated in 16 countries based on consistency of time trends, male-female ratios, and ratio of smear positive to all cases. Three countries had excellent data quality based on these criteria (Ghana, Malawi, and Rwanda). In six countries the data quality assessment indicated that there is considerable scope for improvement.
- The comparison of treatment success rates between those reported to WHO and those obtained from subnational record reviews showed good consistency in recent years for all countries, with the exception of Moldova, Mozambique, and Zambia.

There are, however, also important data weaknesses that hamper the ability to evaluate the impact of scaling up. These include a lack of data on the following:

- TB mortality in countries without civil registration systems
- Disease prevalence, which is only obtained through special surveys that are costly due to the large sample sizes needed to measure low TB prevalence and are not integrated with other health data collection efforts
- Equity
- Diagnostic intensity from laboratories to help interpret trends in case notification
- Supply of TB services.

2.4 Malaria: Data Availability and Quality

Major progress has been made in monitoring intervention coverage and malaria morbidity through household surveys, but major gaps in malaria mortality and morbidity data impede the ability to evaluate impact of malaria programming.

Among the 18 evaluation study countries, 11 are classified as malaria endemic, all in Sub-Saharan Africa, and five as epidemic or low transmission. Lesotho and Moldova have no ongoing malaria

transmission. Data availability and quality to monitor the progress and evaluation of malaria programs have greatly improved during the past five years through the use of a small set of standard indicators, the introduction of malaria modules in Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS), and the implementation of malaria indicator surveys. All but one country had at least two national surveys in the last five years, allowing for the assessment of trends and equity in the coverage of interventions. There has also been an increase in the use of biomarkers to measure parasitemia and anemia.

The evaluation study, however, showed that there are major data gaps that impede the evaluation of the impact of the malaria interventions, including the following:

- Data on malaria mortality are lacking in all evaluation study countries because there are no civil registration systems that include cause-of-death data. Child mortality trends are often used as a proxy, but recent trends are available from only a few countries, and the contribution of malaria control can only be derived by making assumptions about its relative importance.
- Currently, there are only a few countries with more than one survey that includes parasite prevalence, so trends regarding population morbidity cannot be assessed in most countries.
- The completeness and accuracy of trend data on malaria cases and mortality in health facilities is highly variable, and at present such data are only useful in some settings where (1) dedicated efforts have been made to ensure good and consistent data quality over time and (2) the extent to which symptomatic patients seek treatment is known. Because of inadequate facility data, as noted in several country reports, the overall report is based on mostly household survey data.[1]
- Few countries have data on the quality of services. As programs are rolling out, this is an information gap that needs to be addressed to improve implementation.

2.5 Strengthening Health Information Systems

Development partners are only partly addressing the causes of information gaps and often in a piecemeal way.

Support by donor and funding agencies for monitoring and evaluation, while often substantial, has been program-targeted rather than systemic, with a focus on generating consensus around core indicators and stepped-up reporting requirements. Not enough has been done to build and maintain country capacities in data generation, compilation, management, analysis, dissemination, sharing, and use. Country health information systems suffer from poor planning, weak institutions and capacities, and insufficient donor coordination, leading to uncoordinated surveys, incompatible and poorly supported information technology solutions, different clinic-based reporting styles (especially for HIV/AIDS), and frequent demands for donor reports. The predominance of HIV/AIDS in, for instance, the creation of indicators and reporting systems is disproportional to the disease burden in most countries. Notwithstanding efforts focused on the "Three Ones," the approach to health information systems development has been characterized by fragmentation and a reliance on ad hoc solutions for what are, in practice, systemic weaknesses. In general, the Global Fund has contributed little to strengthening country health information systems. In particular, in

[1] For analysis of clinic data, see: World Health Organization. 2008. World malaria report 2008. Geneva: WHO Press.

the context of performance-based funding (PBF), as will be seen in the next section, there are missed opportunities to improve monitoring and evaluation systems.

2.6 Performance-Based Funding

Timely, complete, and accurate data and statistics are the foundation of performance- or results-based disbursement. The evaluation study shows that this basis is, at best, weak.

PBF is increasingly popular in the health sector as a way to focus programs on outcomes or results and accelerate implementation. For instance, the GAVI Alliance uses one indicator (DTP3 coverage) to disburse Immunization Services Support funds to countries and implements a data quality audit system to verify reported results. Yet, it has been shown recently that this relatively simple PBF system based on one coverage indicator, which can be verified easily through multiple sources, can potentially lead to major overpayments based on erroneous data,[2] if not supported by a strong health information system and a regular independent assessment of accuracy of reporting.

PBF is also one of the cornerstone approaches of the Global Fund. Funding is released based on demonstrated results against agreed country-owned targets and indicators that are decided upon in the initial grant agreement.[3] There are two fundamental challenges to the PBF from the data perspective.

First, the evaluation study has shown the multiple issues concerning data availability and quality due to weaknesses of country health information systems. PBF requires the ability to generate reliable and trustworthy data within relatively short time periods. In the absence of solid data on program outcomes, intervention coverage, and health status, the tendency has been to use performance measures of program inputs and processes as the basis for target-setting and benchmarking. Such measures often rely on clinic- and program-based reporting systems from a multitude of partners and service delivery points, which have multiple weaknesses, particularly in relation to accuracy and completeness of reporting and bias. Financial incentives may further aggravate such problems. The complexity of monitoring the use of funds is complicated by the large numbers of interventions, projects, recipients, and target populations.

Second, as shown by the review of selected country grants, there is frequent shifting of indicators and targets during the different stages of the Global Fund grant. Impact and outcome indicators are usually included, but there is limited investment in the measurement, and baselines and targets often are no more than guesses or estimates based on outdated data. In several instances, the indicators are simply the wrong choice because the data need modeling (e.g., TB incidence data) or have considerable measurement issues (e.g., condom use at last sex with nonregular partner), which render them unsuitable for PBF. Therefore, PBF relies almost entirely on a range of process and output indicators that require solid quality control systems. The measures taken by the Global Fund to control quality, such as indicator guidelines, verification by the local fund agent in country, and ad hoc country visits, have not been adequate, as can be deduced from the actual country system and the data used in the grant performance reports. Regular independent assessment of data quality

[2] Lim, S.S., D.B. Stein, J. Charrow, and C.J.L. Murray. 2008. Tracking progress toward universal immunization and the impact of global initiatives: A systematic analysis of three dose DTP immunization coverage. Lancet, 372: 2031-46.
[3] Low-Beer, D., et al. 2007. Making performance-based funding work for health. PLoS Medicine 4(8): e219.

through further analysis, facility assessment, and population-based data collection is essential but may still not guarantee a satisfactory system of rating performance.

RECOMMENDATIONS

Recommendation 2.1 Strengthening country health information systems

A more systematic investment and coordinated approach of all partners is urgently needed to strengthen country health information systems, which are the necessary basis for monitoring progress, PBF, and evaluation.

The increased demand for accountability and results requires a more systematic and coordinated approach involving all major partners than currently is the case. Global alliances and partnerships should earmark significant resources to strengthening country health information systems and enhancing institutional and individual capacities to generate reliable and timely data at the national and subnational levels. Key actors in bringing about these changes at the country level are the Ministry of Health, the National Statistics Office, and academic and research organizations and institutions.

The H8,[4] Health Metrics Network (HMN), and other efforts have provided a basis for a health information strategy that should lead to greater accountability and results through strengthening country health information systems, including the enhanced use of existing data through better access and analysis, systematic investment in filling data gaps, and improved country analytical capacity.[5] The HMN Framework provides guidance on the contents and roadmap for such a plan, which should be fully integrated with the National Health Sector Strategic Plan.[6] International support and resources are urgently needed to permit performance monitoring and future evaluations, striking a balance between standardization and country specificity. Priority data sources for support include the following:

- Surveys: Support harmonized data collection and analysis through household and target population surveys, which should be part of a national health information plan
- Health systems data: Enhance the monitoring of health system strengthening, with an emphasis on improving data on financing, human resources, and health service delivery, including regular district assessments as conducted in the evaluation study
- Surveillance and clinic data: Strengthen through innovation, with much attention to data quality and particular emphasis on the appropriate use of information technology
- Birth and death registration, including attribution of cause of death: While this is a long-term goal, investments need to be made now so that these data are available in the future, starting with improving hospital data, registration in urban populations, and demographic surveillance studies.

[4] Includes the Bill and Melinda Gates Foundation; the GAVI Alliance; the Global Fund; UNAIDS; the United Nations Population Fund; the United Nations Children's Fund; WHO; and the World Bank

[5] H8. 2008. Health information strategy paper. Geneva.

[6] Health Metrics Network. 2007. Framework and standards for country health information systems. Geneva: World Health Organization.

Recommendation 2.1a Strengthening proposals to the Global Fund

The Global Fund and its partners should find ways in which it can strategically improve its support for strengthening country health information systems in a coordinated manner.

The Global Fund has always recognized the need to support monitoring and evaluation and has consistently indicated that 5% to 10% of its funding could be used for monitoring and evaluation. Such funding generally did not happen, and, if it did it, it was not used in a way that adequately strengthened the country system. The evaluation study discovered how difficult it is to redirect unspent Global Fund country funds from previous grants toward monitoring and evaluation work, a process that includes either long delays or complete failure. Much more could be done, in countries lagging behind in grant implementation, to facilitate the use of existing funds for better monitoring and evaluation.

The Global Fund should also develop a much more strategic approach to increase its investments in strengthening country health information systems as part of HSS. Currently, the approach is fragmented, and there is no single mechanism in place that prevents a country from getting separate grants for and parallel implementation of a national TB prevalence survey, a malaria indicator survey, and an HIV survey, or from investing large amounts of money in a single data source without consideration for the overall situation. This requires the development of well-structured guidance to countries, which should be developed as a matter of priority with relevant partners such as HMN, WHO, the Centers for Disease Control and Prevention, and the U.S. Agency for International Development, much along the lines in which disease-specific programs provide country guidance to proposal development for interventions. The Global Fund and its partners should focus on one health information system with well-defined goals and data collection plans that includes disease-specific monitoring and evaluation efforts. This guidance should also provide minimum standards for approval to assist and facilitate the technical review mechanisms of the Global Fund.

Recommendation 2.1b Reorienting HIV/AIDS monitoring and evaluation toward one system

The Global Fund and its partners should reorient investments in HIV/AIDS monitoring and evaluation toward strengthening country health information systems, thereby minimizing fragmentation and duplication and maximizing data quality and use for decisionmaking.

HIV/AIDS-related investments in the "Third One" have fallen short in terms of establishing one monitoring and evaluation system for the disease itself and even more so in contributing to strengthened health information systems. The evaluation study noted marked progress in the availability and quality of HIV data for monitoring and evaluation, with increasing numbers and frequency of household surveys and facility assessments, and better clinical reporting in some countries. However, these developments have frequently led to imbalances.

Although a few countries have relatively simple information systems that permit sound program monitoring and performance evaluation, in most settings there are too many parallel routine reporting systems for HIV/AIDS that collect data for too many indicators. In most countries, huge efficiency gains could be realized through reducing duplication in routine reporting systems. Thus

far, investments in UNGASS reporting have neither improved institutional capacity nor involved systematic assessments of data quality. The Global Fund and its partners should limit the investments in HIV information systems for which the implications for the system as a whole are not clear.

Recommendation 2.1c Strengthening, expanding, and aligning TB monitoring efforts

The Global Fund and its partners should make a systematic effort to assist countries in strengthening their information systems for better program management and monitoring and evaluation to address major data gaps, including TB mortality and prevalence, service availability and quality, and diagnostic effort.

The evidence base on which to assess the epidemiologic impact of scale-up efforts against TB is limited. There remains a critical need to strengthen the empirical basis for measuring changes in TB incidence, prevalence, and mortality and for linking these changes to TB control, including funding. The WHO Task Force on TB Impact Measurement has recommended a range of necessary new work, including strengthening of surveillance systems, better analysis of routine notification and vital registration data, as well as programmatic data (such as diagnostic intensity and drug availability) and disease prevalence surveys in at least 21 countries. As the Global Fund moves forward with developing and refining impact measurement platforms in countries, it will be essential to provide sufficient financial support to ensure that these platforms are developed with rigorous quality assurance measures, including those at the subnational levels. These regular assessments can be done by local institutions, with or without international participation, that are independent of the TB program. In addition, it will be important to align investments in population-based TB surveys and mortality data collection with general efforts to improve health information systems, including health examination surveys and vital events monitoring with causes of death.

Recommendation 2.1d Systematic approach toward malaria monitoring and evaluation

The Global Fund and its partners should develop a more systematic approach to data collection and analysis for the monitoring and evaluation of malaria programs.

The establishment of ambitious malaria goals with a set of well-defined interventions and the ability to measure change in relatively short periods of time is leading to a rapid increase in malaria-specific data collection in countries. Duplication of monitoring and evaluation efforts is increasingly common, as evidenced by the evaluation study in several countries. Therefore, a systematic approach should be promoted and include four components: (1) regular surveys with malaria modules and biomarkers to monitor coverage and health impact, (2) accurate monitoring of financial inputs and expenditures, (3) improved program data on inputs and processes, and (4) systematic information on service utilization, availability, and quality. The Global Fund should look for ways to work with partners to ensure that such monitoring and evaluation is done in accordance with international standards, while global and country data needs are also met in a way that country health information systems are strengthened. In particular, the health facility data on

hospital admissions and clinic attendance are in urgent need of strengthening, which should be done in a way that also benefits the general facility recording and reporting systems.

Recommendation 2.2 Performance-based funding

The Global Fund and its partners should consider immediate measures to improve data availability and quality to support its performance-based disbursement system, including more emphasis on results, better alignment with country information systems, and stronger validation mechanisms.

From a data perspective, the Global Fund PBF system, as it currently functions, is too crude with too few systematic investments in measures to improve availability and quality of data and statistics. First, the system is largely focused on process and output indicators, with data provided by a large number of program implementers, such as civil society organizations and projects. Outcome or impact indicators are included, but there is no concomitant investment to monitor trends. Second, the clinic, project, and program-based reporting systems are often poorly integrated into a national system. The number of antiretroviral therapy clinics supported by or people trained with Global Fund resources are relevant to Global Fund PBF, but for countries it is much more important to have regular information for the country as a whole. Issues of double counting and parallel reporting and quality control are common. This is not unique to the Global Fund and also occurs in cases such as PEPFAR and GAVI. Third, the evaluation study has exposed multiple problems regarding the assessment of performance against a specific target. The challenge of generating accurate and complete data from large numbers of recipients of funding within a single country for a large number of interventions is enormous. Financial incentives may further aggravate the problems, and current efforts to deal with this are not adequate. The development of an internal quality-assessment component as part of a facility-based reporting system is important but not enough. Regular independent assessment of quality through further analysis, facility assessment, and population-based data collection is essential, including the provision of systematic support to the development of institutional capacity within countries.

Such investments need to be supported by a high level of transparency and quality, which is currently not the case. Decisions are currently made based on qualitative judgments derived from a large number of indicators of often poor or uncertain quality.

Recommendation 2.3 Country capacity building in health information

The Global Fund and its partners should redirect and increase their monitoring and evaluation investments to strengthen country capacity, aiming at greater country institutional involvement and harmonized approaches, tools, and methods.

The Global Fund and its partners should help countries develop systems that strengthen data availability, quality, and use to monitor progress, assess performance, and evaluate in a way that goes well beyond current approaches that rely heavily on (semi-)external inputs, such as the local fund agent.

First, a major constraint faced by many countries relates to the individual and institutional capacities required across a range of issues associated with data collection, management, analysis, and sharing. Capacity building requires support to institutions complemented by investment in

training of individuals. In the health sector, there has been relatively little attention paid to institutional capacity building in support of such functions.[7] Establishing stronger partnerships for capacity building between research institutes and Ministries of Health could go some way toward filling the capacity deficit. The institutional component is critical in terms of long-term sustainability. Different organizational forms for such institutions can be envisioned, from an integral part of a Ministry of Health to an entirely separate private, nonprofit organization. Governance and financing structures may also differ. However, evidence from a number of countries suggests that capacity-strengthening efforts should preferably be directed toward institutions that are independent of program implementation so as to maximize objectivity and minimize risks associated with vested interests. In some countries, national statistics offices can provide this degree of objectivity and transparency. Elsewhere, academic, research, and public health institutions may be well placed to provide this function.

Landscaping the institutional context would serve as the foundation for decisionmaking regarding capacity-strengthening activities. The Global Fund and its partners should work with countries to develop institutional capacity-development plans for the health sector and subsequently invest in those plans. The specific areas in which capacity building is required are as follows:

- Data compilation and storage: Bringing together for analytic purposes data generated by the national statistics office, Ministries of Health, researchers, donors, development partners, funds, nongovernmental organizations (NGOs), and others
- Data processing: Including data editing and tabulation
- Data analysis and synthesis: Bringing together data from multiple sources for the purpose of health sector reviews and planning; policy analysis; country, regional, and global reporting; and evaluation
- Data quality assessment, validation, and adjustment: Independent assessment of the quality of data generated from sources such as clinical and administrative sources and ad hoc surveys
- Estimation and statistical modeling: Application of global standards, tools, and methods to correct for bias and missing values, generate estimates, and forecast for planning purposes, focusing on key statistics (e.g., child mortality, immunization coverage, HIV prevalence).

The Global Fund and its partners should also work together to provide a broad-based platform for evaluation and health systems surveillance. The goal is to improve the availability, quality, and use of the data needed to inform country health sector reviews and planning processes, and to monitor health-system performance. This should also inform all global monitoring processes. The platform should build upon existing national and international efforts to bring together data on health systems and specific programs. It ultimately should include a database; a repository of health information documents; dashboards to monitor progress; standards, tools, and methods for evaluation; and information on the country institutional capacity. The evaluation study tools, methods, and experiences are a key input for a model evaluation platform. The recently developed IHP+ common evaluation framework and related results frameworks (e.g., the framework

[7] A recent review of statistical capacity-building activities by the agencies of the United Nations system found that extensive support to statistical capacity building was directed toward data collection and processing for household surveys but noted that sector statistics (including health) appear to receive little support for capacity building.

developed for maternal and child health [MCH] in the context of the Catalytic Initiative) provide a good foundation for a well-integrated results-oriented approach. The use of the HMN framework aims to ensure that the full range of health information system issues is addressed.

The Global Fund should also consider supporting national cross-cutting monitoring and evaluation mechanisms. This provides a platform for governmental bodies, local academics, and civil society organizations to meet regularly with bilateral, United Nations, and large national NGOs to develop and implement national health information system plans.

3 HIV/AIDS

MAIN FINDINGS

3.1 GLOBAL CONTEXT

HIV continues to be a leading cause of ill health and mortality among adults in many countries, even though epidemic growth has halted for about a decade. Increases in international funding have been large, led by PEPFAR and the Global Fund.

According to UNAIDS and WHO, 2.7 million people were newly infected with HIV during 2007 and 2 million died from HIV-related causes, bringing the total number of people living with HIV to an estimated 33 million (uncertainty range 30.3-36.1 million).[8] Prevalence rates have been adjusted downward over the past few years as better data have become available. Current estimates indicate that adult HIV prevalence has leveled off at 0.8% since about 2000.

Global resource flows for HIV/AIDS have increased from US$1.4 billion in 2000 to an estimated US$10 billion in 2007, with two-thirds committed through bilateral and multilateral funding streams. During the periods 2003-2004 and 2005-2006, US$11 billion and US$17 billion, respectively, were disbursed. In other words, during the period 2003-2006, disbursements amounted to almost US$1,000 per person living with HIV/AIDS (PLWHA). PEPFAR and the Global Fund, and to a lesser extent the World Bank, accounted for a large part of the increase.

Increased funding for HIV programs in low- and middle-income countries is reflected in some signs of reductions in AIDS mortality and new infections, although progress appears uneven. The most dramatic progress has been reported for coverage of ART, which reached 31% by the end of 2007.[9]

3.2 FUNDING IN THE 18 EVALUATION STUDY COUNTRIES

HIV funding increased rapidly in the 18 evaluation study countries, with 18% coming from the Global Fund. There were differences in funding levels between countries and the relative predominance of HIV funding in national health spending.

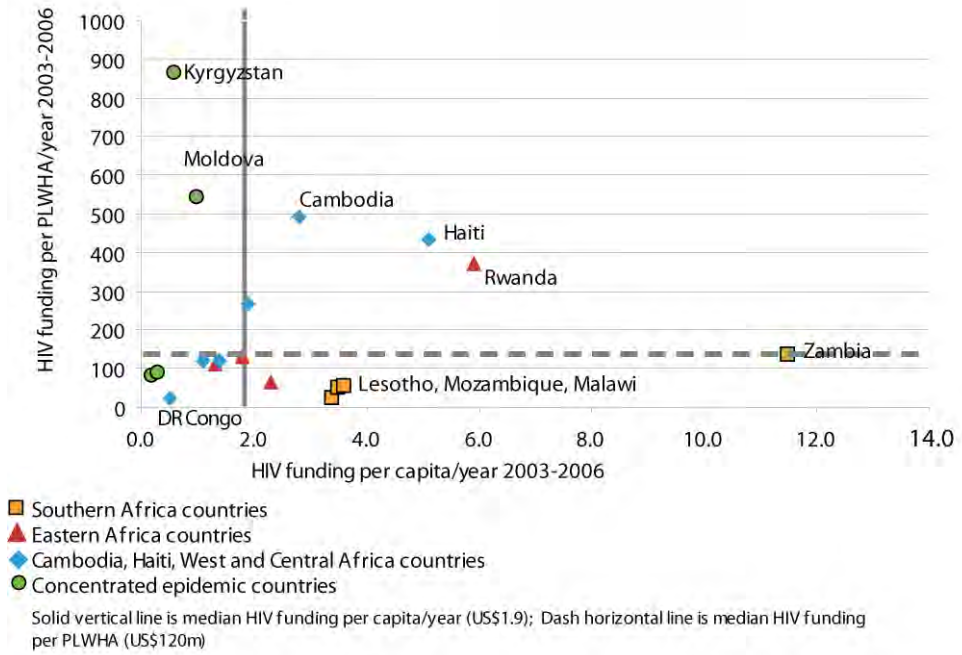
The 18 evaluation study countries are highly diverse in terms of the level and nature of the HIV epidemic. In the countries with generalized epidemics, there are major differences in adult prevalence, from 20% in Lesotho, 10% or higher in three countries in southern Africa, 6% in Tanzania, and below 3% in the remaining nine countries. Four countries have concentrated epidemics, with general adult prevalence consistently below 1%.

For the 18 countries, cumulative funding for HIV/AIDS from all sources during 2003-2006 amounted to about US$2.9 billion, or about 15% of the global total. Average funding over the period increased threefold, from US$350 million in 2003 to US$1 billion in 2006. Global Fund

[8] UNAIDS. 2008. Report on the global AIDS epidemic 2008. Geneva: UNAIDS.
[9] WHO, UNAIDS, and UNICEF. 2008. Towards universal access: Scaling up priority HIV/AIDS interventions in the health sector. Geneva: WHO Press.

disbursements to the 18 countries during 2003-2006 amounted to US$556 million (18% of total). The Global Fund was the largest donor in five of the 18 countries. PEPFAR's share of total funding was 28%, and it was a larger donor than the Global Fund in its six focus countries and seven other countries.

Figure 2
External HIV Funding (Constant 2006 US$) per PLWHA and per Capita, 2003-06 (Annual Average), by Country



Per capita funding increased in all countries but at markedly different paces and levels. Some countries received considerably more per capita funding than others with similar epidemic and regional profiles. Figure 2 shows the external HIV funding levels per capita and per PLWHA. Zambia received by far the highest amount per capita (US$11 per capita per year for the period 2003-2006, in constant 2006 US$), but because of the size of its epidemic, it did not receive more than other countries in terms of funding per PLWHA. The other countries in southern Africa, however, received considerably less external funding, which puts them at the lower end in terms of funding per PLWHA. Some countries such as DR Congo received little funding by all accounts, while Rwanda, Haiti, and Cambodia received the highest amounts per capita and per PLWHA. Some countries with concentrated epidemics (Kyrgyzstan and Moldova) received large amounts compared with the numbers of people living with HIV (more than US$500 per PLWHA), with a significant share going to prevention among most at-risk populations.

In the 18 evaluation study countries, prevention, treatment, and care each accounted for approximately 30% to 40% of total spending on HIV/AIDS, but data quality is considered to be poor. Virtually no country has accurate data on spending by type of preventive intervention, such as interventions directed at most at-risk populations. In the four countries with National Health Account (NHA) studies in 2003 and 2006, HIV-specific expenditures increased substantially and more rapidly than for other diseases. More details can be found in section 6.2 on health systems.

3.3 Access to and Readiness of Services

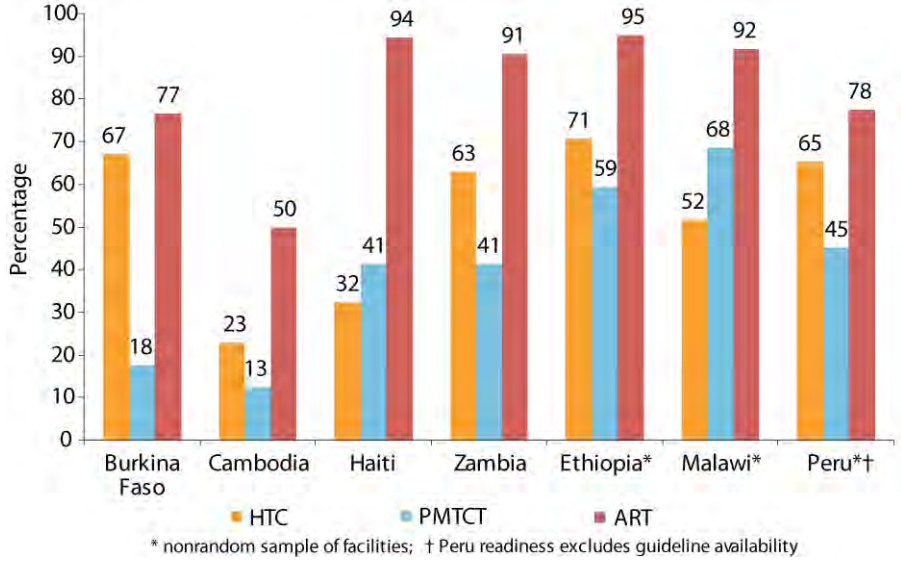
There has been a major expansion in access to services in all countries. However, district facility assessments in seven countries show that gaps in basic requirements such as trained personnel, guidelines, medicines, and equipment need to be addressed in order to ensure the provision of quality services.

The number of sites delivering HIV interventions has increased dramatically in all evaluation study countries this decade and especially since 2004. In most countries, the number of facilities that provide HIV testing and counseling or ART more than doubled between 2004 and 2007. PMTCT is now offered in at least one-quarter of all health facilities, even though the number of sites per 1,000 pregnant women remains below 1 in all countries, except Zambia (2.2 per 1,000). In virtually all countries, the location of sites vis-à-vis the location of people in need of treatment shows a deficit in rural areas, although this is beginning to change as programs scale up. This imbalance also reflects the fact that the epidemic is more urban than rural in most countries.

In the seven countries with a District Comprehensive Assessment (DCA) Facility Assessment, 1,939 public and private health facilities were visited. Overall, 20% to 60% of facilities offered HIV testing and counseling services, 5% to 45% PMTCT, and 5% to 40% ART. These figures are higher than would be observed in a random sample of facilities because Ethiopia, Malawi, and Peru purposefully selected specific facilities to survey, most of them in urban areas.

In the four countries that conducted a full DCA Facility Census in selected districts, the readiness of facilities to provide quality HIV services was fairly good. For instance, among the facilities that offered PMTCT, 84% (Burkina Faso) to 100% (Cambodia) had nevirapine or AZT in stock. Among the facilities offering ART, almost all had adequate drug supplies for first line combination therapy. However, taking together the presence of trained staff, guidelines, diagnostic equipment (HIV test), and medicines for the respective services, there is still considerable area for improvement (see Figure 3).

Figure 3
Percentage of Surveyed Health Facilities that Offer Specific HIV Services that Meet Basic Requirements for HIV Testing and Counseling (HTC), PMTCT, and ART, by Country, 2008



Basic requirements taken into account: HTC-trained staff, guidelines, and any HIV test; PMTCT-trained staff, guidelines, any HIV test, and NVP or AZT; and ART—at least one of the main WHO-recommended first-line therapy drug regimen in stock.
Source: DCA Facility Census and DCA Facility Survey 2008

The increase in funding has resulted in a wide array of home-based care and support activities, interventions aimed at prevention or care, and programs to support orphans and vulnerable children, often provided through civil society organizations. Record reviews and community surveys in selected countries indicated a large number of activities, although it was impossible to translate this into measures of access and quality.

3.4 Coverage of Interventions

There have been dramatic increases in estimated coverage of ART and, to a lesser extent, in HIV testing and counseling and PMTCT. In several instances, these increases tend to be larger in countries with higher levels of external funding.

According to country reports on availability of HIV testing and counseling, in most countries utilization among adults has at least doubled since 2004, as has the provision of PMTCT to pregnant women. Some countries, such as Lesotho and Tanzania, have used campaign-style approaches to mobilize large numbers of people to be counseled and tested with varying success. Recent national surveys and the 2008 DCA surveys also indicate substantial increases in the uptake of HIV testing and counseling.

ART coverage has also improved significantly in all evaluation study countries. Countries with the most rapid increases in coverage between 2004 and 2007 are Cambodia, Moldova, Rwanda, Tanzania, and Zambia, including most countries with relatively larger levels of external funding. Cambodia had the highest estimated coverage in 2007 (67%), followed by Moldova (58%) and Rwanda, Benin, Haiti, and Zambia (41% to 48%).

Rural-urban differences, however, remain large in most countries, with intervention coverage in urban areas at least twice as high as rural areas. Rural-urban differences may gradually narrow, but

there are still major discrepancies between urban and rural availability of counseling and testing sites and ART coverage.

Differences by level of education, for example, in HIV testing and counseling, tend to be even larger than rural-urban differences, indicating the clear need to target people with lower levels of education. There is some evidence (from Tanzania and Zambia) that coverage differences by educational level can be reduced over time as services expand.

Information about coverage of community-based care for PLWHA is limited. Findings from the DCA Household Surveys in four countries with generalized epidemics show that only 10% or fewer households received any form of assistance during the period preceding a recent adult death. In general, it is difficult to gauge either the coverage or the outputs of the large numbers of civil society organizations and multisectoral activities in HIV prevention, care, and treatment. Better measures to monitor the impact of such programs are needed. These should be part of special operational research studies, given the wide variety of interventions and the difficulties in measuring exposure to and intensity of interventions.

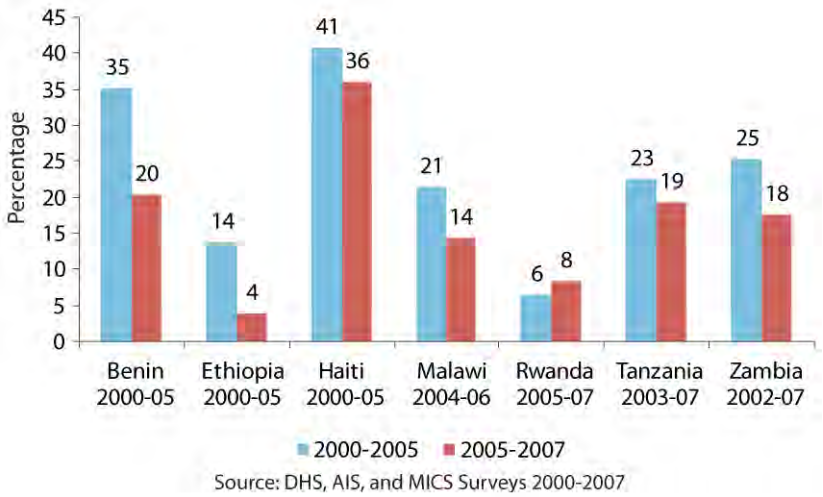
In terms of program coverage aimed at most at-risk populations, the lack of comparable estimates for these populations, often from small-scale studies, leads to ambiguous trend information for the bigger picture. Difficulties in identifying and enumerating these populations result in questionable denominators and, therefore, large uncertainties in the precision of estimates. However, a qualitative judgment on available data from some countries leads to the conclusion that condom distribution has improved among sex workers and men who have sex with men in Cambodia and Peru, respectively, and significant progress in clean needle exchange programs has been made in Kyrgyzstan and Moldova.

3.5 Risk Behaviors

National surveys show reductions in HIV high-risk behaviors among men in the general population in most countries since 2000, with two countries for which data are available providing evidence of changes after scaling up (2003). There is little evidence of large-scale changes in behaviors among most at-risk populations (primarily due to a lack of comparable representative data to allow for an examination of trends).

Population-level changes in risk behaviors could result from a wide array of interventions. Household surveys in countries with two surveys within the last decade show consistent evidence of a modest decrease in higher risk sexual behavior, some of which took place before scaling up and some, possibly, after the scale up (notably in Tanzania and Zambia) (see Figure 4). The only exception is Rwanda, which already had much lower levels of reported higher risk behavior than the other countries.

Figure 4
Percentage of Men who Had a Nonregular Partner in the Last Year and Did Not Use a Condom at the Last Sex with Such a Partner, Selected Countries, 2000-2007



Source: DHS, AIS, and MICS Surveys 2000-2007

Comparable data on exposure to interventions and risk behaviors in most at-risk populations, such as sex workers, men who have sex with men, and injecting drug users, are too limited to evaluate progress in most countries, with the exception of special studies in Vietnam conducted as part of donor-driven projects.

3.6 HIV Transmission and Mortality while on ART

Some countries show evidence of a possible decline in HIV incidence rates among young people, while survival data among people on ART are generally impressive.

Only a few countries have recent data on HIV prevalence, either from surveillance or household surveys, that allow for an assessment of before and after 2003 trends. An assessment of the trends among young people, supported by mathematical modeling with HIV prevalence and sexual behavior trend data, shows that three countries offer evidence suggestive of a decline since 2003. Malawi antenatal clinic surveillance data show a decline since 2003 that continued in 2007. In Tanzania, population-based surveys in 2003 and 2007, supported by antenatal clinic surveillance data, show evidence of a decline in HIV incidence since 2003. In Zambia, after taking the large number of people on ART into account, there may have been a modest decline in HIV incidence during 2003-2007. In addition, three countries (Benin, Ethiopia, and Rwanda) probably experienced declines in incidence, but these mostly started before the scale-up period.

For countries reporting treatment outcomes since 2004, results suggest good retention rates in the first year. Survival rates are only available from special follow-up studies, which generally show relatively high early mortality but overall good survival rates 12 months after treatment initiation. Although most countries reported the percentage lost to follow-up and deaths to be less than 8% in the first 12 months, it is possible that this is too optimistic a scenario that does not adequately reflect the extent of missing data or early mortality due to delayed initiation of treatment.

The most dramatic effect of scaling up has been the large increase in years of life due to ART. The evidence of the effect of scaling up prevention efforts is still fairly limited but can be examined better in the future when more data become available and interventions expand their reach. There

are no sound representative data on trends in new HIV infections in most at-risk populations. Some projects report successful interventions, but these are mainly in small-scale research studies. The number of infections averted due to mother-to-child transmission is still small because coverage of the intervention has been low until recently.

3.7 From Inputs to Results

Increased funding has led to better access to care, including rapid increases in intervention uptake and notable survival benefits through ART. Evidence of changes in HIV transmission is limited, mainly due to a lack of data, the complexity of the epidemiology, and the early timing of the evaluation study.

There are strong associations between the volume of external HIV resources becoming available during 2003-2006 and the number of service points established and the number of clients who received services. For all three interventions examined, the number of service sites and the number of people receiving the intervention increased in parallel with increases in HIV funding, although rural and less-educated populations tended to benefit less. The DCA Facility and Household Survey data provided evidence that districts with higher service availability had higher HIV testing and coverage rates among pregnant women and adults in general than districts with lower service availability. In general, the readiness of facilities—mostly public sector—to provide HIV services for ART and, to a lesser extent, for HIV testing and counseling and PMTCT is fairly good in terms of trained staff, availability of guidelines, diagnostic tests, and availability of medicines.

The extent to which interventions in the health and other sectors have resulted in behavioral and biological changes is difficult to gauge in most countries, despite improvements in data collection. In several countries, changes in general population risk behaviors appear to have taken place, and in some of those countries these appeared to occur after 2003. There is no widespread evidence of changes in behavior among most at-risk populations, in part because measures regarding these populations are methodologically challenging and uncertain.

Modeling showed that the proportion of infections averted due to PMTCT remained low in the 18 evaluation study countries but increased from less 1% in 2003 to 4.2% in 2007. The number of adult life years added due to ART increased rapidly from just 6,607 in 2003 to 576,438 in 2007 in the 18 countries.

The number of infections averted through scaling up from 2003 to 2004 is difficult to estimate because, in the absence of data for 2007-2008, the numbers heavily depend on projecting the past trends, which is not useful for evaluation purposes. In terms of impact, changes in HIV transmission are difficult to measure, and there are multiple epidemiological factors that play a role. Few countries, however, showed evidence of decreased transmission.

RECOMMENDATIONS

Recommendation 3.1 Strengthening prevention programs

The Global Fund and its partners should reinforce prevention strategies tailored to the type of epidemic and local context and focus on the most cost-effective interventions. The Global

Fund needs to ensure that the most effective set of preventive strategies are funded given the type of epidemic and local context, accompanied by appropriate investment in measuring results.

In some countries with data there is evidence of positive changes in risk behaviors and reduced HIV transmission since scaling up. It is impossible to conclude at this point whether much more could have been achieved, given the large investments in HIV prevention relative to other diseases. There is an inevitable time lag between a prevention intervention and the anticipated behavioral change, and between a behavior change and the ultimate impact on HIV transmission. It is also possible that the particular mix of prevention interventions or their implementation have been suboptimal and not sufficiently well tailored to the type of epidemic and the local context. These questions can only be answered through in-depth research studies.

Prevention programs supported by the Global Fund (and its partners) have been characterized by a rather diffuse set of interventions with only limited strategic focus on the type and course of the epidemic and the local context. For instance, countries with concentrated epidemics may receive the bulk of their funding for general interventions for AIDS and sex education for young people. The results have been difficult to document, even of exposure to interventions. In the few areas where it is possible to document the outcomes of interventions (e.g., the proportion of the adult population who know their HIV status or the prevalence of unprotected sexual intercourse with a higher risk partner), there is evidence of only gradual progress.

PMTCT in many countries has only recently started to scale up, but the integration with general maternity care services still needs considerable expansion of scope. Monitoring systems remain fragmented and not integrated with other reporting systems.

The Global Fund and its partners' support to prevention efforts needs to become more results-oriented and find new ways to ensure that investments target the most cost-effective prevention strategies and that they are supported by solid monitoring and evaluation activities, including operations research. Currently, large amounts of money are distributed to large numbers of subrecipients with unclear impact.

Recommendation 3.2 Predictable funding and treatment

The Global Fund and its partners should provide predictable funding and support to reliable antiretroviral drug supply and distribution systems in order to build upon and expand treatment-related investments in rural and most at-risk populations.

Virtually all countries launched treatment programs that have been highly successful, but there remains considerable area for improvement, in terms of both access to and quality of services. Ensuring access to all in need will require increasing resources, even though it appears that currently, in most countries, ART programs consume a relatively small share of the overall HIV budget, either because ART results in savings through lower hospital admissions or due to home-based care. In terms of quality, although availability of trained staff and treatment guidelines is fairly good, further efforts are needed to ensure that treatment sites have the necessary basic medicines and supplies.

Expanding ART coverage to the two-thirds of people who live with advanced HIV infection will require a systematic and sustainable approach. The majority of people who are not on ART live in

rural areas or are part of marginalized populations. The expansion of ART coverage to rural populations will require much greater attention to the HSS component of HIV programs. Similarly, enhancing treatment access to most at-risk populations will be needed, and the lack of information on the current situation affects the ability to plan the right interventions. An important challenge will be to manage the unprecedented increases in the numbers of people receiving ongoing care in ART programs, especially in countries with HIV prevalence rates of more than 3%. This requires stable financing to provide and maintain reliable systems for the procurement of medicines, patient monitoring, record keeping, and follow-up.

4 TUBERCULOSIS

MAIN FINDINGS

4.1 GLOBAL CONTEXT

Strengthening of the existing Directly Observed Treatment, Short Course (DOTS) strategy is the focus of scaling up, with steady progress on treatment outcomes.

WHO estimates that in 2006 there were 9.2 million new cases of TB and 1.5 million deaths from TB, in addition to 0.2 million TB deaths among persons co-infected with HIV (TB/HIV).[10] The number of estimated new cases per year worldwide has been increasing due mainly to population growth, but the global incidence rate has declined annually since 2003. TB prevalence in 2006 was estimated to be 14.4 million persons. Estimated global prevalence has declined since 1990, reflecting a range of factors, including declining incidence rates, improved case detection, and cure, but also reduced survival in some regions relating to TB/HIV. In Africa, TB incidence and prevalence are estimated to be three times higher than global incidence and prevalence rates.

The emphasis of global TB control efforts has been on scaling up existing DOTS programs to promote early diagnosis of active TB and attain high rates of successful treatment while also addressing specific challenges such as TB/HIV and multidrug-resistant TB (MDR-TB). Progress toward international treatment outcome targets is steady. In 2006, WHO estimated that the case detection rate for new smear-positive cases was 61% (target 2015: 70%), and the treatment success rates achieved its 85% target in 2006-2007.

Globally, funding for TB more than doubled during 2003-2006 and reached US$3.3 billion in 2008 among 86 countries reporting to WHO. National governments are the main funders of TB control programs. The Global Fund is the predominant source of external funding in HBCs and, with a disbursement of US$1 billion during 2003-2006, was responsible for nearly all of the increase in funding over this period.

4.2 FUNDING

Expenditures on TB increased in only half of the countries, and the Global Fund is responsible for 61% of external funding, with considerable variation between countries.

Overall, US$215 million was disbursed by the major funders to the 18 evaluation study countries during 2003-2006, with 61% from the Global Fund. The Global Fund is the key external funder in some countries and is non-existent in others. A comparison of expenditures on TB between 2003-2004 and 2005-2006 shows an increase in just half of the 18 evaluation study countries, including a doubling in four countries.

[10] World Health Organization. 2008. Global tuberculosis control 2008: Surveillance, planning, financing. Geneva: WHO.

Four countries conducted a National Health Account study for 2003 and 2006. In two countries—Malawi and Zambia—per capita expenditure on TB decreased from 2003 to 2006 by at least one-third because of reductions in expenditures by the government (both countries) and from external sources (Malawi). Only Burkina Faso observed an increase from $0.1 to $0.8 per capita, entirely due to an increase in externally funded expenditures; there was no change in Tanzania.

For most of the 18 evaluation study countries, per capita TB funding in 2006 was below Int$1. The median for the 18 countries was Int$0.30 per capita and Int$273 per treated case.

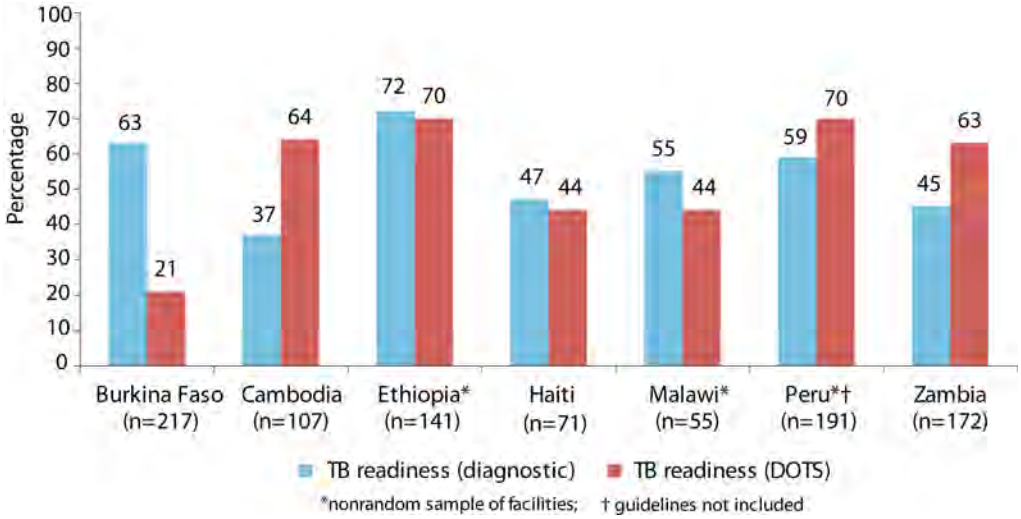
4.3 Access, Quality, and Coverage of Services

There is widespread access to TB services, although there are no major increases since scaling up, and there is considerable scope for improving the quality of diagnostic and treatment services.

There was no clear trend in levels of access to TB services, as measured by facility density. Since 2003, the number of facilities providing TB services per population in 2007 had increased by at least 10% in six countries, decreased by at least 10% in one, and remained about the same in the other six of 13 countries that provided trend data. A similar pattern was observed for the five years preceding 2003.

The DCA Facility Assessments in the seven evaluation study countries showed deficiencies in diagnostic and treatment readiness of health facilities, affecting the quality of care. Public facilities scored better than private facilities in all countries. The availability of diagnostic equipment and materials in facilities that offer TB sputum tests ranged from 54% to 91% (median: 77%), and 27% to 53% (median: 40%) were able to offer same-day results. Figure 5 shows the readiness for diagnosis of TB (at least one staff trained in diagnosis and management of TB, guidelines available, and TB sputum test available [not necessarily observed]) among facilities that report to offer TB diagnosis, and for DOTS of TB (trained staff, guidelines, and essential drugs [INH, rifampicin, ethambutol, and pyrazinamide]) among facilities that report to offer TB treatment.

Figure 5
Percentage of Surveyed Health Facilities that Offer TB Services that Meet Basic Requirements of Service Readiness for the Diagnosis and Treatment (DOTS) of TB, by Country, 2008



Service readiness is defined as at least one trained personnel, guidelines, TB sputum test (for facilities reporting to have sputum diagnostic services), and availability of four basic TB drugs, including ethambutol, isoniazid, pyrazinamide, and rifampicin (for facilities reporting to provide DOTS).
Source: DCA Facility Census or DCA Facility Survey 2008

TB treatment success rates are another indicator of the quality of care. In general, the country-reported data were found to accurately reflect district records, although discrepancies were observed between country records and global numbers in six countries. There is no evidence of an acceleration of the treatment success rate from 2003. Provincial data from 15 countries showed that four countries have made significant progress in reducing geographic disparities in treatment outcomes: Benin, Cambodia, Moldova, and Rwanda.

Coverage estimates for TB interventions—notably TB case detection rates—depend heavily on assumptions, as most countries have no direct measures of the denominator, the incidence rate of smear-positive TB. The level of diagnostic effort through smear microscopy can be used to monitor the strength of the program in terms of its ability to detect cases—and to adjust TB notification rates. Only one-third of the 18 countries were able to provide data on the number of TB suspects examined by smear, which showed large differences between countries (Peru was four times higher than other countries) and an increase since 2001 in some countries.

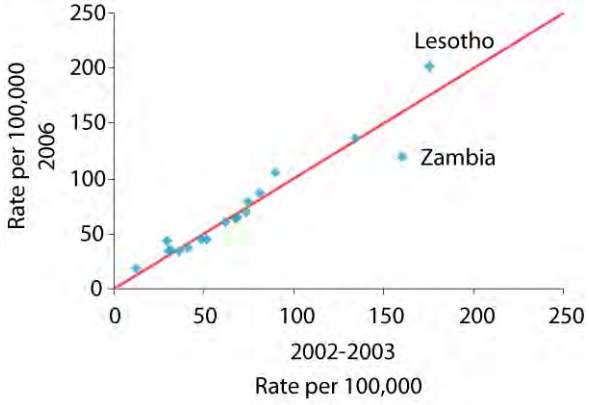
4.4 Disease Burden

TB notification rates are stable or declining in several countries, but the required supporting data on diagnostic intensity are often lacking.

Direct data on disease burden are relatively uncommon in HBCs. TB mortality data are not available because no death registration systems exist, except in Kyrgyzstan and Moldova. TB population prevalence data were only available from one country (Cambodia in 2002), where the prevalence of smear-positive TB was 3.2 times higher than the observed case notification rate, implying that slightly more than half of patients are diagnosed within two years of the onset of active disease. Such surveys with biological and clinical data collection are rarely conducted because they require large sample sizes.

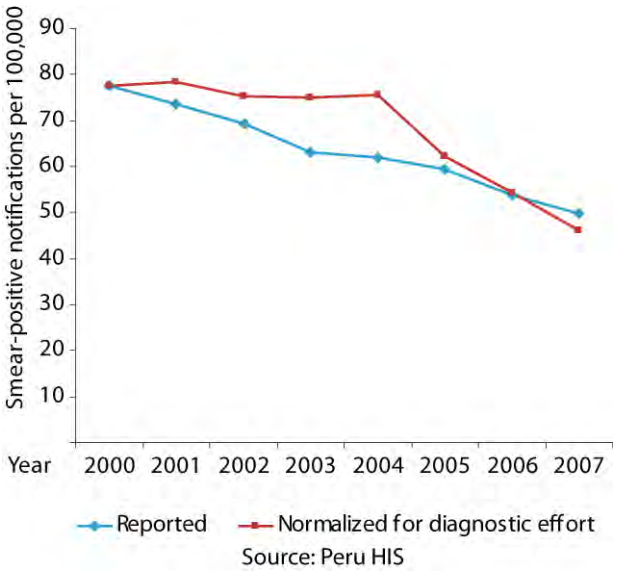
Smear-positive TB case notifications are an uncertain source of information on the disease burden because the extent to which cases are successfully detected by the system tends to vary between countries and over time. Comparing 2003 and 2006, most countries had minimal changes except for Lesotho (8% increase) and Zambia (30% decrease) (see Figure 6). Subnational variation in TB notification rates was reduced in Rwanda and to a lesser extent in Peru, but it increased in Burkina Faso, Haiti, and Malawi. Trends in case notification rates in the absence of complete detection, however, offer ambiguous information about underlying epidemiologic trends, as they may reflect a range of factors, including levels of diagnostic effort, types and quality of reporting systems, and care-seeking behavior of people with TB, which may not be constant over time.

Figure 6
TB Notification rate per 100,000 Population, 2002-2003 and 2006



In the evaluation study notification rates adjusted for diagnostic efforts were used as a proxy for disease burden. However, efforts to use diagnostic intensity as an indicator to adjust for program strength with data from six countries produced variable results. Peru data produced the most convincing evidence that this method is very useful, whereas data from Cambodia and Zambia lead to large and less plausible adjustments (see Figure 7).

Figure 7
New Smear-positive Cases per 100,000 Notified in Peru, 2000-2007, Before and After Adjusting for Trends in Diagnostic Intensity



Among the 18 evaluation study countries, a total of 1.2 million smear-positive cases were registered between 2003 and 2006. The estimated actual number of deaths among smear-positive patients treated under DOTS ranged between 106,000 and 138,000 in these countries. The number of deaths averted through DOTS compared with a non-DOTS regime is estimated to range from nearly 150,000 to up to 700,000. These figures correspond to between 4.5 million and 21.4 million life-years gained. In these ranges, the lower numbers are likely to be closer to the true values because prior analyses of trends in estimated case detection have suggested that most patients recruited under DOTS would likely have been detected and treated anyway in the public health system.

4.5 From Inputs to Results

Positive trends in treatment success rates have continued in most countries, but there is little evidence of accelerated progress since 2003 and no clear association with funding levels and trends.

The financial data from the evaluation study countries suggest substantial increases in TB funding in some countries and no overall major increases in funding in others, with an increasing share of funding from the Global Fund. There is limited evidence from the evaluation study countries that increased international funding for TB since 2003 has led to an acceleration of progress in access to and quality of TB services. Data limitations also preclude any clear evidence of marked changes in TB incidence and prevalence since 2003. The clearest indication of progress appears to be the continuation of the positive trends in many countries in treatment success rates, although variation in treatment outcomes across the countries examined in this study appears to relate in large part to factors other than financial resources.

RECOMMENDATIONS

Recommendation 4.1 Predictable funding for TB programs

The Global Fund, as the most important donor of TB control programs at present, needs to find ways to ensure predictable multiyear funding to maintain quality programs, as other donors appear to have increasingly channeled their funding through the Global Fund.

The Global Fund has become the major external donor of country TB control programs, with considerable variation between countries, responsible for more than half of international funding during 2003-2006. The role of external funding is particularly large in African countries—in five of 11 evaluation study countries in Africa, the Global Fund is the sole external donor. This evaluation study provides only modest evidence that increased funding in TB since 2002-2003 has led to an acceleration in treatment success rates or other indicators. The question of whether a major part of the additional funding is needed to address specific challenges (MDR-TB and TB/HIV) was not addressed in this evaluation study.

There are, however, several positive patterns observed in this study: (1) increases in diagnostic effort in most countries, (2) increases in diagnostic facilities in some countries, (3) satisfactory or improving treatment outcomes in most countries, and (4) substantial numbers of averted deaths. In terms of epidemiologic impact, we find that despite increased diagnostic effort, the overall picture shows little increase in case notifications. This suggests that TB incidence may be relatively stable or declining overall. However, it is important to emphasize that the 18 countries participating in the present study are not a representative sample of the high TB prevalence countries, as they already benefit from well-established programs, so the overall findings must be interpreted in this light.

5 MALARIA

MAIN FINDINGS

5.1 GLOBAL CONTEXT

A high disease burden has existed in Africa and parts of Asia with little progress for decades, but a new focused intervention strategy shows encouraging signs for successfully combating the disease.

The burden of malaria, especially in regards to malaria mortality, is largely confined to countries in Sub-Saharan Africa. Of the estimated 250 million cases,[11] approximately 70% occur in Africa, with another 20% to 25% in countries in South Asia.[12] Malaria deaths, estimated at 900,000 worldwide in 2006, are even more concentrated in countries in Sub-Saharan Africa, with 800,000 deaths occurring among children under the age of five in countries of that region.[13] The estimated rate of malaria cases and deaths has remained largely constant since the 1980s in most countries, but in recent years there have been signs of improvement from several countries derived from population-based surveys or health-facility reporting.

In recent years, most countries have adopted the WHO-recommended intervention strategy that, depending on the epidemiological context, includes new and old interventions: the use of indoor residual spraying (IRS) of DDT, promotion of long-lasting insecticide-treated bednets (ITNs), intermittent preventive therapy of pregnant women (IPTp) with sulfadoxine and pyrimethamine (SP), and treatment with artemisinin combination therapy (ACT). The time lag between policy changes and scaling up implementation are variable between countries and between the four interventions, but there is evidence from many countries that coverage has been increasing. However, major gaps still remain.

International funding for malaria increased rapidly from less than US$50 million in 2003 to more than US$700 million by 2006, with the Global Fund playing a major role, especially in the earlier years of scaling up. In 2006, Global Fund disbursements represented about 50% of total disbursements by the World Bank, the U.S. government, and the Global Fund.

5.2 FUNDING

There have been major increases in funding, led by the Global Fund, with large differences in levels of external funding between countries.

The 15 evaluation study countries with external funding for malaria received US$435 million during 2003-2006, of which 76% came from the Global Fund. During this period, for the 11 evaluation study countries with endemic malaria in Sub-Saharan Africa, commitments from the three biggest donors increased more than fivefold. Countries that received the highest amounts of

[11] The World Health Organization. 2008. World Malaria Report, 2008. Geneva: WHO.
[12] Based on work in Snow, R.W., C.A. Guerra, A.M. Noor, H.Y. Myint, and S.I. Hay. 2005. The global distribution of clinical episodes of Plasmodium falciparum malaria. Nature 434: 214-217.
[13] UNICEF and RBM. 2007. Malaria & children. New York: UNICEF.

external funding per person at risk for the period 2003-2006 were Rwanda (US$9 per person at risk for 2003-2006), Zambia ($4.5), Burundi ($4.4), and Ethiopia ($2.2). Several endemic countries received less than $1 per person at risk over the four-year period, including Burkina Faso, DR Congo, and Malawi.

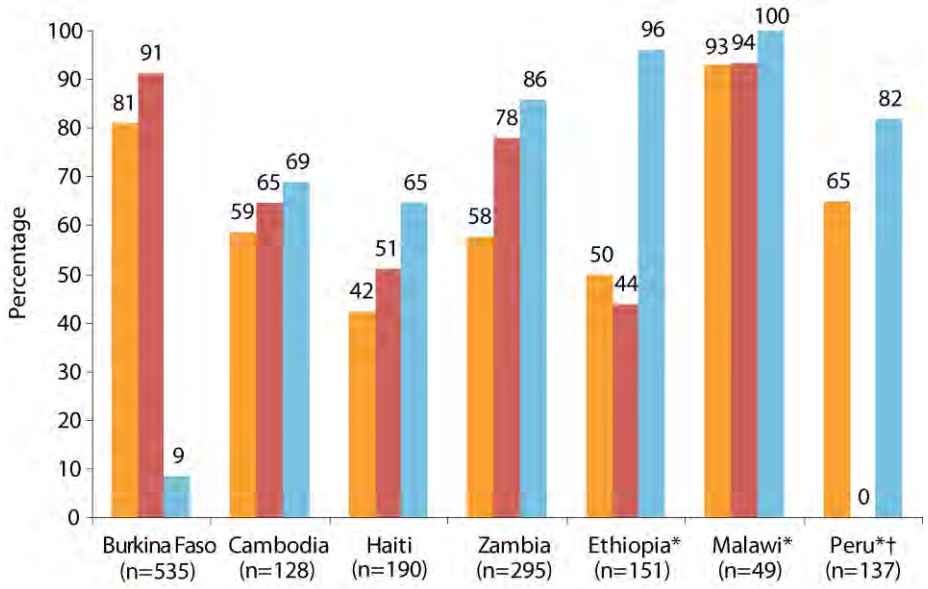
The five countries with 2006 NHA data show that malaria expenditures ranged from 9% (Burkina Faso) to 23% (Tanzania) of total health expenditures in the endemic countries and 4% in Haiti, which does not have endemic malaria. Out-of-pocket expenditures still account for the largest share for four of the five countries.

5.3 Access to and Quality of Services

Malaria diagnostic capacity remains suboptimal, and ACT availability is limited, except in Zambia and in large facilities in Ethiopia and Malawi.

The availability of key diagnostics and drugs in health facilities offering malaria interventions shows that there is considerable scope to improve access to quality services. The majority of facilities offer treatment services, but many lack diagnostic capacity through blood slide or rapid test (see Figure 8).

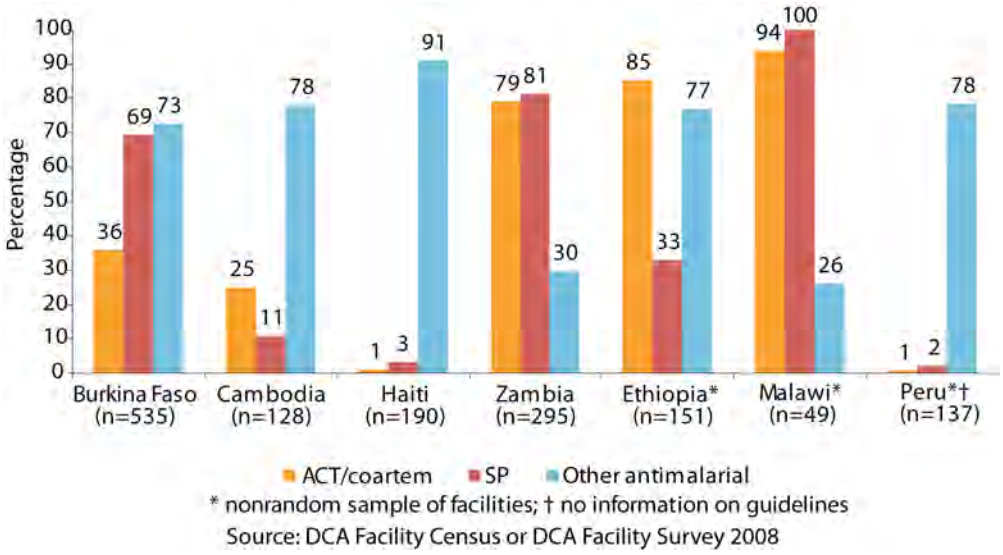
Figure 8
Percentage of Surveyed Health Facilities that Offer Malaria Services that Have Trained Staff, Guidelines, and Diagnostic Aids (Slide or Rapid Test), by Country, 2008



* nonrandom sample of facilities; † no information on guidelines
Source: DCA Facility Census or DCA Facility Survey 2008

ACT was available in 80% to 90% of selected facilities that offer malaria treatment services in Ethiopia, Malawi, and Zambia, but it is much less common in the other countries (see Figure 9). SP (Fansidar), which is used for intermittent preventive therapy during pregnancy, was found in the majority of clinics in Burkina Faso, Malawi, and Zambia but was uncommon in all other countries.

Figure 9
Percentage of Surveyed Health Facilities that Offer Malaria Services that Have ACT, SP (Fansidar), and Other Antimalarial, by Country, 2008



* nonrandom sample of facilities; † no information on guidelines
Source: DCA Facility Census or DCA Facility Survey 2008

5.4 Intervention Coverage

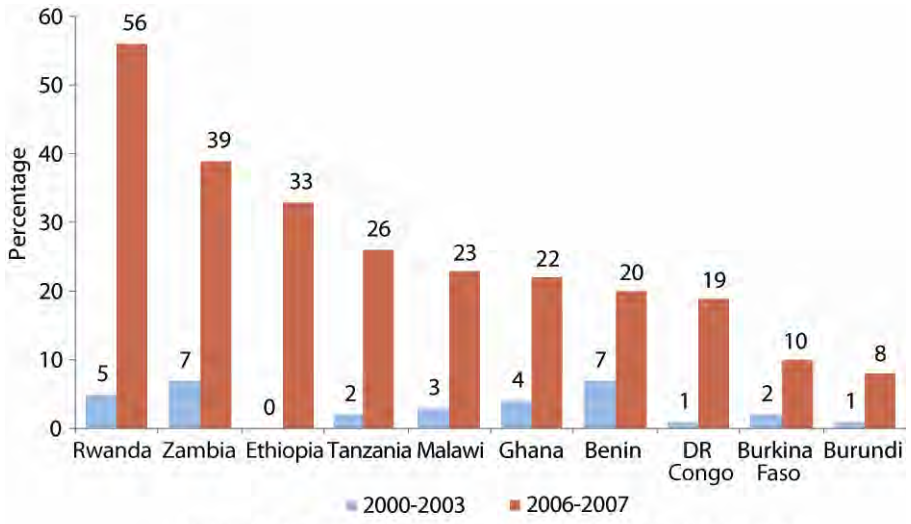
In all countries evaluated, major progress has been made in ITN and IPTp coverage and local improvements in IRS coverage. Progress in ACT treatment has been made in just one country.

The coverage of interventions has improved considerably in many countries in recent years:

- ITN: The most dramatic and widespread improvements are observed in the household ownership and use rates for ITNs. In all 10 evaluation study countries in Africa with survey data from 2003 or earlier and from 2006-2008, coverage of children sleeping under an ITN increased from well below 10% to on average one-fourth of children, ranging from a low of about 10% in Burkina Faso and Burundi to 56% in Rwanda (see Figure 10).

  One way to investigate the importance of Global Fund support is to look at the association between ITN distribution and Global Fund disbursements during the period 2003-2007. A simple correlation shows a significant association between these two measures (r = 0.69), suggesting a strong association between Global Fund support and ITN coverage.

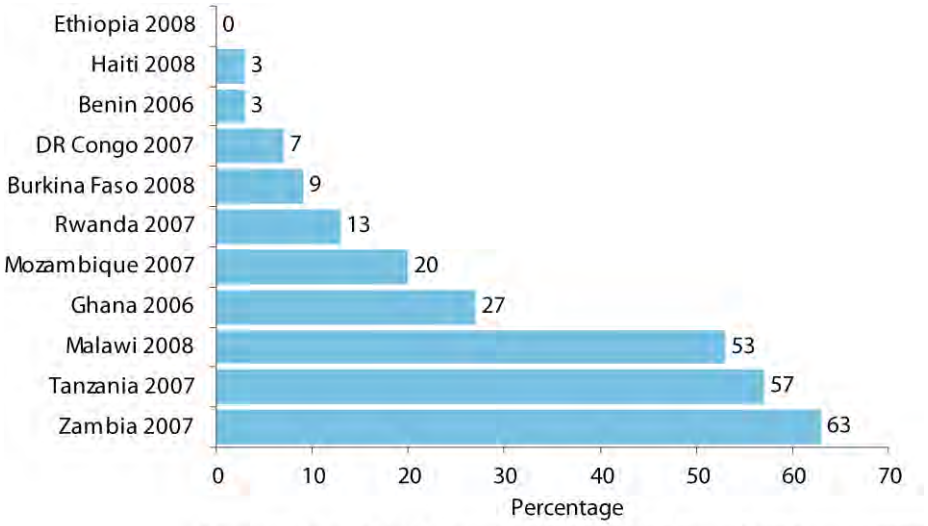
Figure 10
Percentage of Children under Five Years who Slept under an ITN during the Last Night, by Country, 2000-2007



Source: DHS, MICS, and MIS Surveys 2000-2003 and 2006-2007
(See Table 7-12 in main report for specific survey and year.)

- IPTp: Though limited to only some countries, the second most successful scale up concerns IPTp. Countries with trend data have shown upward trends in coverage, and three countries—Malawi, Tanzania, and Zambia—had coverage rates of 45%, 57%, and 63%, respectively, at the time of their most recent survey (see Figure 11). Given that IPTp is a new intervention (coverage of a single dose of SP in Zambia was 1% in 2001), the current levels of coverage in these three countries are an impressive success story, much like ITNs. In several countries, however, IPTp scale up has been less successful, with coverage below 10%, including several west and central African countries with high levels of transmission.

Figure 11
Percentage of Women who Gave Birth in the Last Two Years and who Received Two Doses of SP during Antenatal Care, by Country, 2006-2008



Source: DHS and MICS Surveys 2006-2007, DCA Household Surveys 2008

- IRS: Indoor residual spraying is the intervention that shows the greatest difference among evaluation study countries. While only five of the malaria-endemic countries have some policy promoting IRS, those countries have rapidly scaled up their use of IRS. In fact, in Mozambique, Tanzania (Zanzibar), and Zambia, IRS coverage is quite high and plays a major role in the number of lives saved in those countries. For example, in Mozambique, the estimated number of protected households, which includes the use of nets or IRS, results in an estimated 15,332 deaths averted, most due to IRS. Likewise in a model for Zanzibar alone (excluding mainland Tanzania), it was estimated that by 2006 more than 400 malaria deaths had been averted, approximately a 90% reduction in the estimated malaria deaths in Zanzibar among children under the age of five.
- Treatment of children with fever: The findings related to ACT are the most perplexing and worrisome of the four primary malaria interventions because they show the least improvement. While there are data showing that most countries have purchased large amounts of ACT, there is little or no evidence of a corresponding increase in the use of ACT for treatment of children. A notable exception is Zambia, where 13% of children who were treated for fever were reported to have been treated with ACT in 2006. No other country showed coverage of ACT above 5%. This may partly be affected by bias in the mother's recall of specific drugs. The low levels of coverage of ACT may also be because of the lag between financial disbursements, purchasing, and distribution of drugs, and the use of those drugs being reported correctly in surveys. If this is the case, new surveys should clearly show large increases in ACT coverage for 2008-2009. Another troubling issue with ACT has been the general lack of improvement in treatment (in most countries) by any measure. There is also little evidence that more children receive antimalarial treatment for fever now than five or seven years ago or that the services at the clinics have substantially improved.

5.5 Disease Burden

Among countries with parasite prevalence data, a few countries provide evidence of reductions in parasite prevalence and a potential decline in malaria-attributed child mortality.

There is some evidence of changes in disease burden—

- Zambia had two national surveys in the last three years with biomarkers and observed a modest decline in parasite prevalence among children under five years. Zanzibar research data showed a large decline during the past few years.
- Rwanda and Zambia survey data also suggest substantial declines in under-five mortality between the two most recent surveys (declines of 38% and 29%, respectively), and the decline is more pronounced after the neonatal period when malaria is a more important cause of death, suggesting that malaria interventions have contributed to this improvement.
- Data from selected health facilities suggest that in Rwanda and Zambia the numbers of in-patient cases and deaths are falling, but more rigorous studies are needed. The most convincing evidence is based on sentinel hospitals and research in Zanzibar, which indicate a large decline in the numbers of inpatient cases and deaths starting from about 2004.

- There is no evidence of a decline in severe anemia among children, albeit a less specific indicator of malaria burden, in the six countries with two surveys.
- Modeling with the coverage of the interventions as the main input for 11 evaluation study countries indicates that 110,000 lives were saved by ITN use and 24,000 by IPTp. The model also indicates that a significant part of this positive effect may have been offset by children with malaria getting less treatment in DR Congo, where there were an additional 90,000 deaths.
- In the six countries with severe childhood anemia measured in two representative population-based surveys (Benin, Ethiopia, Haiti, Rwanda, Tanzania, and Zambia), the only country where there was a significant drop was Zambia.

5.6 From Inputs to Results

Coverage of new interventions has increased rapidly in many countries, mainly supported by the Global Fund in its initial years and multiple actors in more recent years, and has had a demonstrated health impact in a few countries.

Rapid increases in funding for malaria, along with a selected set of effective interventions, have resulted in significant increases in intervention coverage and initial signs of health impact in some countries. Countries with the larger influx of external resources—the eastern African countries of Malawi, Rwanda, Tanzania, and Zambia—have been able to scale up interventions at an impressive pace and much faster than those with low levels of investment such as Burkina Faso, DR Congo, and Ghana. During 2003-2006, the Global Fund was the primary donor that made these positive developments possible, especially in earlier years.

One of the things that this evaluation study was not able to do effectively was document the impact of other contextual variables that may have had an effect on the ability of countries to apply for and successfully use funds from the Global Fund to implement programs in malaria control. However, a strong case can be made that a critical factor in the success of the Global Fund in addressing malaria was the launching of the Roll Back Malaria (RBM) Partnership in 1998.

In documenting the rapid scale up of ITN, IRS, and IPTp use in the malaria endemic countries in the evaluation study, it is clear that ITN scale up in particular has proceeded at a rapid pace. Part of the reason for the rapid gains in coverage (funded in large part by Global Fund grants) may be a result of the level of preparedness in countries due in part to the RBM Partnership.

Even though this interpretation is not well documented by the evaluation study, in discussing the findings from the analyses with various actors at the country and international levels, almost all mentioned the synergistic effects of RBM and the partner organizations, which worked with national programs to establish national policy and set a work agenda for malaria control, and the Global Fund, which provided much-needed funding to implement the national plans.

RECOMMENDATIONS

Recommendation 5.1 Potential for impact

Accelerating grants for malaria control should be a priority, given the encouraging initial results from several countries and from research, particularly focusing on countries where other donors are less active and Global Fund grants can catalyze major changes.

The Global Fund investments during 2003-2006 have had a catalytic effect on malaria programs in many countries with demonstrable results. New large international initiatives such as the President's Malaria Initiative and the World Bank have appeared on the scene or expanded their efforts. Initial evidence from selected countries indicates that the potential for short-term progress and health impact is large, and possibly larger than for scaling up other interventions. In many countries, the amount of funding for malaria increased dramatically after 2006, even for successful countries such as Zambia, in part through the Global Fund. This should lead to major improvements in the next few years. Therefore, sustained funding of malaria control programs should be a priority. On the other hand, with new sources of potential funding, it is imperative that partners and funding agencies coordinate and collaborate on providing contributions so that funding can be used in the most cost-effective manner.

The Global Fund and its partners should continue the scale up of all four key interventions and provide support for rapid diagnostic testing. It is difficult to pinpoint which interventions have been most effective as efforts are made to scale up all four. Evidence indicates that the achievement of high levels of coverage of ITN use, backed up by universal access to effective diagnoses using laboratory tests and treatment with ACT, is essential. This needs to be complemented by IPTp and IRS use. While scaling up ITN use currently appears to have been very successful in most countries and perhaps has the greatest potential for continued scale up and health impact, there is clearly a need to support continued efforts in the other three interventions. This is especially true in the area of diagnosis and treatment because there is less evidence of progress in this area. If transmission levels of malaria are brought down, and as ACT is increasingly employed as the first line of treatment, widespread use of rapid diagnostic testing should be promoted.

6 HEALTH SYSTEMS AND SCALING UP: THE CURRENT SITUATION

MAIN FINDINGS

6.1 GLOBAL CONTEXT

There is much interest in determining whether scaling up HIV prevention and treatment efforts in particular have had an effect, positive or negative, on health systems and on other disease programs, but current research has provided little conclusive evidence either way.

The Global Fund, PEPFAR, and other partners have instigated both significant increases in health funding and shifts in their composition. Health budgets have grown considerably since 2003, and HIV/AIDS now accounts for a much greater share of these budgets. These effects are particularly pronounced in HBCs.

Several studies have been conducted to assess the effects on the health system of scaling up interventions against the three diseases. In general, scaling up against HIV/AIDS has been the primary focus of these studies because of its high funding levels, the large numbers of people infected in several countries, and its potentially large impact on health service provision due to lifelong treatment programs. Scaling up efforts against TB and malaria have generally not given rise to similar concerns because they are perceived to be less likely to draw resources from equally or more important interventions against other diseases.

In practice, there is limited conclusive evidence as to the net effects of scaling up on health systems overall or on non-HIV/AIDS programs. This evaluation study was not designed to provide comprehensive documentation of the effects of scaling up. It focused on describing gaps in essential health service components at the district level and comparing developments in HIV-related activities with other, primarily MCH, interventions.

By its own estimates, in 2008 the Global Fund directed 35% of approximately US$4 billion of approved financing to key health systems elements.[14] In Round 5, the first HSS grants were awarded to three countries, of which only one, Cambodia, had actually received the funds by 2007. In Round 7, cross-cutting funding for HSS rose, with about US$186 million approved.

6.2 FUNDING

In most countries, total external funding directed to HIV has increased in both absolute and relative terms; funding for MCH has also increased in absolute terms.

In the evaluation study countries, total health expenditure per capita increased between 2003 and 2006 from a country median of Int$70 to Int$83. At the low end, Burundi, DR Congo, and

[14] Atun R. 2008. Capacity development: Using Global Fund grants to strengthen health systems. Presentation at the Global Partnership Forum, December 8-10, Dakar, Senegal.

Ethiopia had a total health expenditure in 2006 of Int$11, Int$12, and Int$27 per capita, respectively; at the high end, Peru had a health expenditure of Int$306 per capita.

In the 18 evaluation study countries, HIV-related external funding during 2003-2006 accounted for slightly more than 10% of total health expenditure. The share was more than 20% in six countries in eastern and southern Africa, with Burundi (49%, where total health expenditure per capita is very low) and Lesotho (7% only, relies less on external assistance) as outliers. A comparison of the increases in external funding for HIV with those for child and maternal health over the period 2003-2006 shows that increases for HIV-related programs were significantly greater (median 1.9 times greater, and 1.7 times greater excluding the three countries with no child health data) than increases for child (0.7) and for maternal (1.0) health.

There is little evidence that the increase in HIV/AIDS spending has been achieved at the expense of resources for other interventions. In most countries, resources for child, maternal, and neonatal health have also grown during 2003-2006, though not at the pace of HIV/AIDS resources.

NHA studies with subaccounts conducted in 2008 in Burkina Faso, Malawi, Tanzania, and Zambia show that between 2003 and 2006, total health expenditure increased in all four countries (the Haiti NHA only provided 2006 data). Expenditure on other diseases (not HIV, TB, or malaria) remained about the same in Malawi and Zambia and increased in Burkina Faso and Tanzania. Because HIV expenditures increased more rapidly, the relative share of other diseases decreased in three of the four countries and most dramatically in Tanzania, where it fell from 71% to 47%.

Additionality of funding can be gauged at two levels. First, the global resource flows have clearly demonstrated the effect of Global Fund, PEPFAR, and other contributions on the scaling up because levels of funding went up dramatically for the three diseases and did not appear to do so at the cost of funding for other diseases. There was some evidence of replacement funding within the donor community, especially for TB, where the Global Fund contributions increased but bilateral donors appeared to reduce direct funding. And in some countries where World Bank investments declined, this was the case for HIV. Second, the government contribution was about one-fifth to one-third of the total health expenditure in the four countries. In Burkina Faso, the overall government share increased from 2003 to 2006 (23% and 32%, respectively), but it declined in Malawi (35% to 21%, respectively). In Tanzania and Zambia there was little change (28% to 30%, and 24% both periods, respectively) (see Table 4.16 in the main report). Thus, in the four countries with trend data from NHA studies, government funding for HIV, TB, malaria, and other diseases generally did not show declines.

HIV, TB, and malaria programs in low-income countries in the evaluation study depend highly on external funding, as shown by the NHA studies and the comparison of the size of external HIV funding and total health expenditure in 2006. Often more than 70% is financed by external donors, and the Global Fund plays an important role, especially in TB, malaria, and HIV treatment. Fluctuations in funding because of grant suspension, nonrenewal, or nonaward of proposals are potentially large, because the sustainability in terms of country ability to replace withdrawn donor funds is low. The extent to which the Global Fund approach of competitive-funding applications and PBF are conducive to enhancing predictable funding and continuous intervention delivery could be reexamined. In low-income countries, the Global Fund should monitor more closely the funding situation to ensure that any problems with meeting targets are detected early and resolved

quickly to avoid the suspension of large amounts of funding and such action's potentially disastrous aftermath.

The absorptive capacity of most countries with Global Fund grants has been satisfactory, as gauged by Global Fund disbursement reports. However, Global Fund disbursed funds are mostly reported as "spent" by the principal recipient when disbursed to subrecipients. PEPFAR reports lower levels of expenditure of disbursed funds, but the two systems are not comparable.

6.3 State of District Health Systems

In general, there are about 1 to 1.5 health facilities per 10,000 people, with the government as the main provider. Intensive efforts to roll out HIV interventions involve private sector and civil society, and the access gap between HIV and longer-standing health services appears to be closing rapidly.

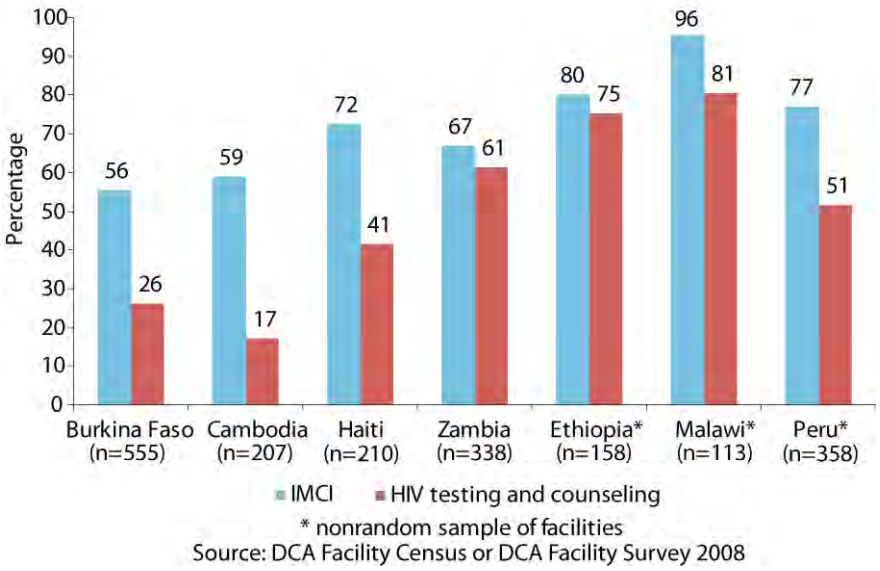
The evaluation study measured the availability of services in seven countries and 64 subnational areas. In four countries a full census of facilities was done in a total of 38 districts. The median density of facilities in the 38 districts was 1 to 1.5 facilities per 10,000 population, ranging from about 0.5 to 4 per 10,000. In all countries, urban districts stand out with higher facility density, as was to be expected.

In all settings, governments bear most of the responsibility for health facilities, administering 50% to 70% of all health facilities. The private (for profit) sector administers 20% to 40% and civil society organizations (nonprofit) the remainder. Only in Haiti are civil society organizations important providers of health care.

The government is the main provider of MCH services (immunization, antenatal care, and delivery care) in all countries. For ART services, the private sector is more prominent; even in the Zambian districts (including Lusaka), where major efforts are being made to roll out ART services through the public sector and civil society organizations, nearly 40% of the facilities providing ART were privately administered. In contrast, in Haiti, the private sector hardly plays any role in ART service provision.

In general, individual health facilities are more likely to offer services such as antenatal care, IMCI, family planning, malaria treatment, and TB treatment (DOTS) than HIV-related services such as testing and counseling, PMTCT, or ART. Figure 12 shows that IMCI, which has been promoted for a much longer period of time, is more likely to be available than HIV testing and counseling. In the Zambian districts, where HIV prevalence is much higher than in the other countries, availability of IMCI and HIV testing and counseling is nearly the same.

Figure 12
Percentage of Surveyed Health Facilities Offering IMCI and HIV Testing and Counseling, by Country, 2008



6.4 HUMAN RESOURCES

Health worker density is low in all districts, especially in rural areas. HIV scale up has focused on districts with higher health worker densities.

In Burkina Faso, Cambodia, Ethiopia, Haiti, and Zambia, the DCA Facility Assessment provides data on clinic staffing disaggregated by cadre and staff presence on the day of the interview. Only Lusaka in Zambia approaches the WHO target of 25 health workers (physicians, clinical officers, nurses, and midwives combined) per 10,000 population. Overall, in Zambia there were 11 health workers per 10,000 population, Cambodia 9, Haiti 8, and Burkina Faso only 4, with large differences between districts within countries. The actual presence of health workers on the day of the visit varied by country, district, and cadre of health worker. The presence of nurses was about 75% to 80% in all five countries. Doctors were less frequently present, especially in Burkina Faso and Zambia. Haiti and Ethiopia had better rates, with about three-quarters present on the day of the visit.

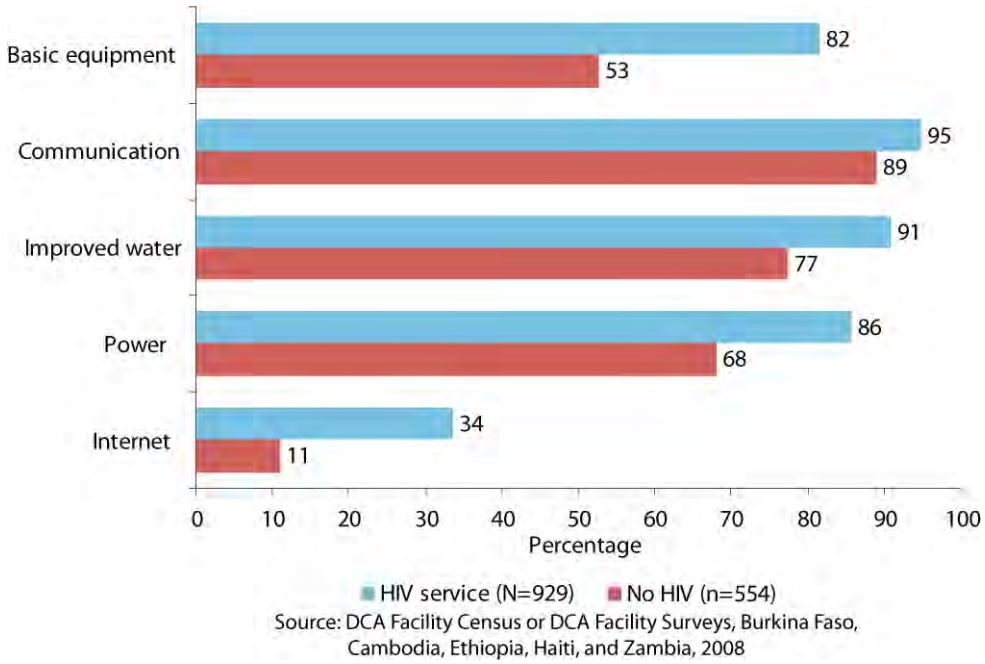
The scale up of health service-related HIV interventions has been more extensive in districts with higher levels of social and economic development and higher densities of health workers and better health infrastructure. This is primarily because scaling up was initiated in urban districts. This implies that health system weaknesses, such as poor infrastructure and limited human resources, are likely to become more prominent constraints as the scale up reaches out to more districts, especially those in rural areas. There is one caveat. It is possible that health worker density is high in districts with more HIV services because they have attracted more health workers to work on the delivery of HIV services. This issue cannot be examined with the cross-sectional district surveys.

6.5 Basic Amenities and Equipment

In many facilities, there are serious deficiencies in terms of basic amenities, especially improved water supply, and essential equipment. The situation is somewhat better in facilities that offer HIV services.

Almost half of the 1,455 facilities in the five countries that conducted DCA Facility Assessments offered HIV-related services (counseling and testing, PMTCT, or ART), and these facilities generally scored better in terms of basic amenities than those not offering HIV-related services (see Figure 13). The one exception was safe water supply, on which both groups of facilities scored very low. Facilities offering HIV services are more likely to have basic equipment such as a stethoscope, weighing scale, and thermometer. These differences can be largely accounted for by the urban bias in the location of the facilities offering HIV services.

Figure 13
Percentage of Surveyed Health Facilities with Basic Amenities and Equipment, by HIV Services Availability, Countries with DCA Facility Assessment, 2008



Source: DCA Facility Census or DCA Facility Surveys, Burkina Faso, Cambodia, Ethiopia, Haiti, and Zambia, 2008

6.6 Drug Availability

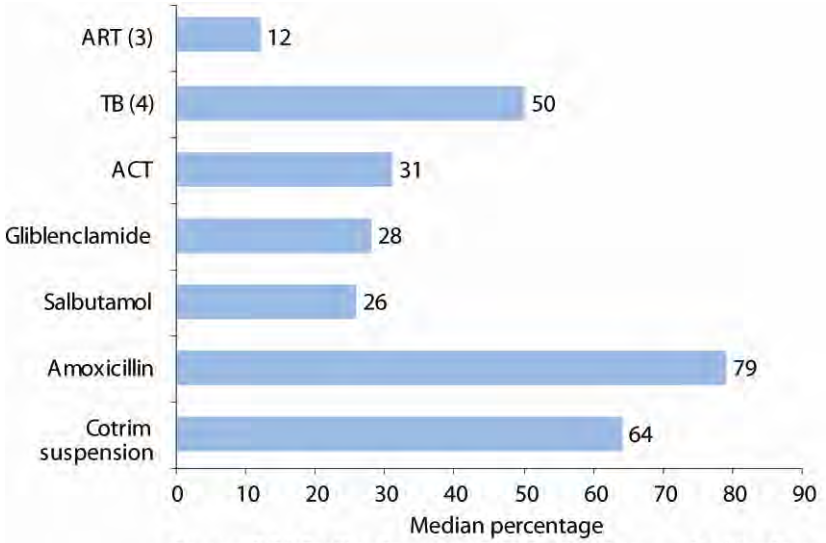
There is inadequate availability of many essential medicines, especially for chronic adult diseases but also for childhood illnesses.

An effective procurement and supply system needs to be in place to ensure continuous availability of medicines and technologies. The DCA Facility Assessments generated data on the availability of a package of 28 essential medicines and commodities at the most peripheral level of the supply chain, the health facility. Average availability was poor, ranging from a low of 38% in Burkina Faso to a high of 51% in Cambodia and Ethiopia. The lowest availability was for eight essential medicines for chronic conditions such as cardiac diseases, chronic respiratory problems, diabetes, and ulcers. Anti-infectious agents (ten antibiotic and antiparasitic drugs) were on average available in 52% to 69% of cases. Contraceptives (oral pills, hormonal injectables, and condoms) were available in most

facilities, especially in Cambodia and Ethiopia. Special medicines and commodities for children (oral rehydration salts, pediatric suspension of co-trimoxazole and paracetamol, and vitamin A) were available in 60% to 70% of cases in all countries.

Figure 14 shows the availability for selected non-expired medicines, showing the median for five countries, including medicines for management of childhood illnesses (co-trimoxazole suspension), infections (amoxicillin), chronic conditions (salbutamol for asthma and gliblenclamide for diabetes), malaria (ACT), TB (all four drugs), and ART (any first-line combination). One would expect variation in the availability of medicines according to the local epidemiological profile: antibiotics and generic medicines for management of chronic diseases should be available in nearly all facilities, TB medicines in a significant part of facilities (designated treatment facilities), ACT in all facilities in HIV endemic districts, and ART in a significant proportion of facilities depending on the size of the epidemic.

Figure 14
Among Surveyed Health Facilities, the Median Percent Availability of Selected Essential Medicines for Infections (Co-trimoxazole Suspension, Amoxicillin), Chronic Conditions (Salbutamol for Asthma and Glibenclamide for Diabetes), Malaria (Artemisinin Combination Therapy), TB (All Four Drugs), and ART (Any First-line Combination), Countries with DCA Facility Assessment, 2008



Source: DCA Facility Census or DCA Facility Surveys, Burkina Faso, Cambodia, Ethiopia, Haiti, and Zambia, 2008

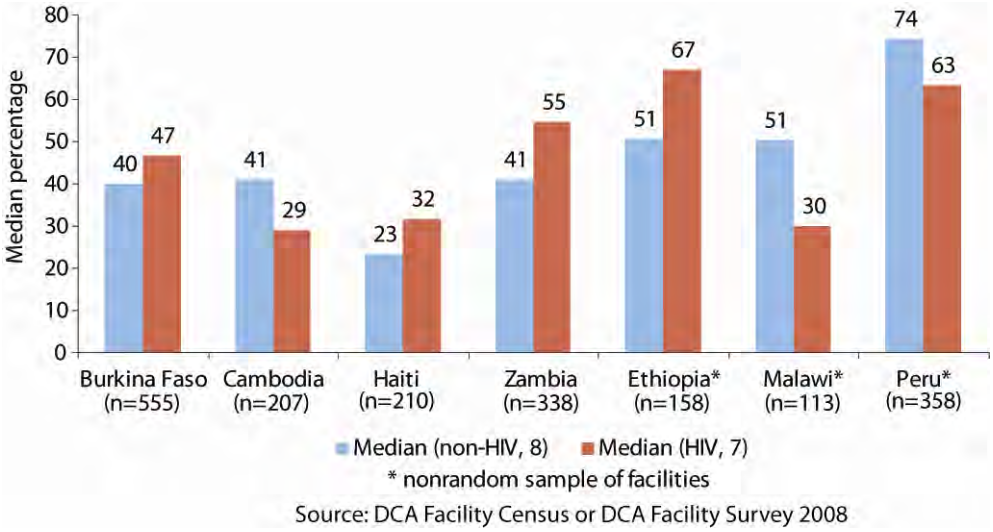
6.7 Training Exposure and Guidelines Availability

In four of the seven evaluation countries, a larger percentage of facility staff is exposed to HIV training than other types of training.

The DCA Facility Assessment asked about staff completion of 19 different types of training (with minor country-specific adaptations) in the last two years. These included seven training courses for HIV/AIDS, one for malaria, two for TB, and one for TB/HIV. The general picture is a fairly high training intensity for a large number of different topics. In four of the five countries, exposure to HIV-related training was more frequent than for other topics. Only in Cambodia and the sampled clinics in Malawi was HIV-related training less common than other topics (see Figure 15). Training for malaria and sexually transmitted infections was particularly common in Burkina Faso. Training

in TB diagnosis and treatment and IMCI was most common in Cambodia and Ethiopia. Training exposure was lowest in Haiti.

Figure 15
Median Percentage of Surveyed Facilities with Staff Trained in HIV-related Training and in Other Topics, by Country, 2008



Source: DCA Facility Census or DCA Facility Survey 2008

In all countries, with the exception of Cambodia, HIV-related guidelines were at least if not more likely to be available than guidelines for other topics such as IMCI, infection control, or family planning.

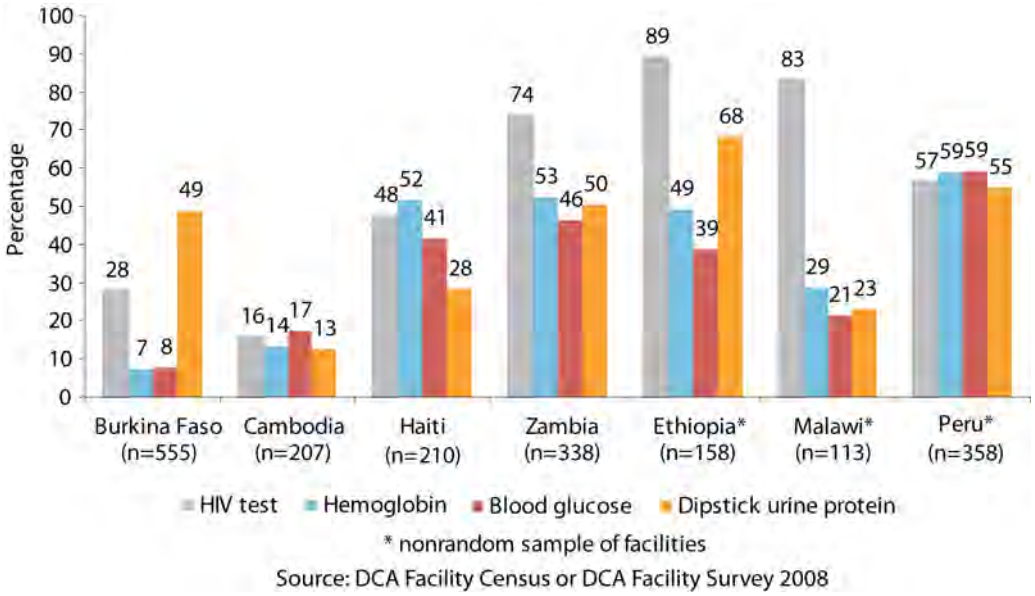
Accelerated implementation of AIDS, TB, and malaria interventions is reflected in somewhat greater training intensity and availability of guidelines than for MCH and other programs, although the differences tend to be small in most instances. However, this may simply reflect the fact that these are new programs. Service delivery levels of, for instance, PMTCT are still low compared with well-established MCH programs.

6.8 Diagnostic Capacity

There are major gaps in the availability of diagnostics, but the HIV test is more commonly available than the anemia test even in low HIV prevalence countries

In all seven countries that conducted a DCA Facility Assessment, availability of basic diagnostic tests, infection control amenities, key diagnostic aids, and infrastructure was poor in many health facilities. In some cases, scale-up efforts may have introduced distortions in availability. For instance, in most countries, an HIV test is now more commonly available than a hemoglobin test despite wide differences in HIV prevalence (see Figure 16). In general, the data show that large gaps exist in availability of the most basic commodities. These gaps need to be addressed if essential high-quality services are to be maintained. Addressing these gaps could contribute significantly to increasing coverage of interventions for AIDS, TB, malaria, and other conditions.

Figure 16
Median District Percentage of Surveyed Health Facilities with Essential Diagnostics, by Country, 2008



Source: DCA Facility Census or DCA Facility Survey 2008

There is some evidence that HIV services have scaled up at a much greater rate than other services and that there are some distortions in the availability of essential medicines, commodities, and services. Signs of disproportionate attention to scaling up HIV-related interventions at the expense of long-standing basic health care needs include, for example, the relatively high levels of training exposure for HIV/AIDS topics and a bias toward HIV in the availability of guidelines, laboratory services, and medicines. However, the cross-sectional nature of this evaluation study precludes a comparative analysis of trends in scaling up HIV interventions compared with such measures as trends in training exposure, medicine availability, and diagnostic capacity for non-HIV-related programs.

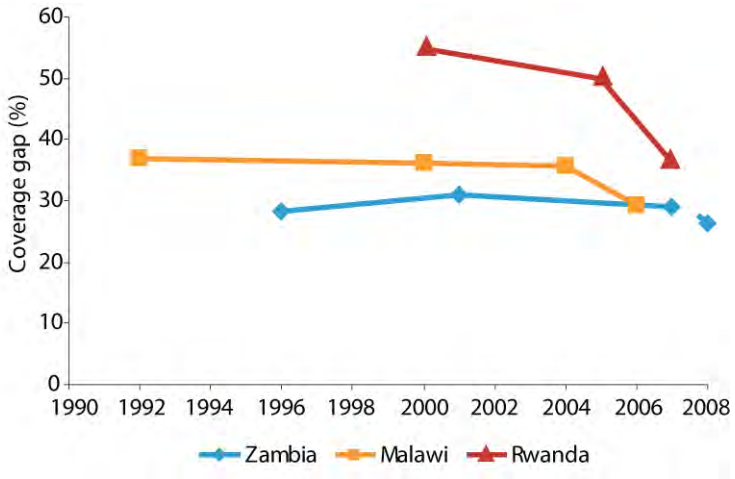
6.9 Changes in Coverage of Non-HIV Interventions and in Levels of Child Mortality

There is no evidence of adverse changes in coverage for MCH interventions or in child mortality.

Documenting trends in coverage of interventions and child mortality could help assess the extent, if any, of spill-over effects of increased resources for HIV, TB, and malaria on other health outcomes. There is a need for reliable, continuous data on coverage and mortality to be able to ascertain trends prior to 2003-2004 and subsequently. By these criteria, virtually all adult health interventions and many child health interventions are excluded. The availability of trend data on coverage is most complete for MCH programs, for which population-based household surveys have collected data in a standardized way for a limited set of core indicators since the early 1990s. If scaling up efforts have no negative impact, and assuming all other things remain equal, trends in MCH interventions should continue in the same direction and at the same pace as before 2003-2004. Several countries, including Zambia, Malawi, and Rwanda, have recent coverage surveys that permit testing of this hypothesis.

Zambia has a large AIDS epidemic, and through PEPFAR, the Global Fund, and other partners significant funds have been allocated for HIV/AIDS interventions in recent years, totaling about one-third of the total health expenditure. International resource flows for MCH also increased, by about 40%, between 2003 and 2006 and funding per child is relatively high (US$27 per year for 2005-2006). Zambia conducted national household surveys in 1996, 2001, and 2007. These indicate that the MCH coverage gap was about 30% in the mid-1990s and changed little in subsequent years. After 2001, there may have been a modest improvement, compared with before 2001, but differences are small (see Figure 17). The 2008 DCA Household Survey shows a slightly smaller coverage gap than the 2007 DHS survey, which may, in part, be due to an urban bias in the Zambia selection of districts in the DCA. The most recent DHS reports an under-five mortality rate of 119 per 1,000 live births for 2003-2007, compared with 158 in the preceding five-year period. Improved malaria control, a major component of the scaling up of interventions, may have contributed significantly to the decrease. Changes in child mortality due to HIV/AIDS are likely to be small, as PMTCT programs have only been rolled out recently and HIV prevalence in Zambia declined very little during 2002-2007.

Figure 17
Trend in the MCH Coverage Gap (%), by Country and Year



Note: The isolated dot indicates an estimate from the 2008 Zambia DCA Household Survey, which was not a national sample.
Source: National Household Surveys 1992-2008

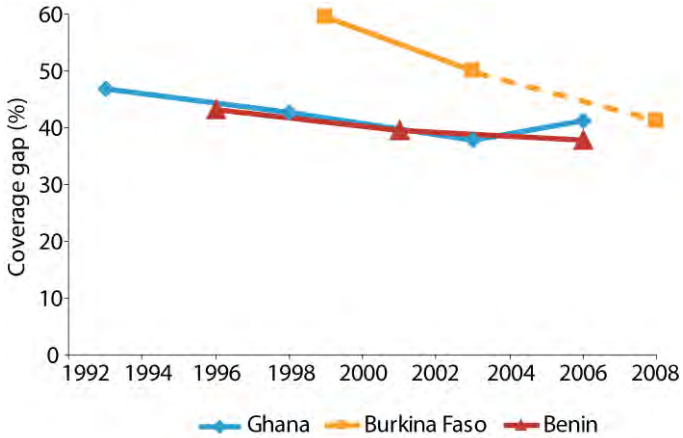
Malawi has a large epidemic and has seen major increases in funding for HIV, although considerably smaller than in Zambia, with external HIV funding amounting to about one-fifth of its total health expenditure in 2006. Malawi received about US$13 per child per year in official development assistance in 2005-2006 and saw increases of at least 40% in assistance for child and 75% for maternal and neonatal health programs. Coverage trends show little improvement from 1992 to 2004, but the 2006 MICS indicated that substantial progress was made after 2004. Most progress was made in family planning and treatment of acute lower respiratory infections.

Rwanda's national HIV prevalence is just under 3%, and the country's response against HIV/AIDS has been extensive. The predominance of HIV funding in Rwanda has been a concern raised internationally because during 2003-2006 external funding for HIV was 27% of the total health expenditure. International funding for child and maternal/neonatal health increased twofold and sixfold, respectively, between 2003 and 2006, rising to US$21 per child and US$27 per pregnant woman/neonate. Three household surveys in 2000, 2005, and 2007 indicate a gradual decline in the

overall coverage gap between 2000 and 2005 and a larger decline between 2005 and 2007. The coverage gap decreased from a high of 50% to 36% between 2005 and 2007, bringing it closer to the level in other countries in eastern Africa. Improvements were observed in all four main intervention areas of immunization, family planning, treatment of sick children, and maternal care. Under-five mortality dropped to 107 per 1,000 live births for the period 2003-2007, compared with 173 in the period 1998-2002.[15] HIV is likely to have played a minor role because prevalence among pregnant women is well below 10%. Malaria may have been an important contributing factor, even though the scale up of ITN use and other interventions is very recent.

The three west African countries with recent data, Ghana, Burkina Faso, and Benin, receive much less HIV funding than the east African countries, in part because their epidemics are smaller. A 2006 survey in Ghana suggests an increasing coverage gap, but data from Benin and Burkina Faso seem to indicate a continuing decline (see Figure 18).

Figure 18
Trend in the MCH Coverage Gap (%), by Country and Year



Source: National Household Surveys 1992-2008

The remaining countries did not conduct national surveys in recent years. In Haiti, results from the 2008 DCA Household Survey are fairly similar to those from the 2005 DHS in terms of overall coverage gap, but the results for individual interventions suggest that immunization coverage has actually declined, which should give rise to concern. However, the two sources are not strictly comparable; while the characteristics of the 2008 DCA survey respondents and households are similar to that of the Haiti 2005/06 DHS survey, they are slightly more urban and wealthier.

[15] Rwanda is a possible example of positive effects of strong leadership and political commitment on health. The well-resourced AIDS program may have provided the impetus for the development of integrated approaches to service delivery and development and implementation of robust health plans to improve access to basic health services. The Rwandan government introduced various health system-related changes, including improved coordination of donors and external aid with government policy; a countrywide independent community health insurance scheme, coordinated by the Ministry of Health, reaching 73% coverage in 2006; and the introduction of a performance-based pay initiative for health workers.

RECOMMENDATION

Recommendation 6.1 Address basic gaps in services

The major gaps in basic health service availability and readiness, which affect the quality of care for common health problems, will need to be addressed as part of scaling up against the three diseases by supporting a health system component of disease specific grants and general HSS grants in a way that supports country health sector strategic plans.

The DCA Facility Assessments have shown that the availability of basic laboratory tests, infection control amenities, diagnostic aids, trained health workers, guidelines, and infrastructure needs to be improved in all seven countries. Medicine availability in health facilities remains inadequate in many districts, with medicines for chronic noncommunicable diseases in especially poor supply. It is not possible to say whether these drug stock-outs are a consequence of scaling up the response against the three diseases, especially HIV/AIDS, although this is not likely. On the other hand, there is no evidence that the investments in HIV have strengthened supply systems.

Addressing those basic service delivery gaps may contribute significantly to the scope for increasing effective coverage of interventions for AIDS, TB, malaria, and other conditions. HSS needs to be supported in a way that is fully aligned with strengthened national health sector strategic plans. The Global Fund and its partners should work together to strengthen and support such national plans, along the lines of IHP+ country compacts. This process should also become the platform for positive synergies between scaling up against the three diseases and HSS.

Currently, aspects of HIV, TB, and malaria grants are considered to contribute to HSS, but the evaluation study provides sufficient evidence that this is leading to imbalances in efforts to effectively deliver interventions, as shown by training intensity, guideline availability, and other elements of service delivery. For instance, in five countries with DCA Facility Assessments, an HIV test is now more commonly available than a hemoglobin test.

To some extent, the scale up has occurred primarily in districts with stronger health systems, higher socioeconomic status (often urban), and often in somewhat better endowed health facilities. Therefore, the health system constraints are likely to become more prominent obstacles to further expansion of HIV services. The need to address the very basic gaps in other interventions, from IMCI to noncommunicable diseases, becomes increasingly urgent.

On the other hand, the evaluation study analyses suggest that trends in coverage of MCH interventions show little evidence of a negative change in trends comparing data for 1995-2003 with data for 2004 and later in the countries with recent data. The trends, however, need to be accelerated to achieve the MDG 4 and MDG 5. External funding increases, especially for HIV, have been dramatic and have shifted country health budgets. There were also increases in funding for MCH, albeit smaller, which may have been sufficient to maintain progress in the coverage of MCH interventions and sustain the declines in child mortality that were observed in several countries.

As part of HSS, the Global Fund and its partners need to support and monitor HSS through a systematic approach that regularly assesses the strength and performance of the health system in a way that it supports country review processes such as annual health sector reviews.

ACKNOWLEDGEMENTS

This report brings together the work of the 18 country teams that collected data and produced the Evaluation country reports. These teams consisted of a mixture of academicians, government employees, and consultants; all who worked with their country's Impact Evaluation Task Force to carry out the Global Fund Five-Year Evaluation in their country.

Below follows a list of key people who contributed to this report, either as authors or reviewers of parts of the report. Comments on an earlier version were also received from STOP TB, PEPFAR, UNAIDS and Roll Back Malaria.

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ACRONYM LIST

ACSD	Accelerated Child Survival and Development
ACT	Artemisinin-Based Combination Therapy
AIS	AIDS Indicator Survey
ANC	Antenatal Care/Clinic
ARI	Acute Respiratory Infection
ART	Antiretroviral Treatment/Therapy
ARV	Antiretroviral
AZT	Azidothymidine
BCC	Behavior Change Communications
BED	HIV-1 Subtypes B, E, and D IgG-capture Enzyme Immunoassay
BMU	Basic Management Unit
BSS	Behavioral Surveillance Surveys
CBO	Community-Based Organization
CCM	Country Coordinating Mechanism
CRS	Creditor Reporting System
CSO	Civil Society Organization
CSW	Commercial Sex Worker
DCA	District Comprehensive Assessment
DEP	Direction des Etudes et de la Planification au MOH
DFID	Department for International Development (UK)
DHS	Demographic and Health Surveys
DOTS	Directly Observed Treatment/Therapy, Short-Course

DPT3	Diphtheria Toxoid, Tetanus Toxoid, and Pertussis Vaccine Third Dose
DSS	Demographic Surveillance Sites
EC	European Community
ESF	Economic Support Fund
FBO	Faith-Based Organization
FP	Family Planning
FSA	FREEDOM Support Act
FSW	Female Sex Worker
GDP	Gross Domestic Product
GHIN	Global HIV/AIDS Network
GNI	Gross National Income
GOZ	Government of Zambia
HBC	High Burden Country
HIS	Health Information System
HMIS	Health Management Information System
HMN	Health Metrics Network
HSS	Health Systems Strengthening
HTC	HIV Testing and Counseling
IBBS	Integrated Biological and Behavioural Survey
IDU	Injecting Drug User
IETF	Impact Evaluation Task Force
IHP+	International Health Partnership
IMCI	Integrated Management of Childhood Illness
IPTp	Intermittent Preventive Treatment during Pregnancy

IRS	Indoor Residual Spraying
ITN	Insecticide-Treated Nets
IT	Information Technology
JICA	Japan International Cooperation Agency
KYS	Know Your Status
LLIN	Long-Lasting Insecticide-Treated Net
M&E	Monitoring and Evaluation
MACEPA	Malaria Control and Evaluation Partnership in Africa
MAP	Multi-Country AIDS Program
MARPS	Most At-Risk Populations
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MDR	Multidrug Resistance/Resistant
MERG	Monitoring and Evaluation Reference Group
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
MOH	Ministry of Health
MSM	Men Who Have Sex with Men
NACP	National AIDS Control Program
NASA	National AIDS Spending Assessment
NCHADS	National Center for AIDS, Dermatology and STD
NGO	Nongovernmental Organization
NHA	National Health Accounts
NMCC	National Malaria Control Center

NRR	National Record Review
NVP	Nevirapine
OECD	Organization for Economic Co-operation and Development
OVC	Orphans and Vulnerable Children
PAMAC	Programme d'Appui au monde communautaire
PBF	Performance-Based Funding
PDAC	Primary Data Analysis Country
PEPFAR	U.S. President's Emergency Plan for AIDS Relief
PLWA	Person/People Living with AIDS
PLWHA	Person/People Living with HIV/AIDS
PMI	President's Malaria Initiative
PMTCT	Prevention of Mother-to-Child Transmission [of HIV/AIDS]
PPP	Purchasing Power Parity
PR	Principal Recipient
PREVEN	Prevención Comunitaria de Enfermedades de Transmisión Sexual (Peru)
PSU	Primary Sampling Unit
RBM	Roll Back Malaria [Partnership]
RDT	Rapid Diagnostic Test
SAM	Service Availability Mapping
SDA	Service Delivery Area
SDAC	Secondary Data Analysis Country
SEED	Support for East European Democracy
SOPE	Status of Project Execution
SP	Sulfadoxine-Pyrimethamine

SPA	Service Provision Assessment
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
SWAp	Sector Wide Approach
SWEF	System-Wide Effects
TB	Tuberculosis
TERG	Technical Evaluation Reference Group
THIS	Tanzania HIV Indicator Survey
TRAC	Treatment and Research on AIDS Center (Rwanda)
TOMSHA	Tanzania Output Monitoring System for HIV/AIDS
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
UNGASS	United Nations General Assembly Special Session
USAID	U.S. Agency for International Development
VCT	Voluntary Counseling and Testing
WHA	World Health Assembly
WHO	World Health Organization

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1 BACKGROUND

1.1 INTRODUCTION

In November 2006, the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) Board agreed to fund an extensive evaluation of the first five years of operation. Guidance and oversight to the design and conduct of the Five-Year Evaluation has been assured by the Global Fund's Technical Evaluation Reference Group (TERG).[1] Through an extensive consultative process among stakeholder constituencies and members of Global Fund governance and advisory bodies, the TERG generated consensus around key principles for the evaluation and three overarching questions, subsequently referred to as Study Areas:

- The organizational efficiency and effectiveness of the Global Fund (Study Area 1)
- The effectiveness of the Global Fund partner environment (Study Area 2)
- The impact of scaling up on the three diseases (Study Area 3)

This report pertains to Study Area 3. Seen as distinct from the first two Study Areas, which focus on Global Fund-related organizational and partnership processes, Study Area 3 focuses on country progress in the fight against AIDS, tuberculosis (TB), and malaria, with special attention to health system effects.

In its discussions of the evaluation study, the Board endorsed and expanded the initial TERG proposals on the objectives and process of Study Area 3 and established some criteria for the evaluation study. Specifically, it should—

- Comprehensively assess country progress in tackling the three diseases. In other words, rather than investing in what difference the Global Fund investments are making, the evaluation study focuses on the collective impact of the Global Fund and other national and international partners' fight against the three diseases.

- Support learning and be conducted not simply as an external audit of performance but in close partnership with country institutions. This will enhance the use of results, contribute to improving health information systems, and strengthen country capacity for evaluation.

- Document the effects and impact of scaling up, balancing country ownership and independence, fostering capacity strengthening, and maximizing the use of existing data and information systems.

To ensure an independent evaluation, the Global Fund competed internationally for its Five-Year Evaluation and requested the involvement of a large number of countries. For Study Area 3, it set aside US$12 million. The evaluation study was organized and overseen by a consortium of five organizations—Macro International Inc., the African Population and Health Research Center, Harvard University School of Public Health, Johns Hopkins Bloomberg School of Public Health,

[1] Technical Evaluation Reference Group. 2006. Framework document on the scale and scope of the five-year evaluation. GF/B14/7 Annex 3. Geneva: Global Fund.

and the World Health Organization—referred to as the Evaluation Study Consortium in this report.

1.2 THE GLOBAL HEALTH CONTEXT

The Five-Year Evaluation takes place in a global health context characterized by the involvement of multiple actors and agencies focused on achieving national or international health-related outcomes, in particular, the health-related United Nations (UN) Millennium Development Goals (MDGs).[2] Annual updates by UN agencies indicate that many countries are moving in the right direction, but many are falling behind the targets set for most MDG health indicators.

In response, several initiatives have been established to accelerate progress toward MDGs 4 (Reduce Childhood Mortality), 5 (Improve Maternal Health), and 6 (Combat HIV/AIDS, Malaria, and Other Diseases), and international funding for health has increased significantly. The Global Fund and the GAVI Alliance are financing mechanisms charged with raising significant new resources for scaling up interventions in countries. Other global initiatives exist, but rather than being primarily country financing mechanisms, they advocate for and generate political momentum for scaling up. They include the Stop TB Partnership; Roll Back Malaria; the Global Campaign for the Health MDGs; the Catalytic Initiative to Save a Million Lives; Women and Children First; the Partnership for Maternal, Newborn and Child Health; and the Global Health Workforce Alliance. Although not global partnerships but U.S. government projects, both the U.S. President's Emergency Plan for AIDS Relief (PEPFAR)[3] and, more recently, the President's Malaria Initiative (PMI)[4] have also channeled significant new resources to the fight against HIV/AIDS and malaria. So too have World Bank initiatives such as the Multi-Country AIDS Program (MAP) and the Malaria Booster Program. Common to all these initiatives is a commitment to the scaling up of resources coupled with enhanced accountability, performance-based disbursement, commitment to country ownership in implementation, and involvement of civil society and the private sector in delivering interventions.[5]

Since its creation in 2002, the Global Fund has become the single largest source of funds for TB and malaria programs. In 2005, it provided about two-thirds of total international funding for each disease. It is the second largest source of funds for HIV/AIDS programs (about one-fifth of the total global resource flow). By August 2008, the Global Fund had signed grant agreements worth more than US$9 billion in 784 grants with 136 countries.[6] The Global Fund operates in all regions of the world but is strongest in Africa, in response to the high disease burden in the region. Approximately 60% of grant funding during the first two funding rounds was destined for programs in Sub-Saharan Africa. Some two-thirds of total funds have been directed to HIV/AIDS interventions, while malaria and TB received 17% and 14%, respectively. The Global Fund website describes the Global Fund operations as—

[2] http://www.un.org/Millenniumgoals/
[3] http://www.pepfar.gov/about/c19380.htm
[4] http://www.fightingmalaria.gov/
[5] Global Fund Framework Document. 2000. Founding principles of the Global Fund. Geneva: Global Fund.
[6] For further information, consult the Global Fund website (http://www.theglobalfund.org). An extensive and systematic summary of the Global Fund structure and activities can be found on the Avert website: (http://avert.org/global-fund.htm).

> The Global Fund is a unique global public/private partnership dedicated to attracting and disbursing additional resources to prevent and treat HIV/AIDS, tuberculosis and malaria. This partnership between governments, civil society, the private sector and affected communities represents a new approach to international health financing. The Global Fund works in close collaboration with other bilateral and multilateral organizations to supplement existing efforts dealing with the three diseases.[7]

No other single agency has such power and reach in terms of numbers of country partners and diversity of recipients. By comparison, even though PEPFAR has a larger total budget of US$18.8 billion (soon to be increased to US$48 billion for future assistance, including funding for the Global Fund and Joint United Nations Programme on HIV/AIDS [UNAIDS]), it addresses only HIV/AIDS and has been active mainly in its 15 focus countries, though funding has reached 113 countries in total. A large part of its support goes to the nongovernmental sector, including faith-based organizations.

Although the Global Fund and PEPFAR are major players, global health is a crowded field, comprising many multilateral and bilateral agencies, development banks, foundations, national and international nongovernmental organizations, and academic institutions with projects and programs directed toward the three diseases. In recognition of the need to avoid overlap, duplication, contradiction, and inefficiency, the Global Fund has from the start strongly endorsed the 2005 Paris Declaration on Aid Effectiveness and actively monitored its contribution against the Paris Declaration principles.[8] The Global Fund joined several bilateral donors and health partnerships in the International Health Partnership (IHP+) launched in September 2007.[9] The aim of IHP+ is to ensure that donor countries and agencies work more effectively together to provide longer term and more predictable funding to countries. Recipient countries, for their part, are expected to strengthen their planning and accountability mechanisms and demonstrate how external support has enabled the scaling up of interventions and concomitant improvements in health. Through IHP+, a harmonized monitoring and evaluation framework has been developed in support of country and global needs to demonstrate results, secure future funding, and enhance the evidence base for intervention packages.[10, 11, 12, 13]

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[7] http://www.theglobalfund.org

[8] 2005 Paris Declaration on Aid Effectiveness

[9] IHP+. 2007. Scaling up for better health. IHP+ work plan of the Health 8 agencies. http://www.internationalhealthpartnership.net/pdf/02_IHP_Workplan_EN_Feb20_2008_FINAL.pdf.

[10] Victora, C.G., R.E. Black, and Bryce. 2007. Learning from new initiatives in maternal and child health. Lancet 370: 113-144.

[11] Murray, C.J.L., J. Frenk, and T. Evans. 2007. The Global Campaign for the Health MDGs: Challenges, opportunities and the imperative of shared learning. Lancet 370: 1018-1020.

[12] Bennett, S., J.T. Boerma, and R. Brugha. 2006. Scaling up HIV/AIDS evaluation. Lancet 367: 79-82.

[13] Boerma, T., E. Bos, V. Walford, J. Bryce, and C. Abou-Zahr. 2008. A common framework for monitoring performance and evaluating the scale-up for better health. Geneva: International Health Partnership, Monitoring & Evaluation Working Group.

1.3 Ability to Assess Impact

The Global Fund has made an explicit commitment to making an impact on the three diseases as measured by infections averted, lives saved, and increases in healthy life expectancy. Its evaluation framework[14] developed in 2003 describes a four-tier evaluation pyramid—with impact at the apex—to which Global Fund operations, grant performance, and partnerships are intended to contribute. These ambitious goals have created high expectations for rapid results. A stakeholder survey conducted by the Global Fund in 2007 showed widespread expectations of demonstrable health impact within a short timeframe.[15] Similar views prevail in other major intervention programs such as PEPFAR and PMI, all of which have the achievement of specific results and continuous monitoring and evaluation as major characteristics.

Notwithstanding the widespread demand, there are scientific, technical, and practical challenges to evaluating impact. Major challenges in this particular evaluation study are the relatively short duration of the scaling up of funding, the time lag between funding and implementation, the large number of interventions that have been implemented with the funding, the large number of partners involved in funding and implementation, the lack of reliable trend data on outputs and outcomes of scaling up for many interventions, and the difficulties of measuring changes in health outcomes. All of these factors affect the ability to attribute changes in general efforts to scaling up and to the Global Fund itself. From a scientific perspective, impact evaluation requires both measuring changes in health status and disease epidemiology, as well as attributing observed changes to specific interventions and actors.

The evaluation study of the scale up needs to balance expectations with the realities of what can actually be delivered within the short time period since scaling up was adopted, which coincides approximately with the establishment of the Global Fund. The enormous increase in resources is a relatively new phenomenon, and impact will depend critically on both the amount of funds actually disbursed and the length of time that they have been available for implementation. For instance, although the first Global Fund grants were disbursed in late 2002, the pace of disbursement was quite slow. As of the end of 2007, only about one-quarter of the total disbursements had been made before 2005; nearly half of all disbursements took place in 2006 or later. PEPFAR was created in May 2003, and the first grant of US$100 million was assigned to the U.S. Agency for International Development for programs on orphans and vulnerable children in November 2003. Priority countries were named in 2004 when an additional US$2.4 billion was authorized, US$550 million of which was assigned to the Global Fund. The World Bank's MAP was earlier on the scene, and about US$1.1 billion has been provided to 29 countries since 2000, including the financing of 49,000 community projects.

Even when financial resources are available, scaling up must necessarily deal with the complexities and practical constraints inherent in country settings. Realities such as prevailing capacities, timing of operations and phasing of funding, and speed of implementation must be taken into account. Global Fund monitoring reports show good implementation rates in many countries, but there is inevitably a lag between implementation and demonstrable impact. The need to target

[14] The Global Fund. 2007. Partners in Impact: Results Report. Geneva: The Global Fund.
[15] The Global Fund. 2007. 360° Stakeholder Assessment: Perceptions and opinions of stakeholders of the Global Fund. Geneva: The Global Fund.

interventions to reach those in greatest need adds to the complexity both of program delivery and of impact evaluation. The latter is further complicated by the significant epidemiological differences between countries, the wide array of interventions, and the large numbers of country recipients and subrecipients.

Scaling-up activities take place in a complex environment in which multiple national and international donors and implementation groups are working to achieve similar ends but have different roles and responsibilities. For example, the Global Fund's primary role is that of funder rather than implementer, whereas PEPFAR and MAP are more directly involved with in-country implementation. This evaluation study will therefore reflect the impact of the collective activities of the multiple national and international actors responsible for implementation. From the country perspective, the relevant evaluation question is what impact the scaling up of all interventions and initiatives has had, and much less so what the contributions of specific initiatives are. This perspective includes that of the national government, civil-society organizations, international partnerships and initiatives, and bilateral donors.

There is little experience in the international domain with evaluations of comparable scope and reach as this one, conducted relatively early in the life of a public health initiative targeting countries in greatest need.[16] The five-year evaluations of UNAIDS focus on process rather than health impact.[17] The World Bank MAP evaluation focused on monitoring inputs, processes, and outputs, with some attention to outcomes but no attempt to evaluate impact in terms of disease epidemiology.[18] The evaluation of Stop TB studied the functions and structure of the partnership with impact defined in terms of political commitment, availability of anti-TB drugs, and TB awareness and partnership building. The Roll Back Malaria evaluation, noting "the impossible task of tracking the impact of specific contributions," focused on evaluating the "value-added" of the partnership in terms of coordination among partners and "creating synergies resulting in better overall progress towards rolling back malaria on a global scale."[19] The GAVI monitoring and evaluation strategy has largely focused on outcome (immunization coverage) and only recently included impact (deaths averted).[20] One of the most significant multicountry impact evaluations was the evaluation of a group of interventions, the Integrated Management of Childhood Illness,[21] rather than of an institutional mechanism.

The present evaluation study will add to the experience in the evaluation of large international programs, but its contribution will necessarily be limited by the short time period that funds have effectively been available to design and implement appropriate intervention programs.

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[16] Center for Global Development. 2006. When will we ever learn? Improving lives through impact evaluation. Final Report of the Evaluation Gap Working Group. Washington, DC: Center for Global Development.
[17] http://data.unaids.org/pub/BaseDocument/2008/080905_unaids_sie_inception_report_draft_en.pdf
[18] http://siteresources.worldbank.org/EXTAFRREGTOPHIVAIDS/Resources/717147-1181768523896/overview.pdf
[19] External Evaluation of Roll Back Malaria, Achieving Impact: Roll Back Malaria in the Next Phase. http://www.rbm.who.int/cmc_upload/0/000/015/905/ee_toc.htm.
[20] HLSP. 2006. Evaluation Framework: GAVI Alliance & GAVI Fund Phase 1 (2000-2005). London: HLSP.
[21] Bryce, J., C.G. Victora, J.P. Habicht, R.E. Black, and R.W. Scherpbier. 2005. Programmatic pathways to child survival: Results of a multi-country evaluation of Integrated Management of Childhood Illness. Health Policy Planning 20 (Supplement 1): i6-i17.

2 EVALUATION STUDY DESIGN AND IMPLEMENTATION

2.1 GUIDING PRINCIPLES

The design of the evaluation study was guided by the general operational principles envisioned by the Technical Evaluation Reference Group (TERG). These include the following:

- **Focus on country progress in the context of scaling up:** The evaluation should focus on the collective efforts to scale up prevention and treatment programs with special attention to the role of the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund). A stepwise approach was used, consisting of four sequentially linked questions on trends in funding, access to services, coverage of interventions and risk behaviors, and health outcomes. The underlying assumption is that improvements at each step can be adequately ascribed to improvements in the previous step, although contextual factors will be important determinants of the efficiency of the process across each step.[1]
- **Attribution not a primary focus:** While the main goal of the evaluation study was to assess the overall effects of scaling up, the potential contribution of the Global Fund was assessed by focusing on its financial contribution relative to that of other players.
- **Analysis of existing data with additional data collection in eight countries:** The evaluation study should be based on a combination of existing and new data and should be carried out in a large number of countries. Initially, 20 countries were selected, but only 18 participated in the evaluation study (see Annex A for a map of all 18 countries). In all 18 countries, local institutions and individuals made extensive efforts to compile and analyze all available data. Additional data collection took place in eight countries. This data collection included National Health Accounts (NHAs), district facility censuses, household surveys, record reviews, and follow-up studies of patients (the geographic areas involved in these data collection efforts are mapped in Annex A). Special efforts were made to evaluate data quality, analyze subnational data, and assess equity and health services.

[1] The gold standard method for generating scientific evidence on the impact of an intervention—the randomized controlled trial—is rarely feasible for the evaluation of complex, systemic interventions implemented by a diversity of agents. Attribution is complicated and often affected by confounding factors because causal chains in public health are complex. It is also challenging to identify comparison groups that resemble the intervention groups (as done in a quasi-experimental design), and it is difficult to measure exposure to the interventions in the comparison group. Victora et al. distinguished three types of scientific inference that are often used for policymaking in the field of health and nutrition, each based on a different evaluation approach. Probability statements are based on randomized clinical trial results, and in a few cases on randomized community trials. Plausibility statements are derived from nonrandomized evaluations aimed at making causal statements using observational designs with a comparison group. Adequacy statements result from demonstrations that trends in process indicators, impact indicators, or both show substantial progress, thus suggesting that the intervention has an important effect. Evaluating diffuse large scaling-up efforts of multiple interventions most often fits in the last category.

- **Most evaluation resources should be used for country data collection, analysis, and capacity building:** Of the US$11.7 million available for the study, 40% was spent on data collection and analysis in countries, 30% on capacity building and technical assistance, 15% on administration, 9% on development of instruments and tools, and 6% on analysis and reports.

2.2 Factors Affecting the Evaluation Study Design

Scaling-up efforts are founded on the premise that the mobilization and distribution of new funding to fight HIV/AIDS, tuberculosis (TB), and malaria will significantly increase the availability and uptake of effective interventions and thus help halt the spread of the three diseases. Therefore, the overarching evaluation study question is: Did intervention coverage increase and did disease epidemiology (incidence, prevalence, mortality) improve as a result of scaling up?[2] The basic counterfactual argument would be: in the absence of scaling-up efforts, mortality and morbidity due to the three diseases and interventions coverage would have, at best, remained the same or worsened.

Because scaling-up efforts have been supported by a range of actors, including the Global Fund, improved coverage or declines in morbidity and mortality cannot easily be attributed to any one partner. This evaluation study is about the effect of the rapid scaling up of a wide range of interventions through government and nongovernment channels with the involvement of many national and international partners.

There are at least four key issues that affect the design of the evaluation study: (1) the availability of baseline data along with ongoing data collection to measure progress, (2) the ability to measure exposure to interventions, (3) the ability to attribute results to interventions and funding sources, and (4) the need to measure contextual factors that affect the delivery of interventions and disease trends. Neither the Global Fund nor many other international partners invested systematically at an early stage to obtain baseline data or to establish data collection mechanisms (routine and periodic) that would meet the needs for future impact evaluation. Most global health initiatives rely on existing data collection and analysis processes in countries (e.g., the TB program data collected in country and reported to the World Health Organization [WHO]) and at the global level (e.g., the United Nations [UN] estimates). However, the new HIV/AIDS and malaria initiatives have paid more attention to improving the quality of routinely reported data in order to generate indicators for process and output monitoring of their initiatives.

Concerted efforts to strengthen data collection for HIV and malaria intervention coverage and HIV prevalence indicators include, for example, the intensification of the U.S. Agency for International Development (USAID)-supported Demographic and Health Surveys (DHS), malaria and HIV/AIDS indicator surveys, and the inclusion of biomarker data collection, supported mainly by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR). These efforts have been significant in enabling scientific assessment of coverage of interventions and prevalence among the general population. However, measuring exposure to interventions of people most at risk for disease, especially HIV, is difficult because the populations are difficult to identify and/or

[2] Evaluations can also go beyond health impact and aim to ascertain the socioeconomic impact of interventions to improve health. These questions were not addressed in this evaluation study.

enumerate accurately. In addition, more time is needed for comprehensive tracking of trends and differentials of coverage and prevalence indicators in all countries.

A particularly challenging aspect of impact evaluation is the attribution of effects to specific actors or interventions. Within a given country, resources from multiple actors are often distributed in a general manner across the country and across interventions, such that attribution of success or failure to a single source is impossible. In addition, there are many interventions that are intended to have the same effect. For example, indoor residual spraying and the use of insecticide-treated bednets are both intended to reduce malaria transmission.

An issue of particular concern is the need to measure unintended effects. These include, for example, whether scaling up has resulted in displacement of resources from other programs such as maternal and child health (MCH) or the extent to which overall gains in health status mask stagnation or even regression among certain population groups, particularly the poor and marginalized.

Measurement challenges aside, the achievement of health impact takes time. During its initial discussions in 2004, the TERG argued that although the Global Fund had been active for only five years, it was nonetheless appropriate to request that the Board make a substantial investment in a health impact evaluation. This was motivated not only by interest in tracking improvements in health outcomes, but also by a desire to strengthen monitoring and evaluation in the future. This would be achieved by strengthening country evaluation capacity, developing tools and methods, and making recommendations about investments required.[3] Given these circumstances, expectations regarding the measurement of impact need to be tempered by the reality of timing.

2.3 Evaluation Study Framework

The purpose of the evaluation study as defined by the TERG was to assess the impact that the Global Fund, domestic investments, and other actors have achieved on the burden of the three diseases. The focus was on the collective efforts to scale up prevention and treatment programs, with special attention to the role of the Global Fund. Therefore, the evaluation study assessed overall impact without direct attribution.[4]

Taking a stepwise approach, the primary focus of the evaluation study was on documenting trends in inputs, outputs, exposures, and health outcomes. This approach can strongly suggest whether the interventions are having an important effect.

[3] Technical Evaluation Reference Group. 2006. Framework document on the scale and scope of the five-year evaluation. GF/B14/7 Annex 3. Geneva: Global Fund.

[4] The conclusions are essentially statements of adequacy and, where possible, plausibility.

Figure 2.1
Basic Framework for the Evaluation

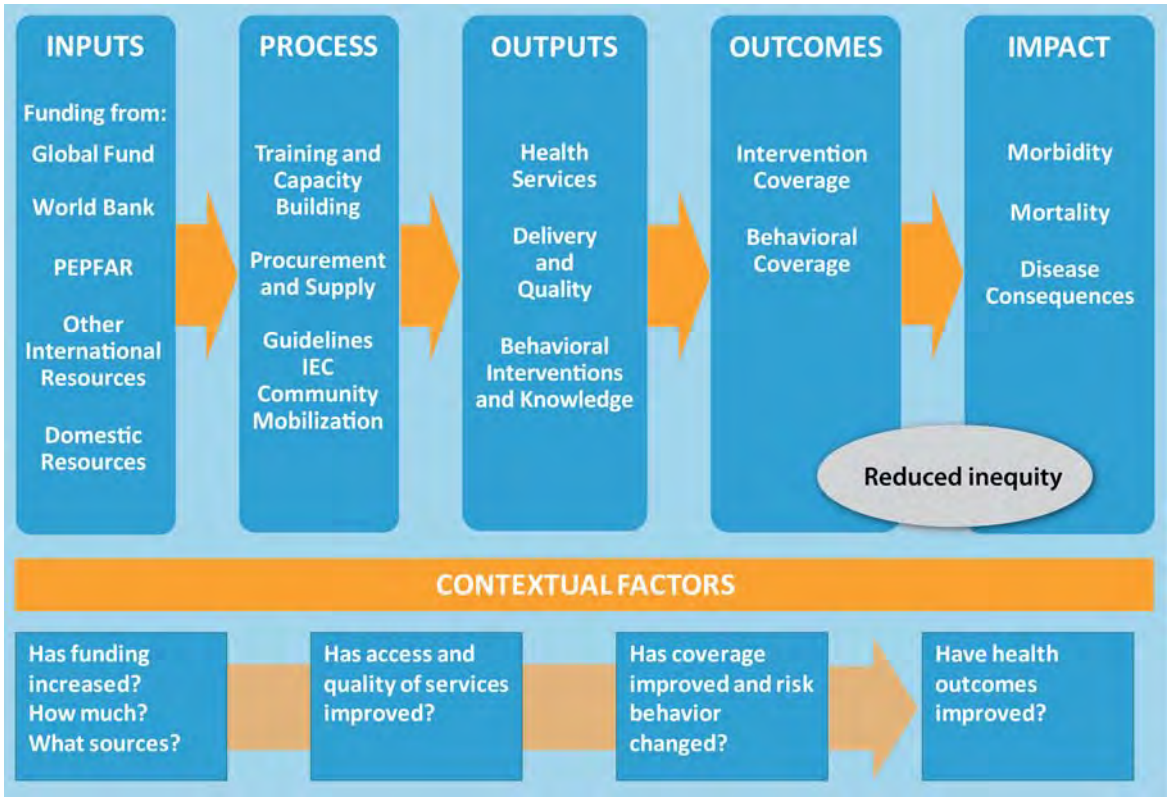

Figure 2.1 presents the stepwise approach of the overall framework for the evaluation study. The underlying logic was to begin with tracking Global Fund and other international and domestic resources. The inputs needed for interventions for the three diseases needed to be measured as specifically as possible in order to assess how much (additional) funding had become available and to track expenditure by disease, paying attention to the specific contribution of the Global Fund and that of the U.S. government (PEPFAR and the President's Malaria Initiative [PMI]) and the World Bank. The availability of increased resources contributed to the scaling up of interventions and should have resulted in enhanced access to and quality of services, increased exposure to interventions, and positive behavior change. Even if the resources disbursed were sufficient, the impact of increased intervention coverage depends on the efficacy of the interventions, on factors related to translating efficacy into effectiveness (i.e., coverage and quality), and on contextual factors (e.g., epidemiology, economic changes, political stability). Therefore, disease trends need to be interpreted against the trends in these factors. The last step was to relate morbidity and mortality levels to the first four steps to assess impact. Health impact is defined as the measured or estimated overall program effect on morbidity and/or mortality, brought about by all initiatives and programs combined, irrespective of their financing source(s). Because of weaknesses in health information systems and a frequent lack of timely and representative data on disease incidence, prevalence, and mortality, impact assessment was mainly carried out by means of statistical modeling for HIV and malaria.

The above framework permits identification of key variables needed to evaluate impact and define the data to be collected. The evaluation study used the set of indicators agreed on for international monitoring for which consensus has been developed among expert groups and UN agencies.[5]

The generic evaluation study framework is aligned with the International Health Partnership (IHP+) common monitoring and evaluation framework.[6] The IHP+ framework is applicable to a range of other diseases or interventions[7] and describes pathways through which increased funding, better processes, and additional outputs can lead to higher coverage of interventions, reductions in risk behavior, and ultimately improved health outcomes.

The IHP+ monitoring and evaluation framework is associated with a set of six principles—based on the 2005 Paris Declaration on Aid Effectiveness—that should guide the way in which the monitoring and evaluation activities of all development partners are conducted. The principles include the need for collective action and harmonization of international partners, alignment with country processes, balance between country participation and independence, harmonization of methods across settings, capacity building and health information system strengthening, and adequate funding for monitoring and evaluation. The extent to which these principles have been applied successfully in the Global Fund-sponsored evaluation is discussed later in this chapter. The evaluation frameworks specific to HIV/AIDS and malaria are discussed in Chapters 5 and 7, respectively.[8]

In order to document trends, the evaluation study attempted to collect information for the past 10 years (1998 to 2007). The ability to collect such information was country and disease dependent. For example, TB information was generally available in all countries from 1998, but most countries had HIV information starting around 2003/04. When comparisons were made between the period before Global Fund involvement and the period after Global Fund involvement, the year 2004 was used as the start of the Global Fund, regardless of when Global Fund money was disbursed to the countries.

2.4 Data Sources

In all 18 countries involved in the evaluation study, a number of the findings are primarily derived from secondary analysis of existing data. However, for eight countries, additional data were collected, with a focus on data quality issues and on generating data for the subnational level (see Section 2.6). The main sources of time-trend data are the routine data collection systems that exist in most countries. Additional sources for time-trend data are surveys or other data collection activities that have been carried out over time and that have generated indicators that fit within the evaluation study framework.

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[5] The Global Fund. 2009. Monitoring and evaluation toolkit HIV/AIDS, tuberculosis and malaria and health systems strengthening. 3rd Edition. Geneva: The Global Fund. Available at http://www.theglobalfund.org/documents/me/M_E_Toolkit.pdf.

[6] Macro International Inc. 2007. Data Collection Design and Methods. In Five-year Evaluation of the Global Fund—Study Area 3: Health Impact, Inception Report.

[7] Bryce, J., R.E. Black, and T. Boerma. 2008. Evaluating the scale-up for maternal and child survival. Baltimore, Maryland: Johns Hopkins University International Programmes.

[8] References to Malaria MERG framework and publications, UNAIDS evaluation framework, HIV/AIDS evaluation research framework published in STD book.

Mortality

The overarching question for the evaluation study relates to changes in the epidemiology of the three diseases, of which reduction in overall and cause-specific mortality due to the three diseases is a key component. However, this is extraordinarily difficult to measure because of the absence of reliable data on levels and causes of death by age and sex. Few high-mortality countries have civil registration and death certification of sufficient reach and quality to generate reliable vital statistics. Alternative, though less satisfactory, methods for generating such data include local Demographic Surveillance Sites (DSS), household surveys using verbal autopsy methodologies, and statistical modeling. All three approaches have significant limitations for national evaluation. DSS are often located only in rural areas, and the results cannot be extrapolated to the whole country. Household surveys may not be large enough to capture enough deaths to make accurate statements about cause of death, and statistical modeling is only as good as the variables that are used in the model.

Since reliable trend data on cause of death for the population as a whole are not available for most countries, the evaluation study collected data using several methods, each with its own limitations. Hospital data on cause of death and case fatality rates are often problematic because standard classifications such as the International Classification of Diseases are not systematically applied and because of selection bias in hospital mortality patterns. Follow-up studies of TB patients and people on antiretroviral (ARV) treatment were used in the evaluation study to gain more insight into AIDS- and TB-related mortality.

Morbidity

Various population- and clinic-based sources can generate data on morbidity (disease incidence and/or prevalence), including household and target population surveys that include testing for HIV infection, malaria parasites, anemia, and information on childhood diseases; population surveillance and population-based surveys that target particular populations such as sex workers and injecting drug users; clinical surveillance information that includes data from sentinel surveillance of pregnant women attending antenatal clinics for HIV; and TB disease notification rates. It would be possible to include surveillance of malaria cases, but only if there is consistent information on whether cases are laboratory-confirmed, which is seldom the case. The evaluation study used all available sources to examine trends in disease morbidity.

Coverage

The main sources of data on coverage of interventions are household surveys and service records. Household surveys generate data on HIV testing and counseling (for the general population and pregnant women), orphan care and support, bednet ownership and use, recent indoor residual spraying, malaria treatment patterns, and other health services. Service records provide data on HIV testing and counseling, prevention of mother-to-child transmission of HIV/AIDS (PMTCT), antiretroviral therapy (ART), and TB coverage and success rates. However, in most countries, the routine system covers only services provided through public health facilities. Coverage from service statistics requires a denominator, usually the population at risk for the service (the general population, pregnant women, people needing ART). Estimation of these population denominators can be problematic where data on population size are incomplete, out of date, or unknown.

Service Availability and Quality

In most cases, high-quality administrative records are not available and cannot be used to assess the availability and quality of services provided by health facilities or by community organizations. In some countries facility assessments and key informant surveys on civil society organizations were done for the evaluation study. From the beginning, it was recognized that it would not be possible to measure the quality of services delivered to individuals, due to the short evaluation timeframe and the difficulties and cost of collecting appropriate data at the national level. Instead, it was agreed upon to use a marker for quality, namely the "readiness" of health services to offer services meeting clearly defined minimal criteria or prerequisites of quality. In addition, several national indicators collected in national surveys, such as the proportion of HIV-tested individuals who received their test results, provide an indication of the quality of services and program delivery. The civil society organization survey provided limited information about the availability of services but no information about their quality.

Financial Information

Data on funding and expenditure were obtained from a comprehensive review of data from different sources, including the public and private sectors. For this evaluation study, complete health sector financial data were derived from NHAs conducted in five evaluation study countries. Disease-specific subaccounts for the three diseases were also collected in the five countries. For the other countries that could not undertake a health accounts exercise, data on external funding disbursed to other countries were collected from international sources: the Global Fund, the Organization for Economic Co-operation and Development, the Joint United Nations Programme on HIV/AIDS (UNAIDS), PEPFAR, PMI, and the World Bank.

2.5 Country Selection

The TERG goal was to involve a large number of countries to obtain a broad picture of progress rather than more detail on a few countries through in-depth evaluation. The TERG engaged in a thorough process of country selection for this evaluation study, guided by five main selection criteria, including regional and disease balance, availability of existing impact and baseline data, magnitude of Global Fund disbursement, duration of programming, and opportunities for partner harmonization.

The selection of countries was purposeful, not random, following the above criteria as well as more subjective assessments about the advisability of country participation. Countries were selected by the TERG in March 2007 following the Partners in Impact Forum in Glion, Switzerland, during which the foundation was laid for the country collaboration in this evaluation study. Eleven of the evaluation study countries participated in the Forum.[9]

[9] Burkina Faso, Cambodia, Ethiopia, Ghana, Haiti, India, Malawi, Moldova, Peru, Tanzania, and Zambia attended the 2007 Partners in Impact Forum.

The initial plan was to select 12 countries in which the evaluation study would be undertaken largely on the basis of already existing information (these were referred to as Secondary Data Analysis Countries) and an additional eight countries where the evaluation would also include an extensive collection of additional information (these were referred to as Primary Data Analysis Countries). Following this strategy, the TERG selected 20 countries to participate in the evaluation. The countries with additional data collection were Burkina Faso, Cambodia, Ethiopia, Haiti, Malawi, Peru, Tanzania, and Zambia. Countries with no additional data collection were Benin, Burundi, Democratic Republic of the Congo (DR Congo), Ghana, India, Kyrgyzstan, Moldova, Mozambique, Nepal, Rwanda, South Africa, and Vietnam.

Ultimately, India, Nepal, and South Africa decided not to participate. India and South Africa did not show interest in participation, and Nepal went through a transition period and was not able to set up the necessary work. South Africa was replaced by Lesotho by the TERG. India and Nepal opted out at such a late stage that they could not be replaced.

2.6 Data Collection Tools

An important early decision was that countries should use the same data collection tools wherever possible to maximize comparability across countries and over time and permit data collection in a large number of countries in a relatively short time period. Necessary country adaptations formed part of this process.

Two types of data collection tools were designed. In the first group are all the tools necessary to collate existing data, mainly through extraction of data from existing clinic-based information systems and other sources, and their compilation into Microsoft Excel spreadsheets for further processing. This group of tools also includes the modeling approaches for HIV/AIDS and malaria as well as the instructions for collecting other relevant information from existing studies.

In the second group are tools intended for the collection of additional information. These tools include all the instruments for completing surveys of households, facilities, civil society organizations, and district financial officers. It also includes the instruments for follow-up studies of TB patients and ART users, for facility record reviews for HIV/AIDS and TB, for a review of data in certain hospitals, and for the NHA exercises. Additional information about these tools and their use by the countries is found in Annex B.

In the eight countries where additional data collection was undertaken, the data collection was confined to between 7 and 15 districts that participated in the District Comprehensive Assessment (DCA). The sampling of districts was purposive, not random, and designed to achieve regional representation. The number of districts varied by country, but in general, an attempt was made to include each major region in order to achieve a somewhat representative national-level sample. Maps of the districts surveyed can be found in Annex A.

Typically, within each district, households were randomly selected in 20-25 clusters (20-30 households per cluster) and were thus representative of the district. In general, the household size by district was expected to be approximately 500 households, but it varied by country. Individual interviews were obtained from all women age 15-49 in the selected households. Sampling procedures differed from country to country, which affects the level of precision of the

data. Detailed descriptions of the household and individual samples can be found in the individual Country Impact Evaluation Reports. The results, however, indicate that the characteristics of households and respondents in the district surveys are comparable to those reported in recent national surveys. For the facility surveys, the basic premise was to enumerate all facilities in each selected district and to undertake a full census of all facilities (public and private), including pharmacies.

Both the individual and the facility questionnaires were primarily designed to collect data on HIV/AIDS, malaria, and TB, though some information was also obtained on MCH indicators to permit comparison of progress in the three diseases with that for MCH and to address potential systems effects. Typically, all generally agreed-upon major HIV/AIDS, malaria, and TB indicators that can be collected from population-based surveys were covered in the household and individual questionnaires. The facility surveys collected information on equipment, supplies and drugs, services, and staffing relevant to the three diseases and MCH. Thus, these surveys were more exclusively and finely targeted on the three diseases than large ongoing household survey programs such as the DHS and the Multiple Indicator Cluster Surveys.

2.7 Data Quality Assurance

The review of the quality of the routine service statistics data was a key component of the evaluation study. This review took several forms, the most common being a review of the completeness, comprehensiveness, and internal consistency of the data on HIV/AIDS and TB services collected in each country.

By definition, routine monitoring and evaluation data from service statistics have already been "collected" at the time of reporting. Normally, these data are reported as aggregated cases for a certain time period. The aggregation may occur at several different levels, for example, starting with the periodic facility reports that are then combined with other facilities reports at the district level, which are in turn combined at the province/region level, and finally at the national level. At any stage, there may be erroneous or incomplete reporting. Numerous measures are taken to identify such problems.

Data quality was examined at two stages: first, at the compilation stage and, second, at the analysis stage. At the compilation stage, the evaluation study attempted to quantify accuracy, completeness, and timeliness of reporting. At the analysis stage, the quality measures involved four general criteria, which are associated with specific measures for each disease. For instance, for TB, the standard WHO assessment was applied to national and subnational reported data, examining statistical validity, consistency, precision, and plausibility. The service statistics reviews identified many major data gaps and a lack of quality in many of the routine statistics provided, though data on TB suffered from less problems. Both timeliness and completeness of reporting were considered and showed major shortcomings in a number of countries for certain periods.

Data quality criteria for the additional data collection activities involved mainly design of the survey instruments, training and supervision, and data editing. As most of the indicators collected in the DCA have been widely used, the questions to generate these indicators were taken from existing instruments that have a proven record of performance. This enhances the degree of confidence in the resulting data. Training and supervision of the data collection staff were given high priority,

especially with regard to ensuring the privacy of the respondents and the confidentiality of the data. Data collection was carried out using small teams of interviewers, each with its own supervisor, thereby enhancing data quality. During the processing of the data, internal consistency and range checks were also performed, and data were adjusted where necessary—although no imputation of missing information was undertaken. During the analysis stage, data quality issues could come to light that could not be identified through the simple review of individual interviews.

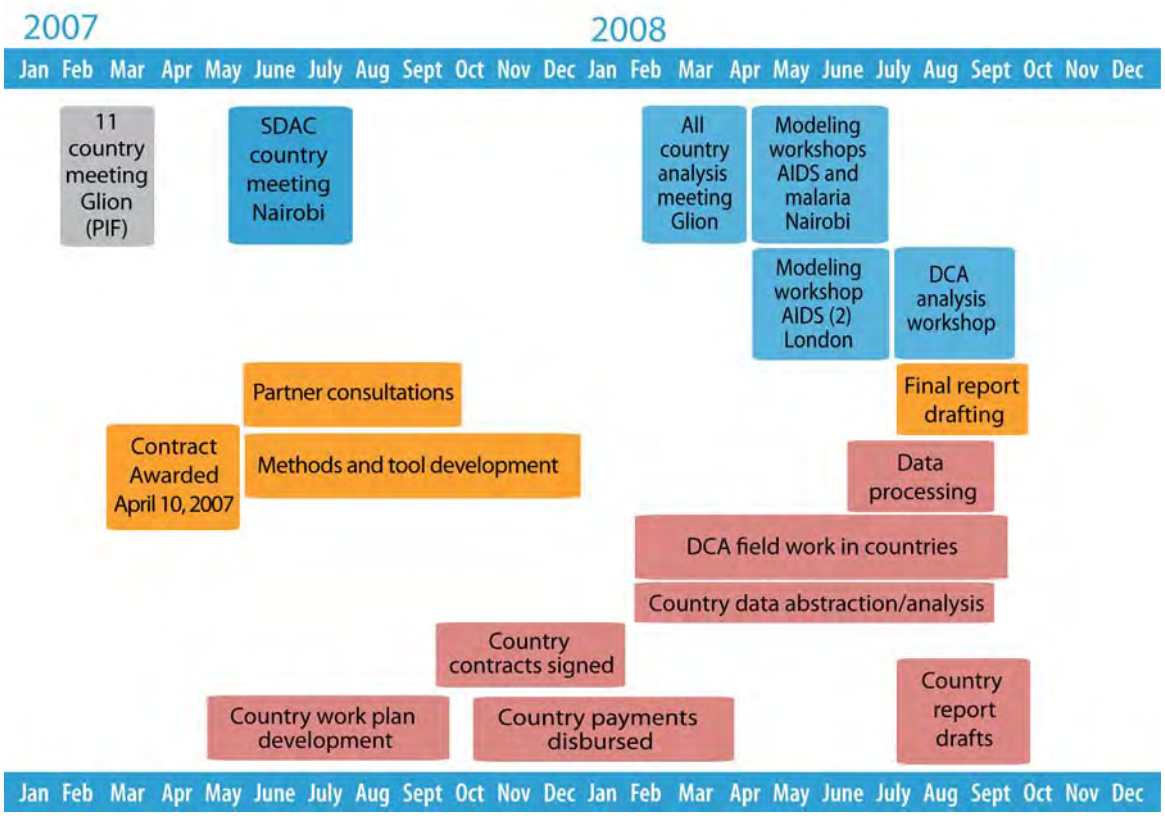
2.8 Implementation in Countries

Country ownership of the results of the evaluation study was one of the key goals established by the Global Fund Board. In pursuance of this goal, the Partners in Impact Forum was held in Glion, Switzerland, in March 2007, with the participation of 11 countries. In June 2007, a meeting was held in Nairobi, Kenya, with participants from all selected countries (with the exception of Lesotho, which had not been selected to replace South Africa at that time, and Rwanda, whose representatives could not obtain a visa in time). The objective of the meeting was to foster further understanding of the goals of the evaluation study and to develop detailed country work plans and budgets.

Country-level Impact Evaluation Task Forces (IETFs) were established in several countries with representation of all relevant local institutions and donors, including the Global Fund. These IETFs approved the country work plans and reviewed the Country Impact Evaluation Reports. However, given that in countries with additional data collection, there were often more than 25 people involved in the IETF, not all members were equally involved in all aspects of the evaluation study. In each country, representatives from the Ministries of Health and the HIV/AIDS, malaria, and TB communities played major roles, as did representatives of the Global Fund Country Coordinating Mechanism (CCM).

All data collection and analysis for the country reports was carried out by local organizations and individuals, with technical assistance from the Evaluation Study Consortium. These organizations and individuals were selected by the country IETF in consultation with members of the Evaluation Study Consortium during the initial visits to participating countries. In some countries subcontracts were tendered. A timeline highlighting major events of the evaluation study is presented in Figure 2.2.

Figure 2.2
Timeline of the Evaluation Study, April 2007 to September 2008



One of the unintended effects of the focus on the three diseases and the extensive consultations with local agents to design the studies was a larger number of local subcontractors (49) than desirable (see Table 2.1 for the number of subcontracts for each country). Coordination was more difficult because of the large number of local counterparts, both institutions and individuals. Many subcontracts were with individuals (20). With the exception of DR Congo and Ghana, all work in countries without additional data collection was accomplished through individuals rather than institutions. In contrast, in the Primary Data Analysis Countries with additional data collection, work was mostly accomplished through subcontracts with institutions, supplemented by subcontracts with individuals who often took on the role of local coordinator of the activities.

Table 2.1: Number of Subcontractors, by Type and Country

Primary Data Analysis Countries	Institutional	Individual	Secondary Data Analysis Countries	Institutional	Individual
Burkina Faso	4	0	Benin	0	2
Cambodia	7	2	Burundi	0	2
Ethiopia	1	0	DR Congo	1	0
Haiti	1	0	Ghana	1	0
Malawi	7	0	Kyrgyzstan	0	2
Peru	1	0	Lesotho	0	3
Tanzania	3	0	Moldova	0	2
Zambia	3	1	Mozambique	0	2
			Rwanda	0	2
			Vietnam	0	2

As individual country work plans were elaborated, it became clear that in some countries recent data collection activities had already filled some of the data gaps. In other instances, the evaluation study was used as an opportunity to expand data collection beyond what was originally envisioned. The result of these developments was that work plans could differ significantly from country to country. Tables 2.2 and 2.3 provide a listing of the specific activities for each country.

Table 2.2: Detail of Evaluation Study Activities: Primary Data Analysis Countries

	Primary Data Collection	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Tanzania	Zambia
1	District Household Survey	X		X	X	X		X	X
2	District Individual Woman Survey	X		X	X	X		X	X
3	District Facility Census	X	X	X	X	X	X	X	X
4	District Community-based Organizations Survey	X	X		X	X	X	X	X
5	District Medical Officer Financial Survey	X			X	X			
6	ART Follow-up Study	X			X	X	X	X	X
7	TB Outcome Study	X	X		X	X	X	X	X
8	District Hospital Record Review	X			X	X		X	X
9	District Facility Record Review, HIV/AIDS	X	X		X	X		X	X
10	District Facility Record Review, TB	X	X		X	X		X	X
11	National Health Accounts	X			X	X		X	X
Review of Existing Survey Data and Other Sources									
12	National Record Review								
	-HIV/AIDS	X	X	X	X	X	X	X	X
	-Surveillance	X	X	X	X	X	X	X	X
	-ART	X	X	X	X	X	X	X	X
	-PMTCT	X	X	X	X	X	X	X	X
	-Tuberculosis	X	X	X	X	X	X	X	X
	-Malaria	X	X	X	X	X	X	X	X
13	Previous Surveys	X	X	X	X	X	X	X	X
14	Any Other Relevant Sources	X	X	X	X	X	X	X	X
15	Financial Information	X	X	X	X	X	X	X	X

Table 2.3: Detail of Evaluation Study Activities: Secondary Data Analysis Countries

		Benin	Burundi	DR Congo	Ghana	Kyrgyz-stan	Leso-tho	Mol-dova	Mozam-bique	Rwanda	Vietnam
Review of Existing Survey Data and Other Sources											
1	National Record Review										
	-HIV/AIDS	X	X	X	X	X	X	X	X	X	X
	-Surveillance	X	X	X	X	X	X	X	X	X	X
	-ART	X	X	X	X	X	X	X	X	X	X
	-PMTCT	X	X	X	X	X	X	X	X	X	X
	-Tuberculosis	X	X	X	X	X	X	X	X	X	X
	-Malaria	X	X	X	X	X			X	X	X
2	Previous Surveys	X	X	X	X	X	X	X	X	X	X
3	Any Other Relevant Sources	X	X	X	X	X	X	X	X	X	
4	Financial Information (Including Existing NHA)	X	X	X	X	X	X	X	X	X	X

2.9 Roles of the Global Fund and Partners

TERG

The Global Fund TERG was established in 2003 to provide independent assessment and advice to the Global Fund Board. The TERG was tasked by the Board to organize and oversee the evaluation and ensure its independence. As a first step, the TERG designed the Request for Proposals through which the evaluation would be competed among potential bidders in open competition. The Evaluation Study Consortium was selected in March 2007 and was invited to attend the Partners in Impact Forum in Glion, Switzerland. The actual contract with the lead agency, Macro International Inc., was signed on April 10, 2007, by the Global Fund and on April 18, 2007, by Macro.

Since then, the TERG has exercised its oversight function by inviting the leadership of the Evaluation Study Consortium to meetings in Geneva and the United States to render accounts of progress and problems, as well as by requesting regular written updates on progress and problems and through supervisory visits to a number of countries. The TERG reviewed and approved the basic approach for the evaluation study and the overall work plans for each country. Country deviations from the original plan were also approved by the TERG. Finally, the TERG advised on analysis plans and arranged for the review of the country reports and the final overall report.

Global Fund Secretariat

To preserve the perceived independence of the evaluation study, the involvement of the Global Fund Secretariat has been limited. It played a supporting role to the TERG, facilitating meetings and assisting in reviewing regular evaluation study reports and documents. The Secretariat facilitated contacts between the Evaluation Study Consortium and Global Fund country representatives in order to smooth the process of project development and implementation and to obtain necessary additional funds where required. The Secretariat also maintained contact with interested agencies such as PEPFAR, Roll Back Malaria, and the Stop TB Partnership, and it

organized a workshop on the evaluation study for international partners and selected countries in Geneva in March 2008.

The Secretariat was instrumental in raising additional funds from PEPFAR for further capacity building and system improvement activities. There were also efforts to obtain additional Global Fund country funding for the evaluation study if the country work plans showed a funding gap. This was the case in six of the Primary Data Analysis Countries, but it was only successful in two countries. Obtaining the additional funding was a cumbersome process, which led to substantial delays in the release of additional funding and the fieldwork.

Partners

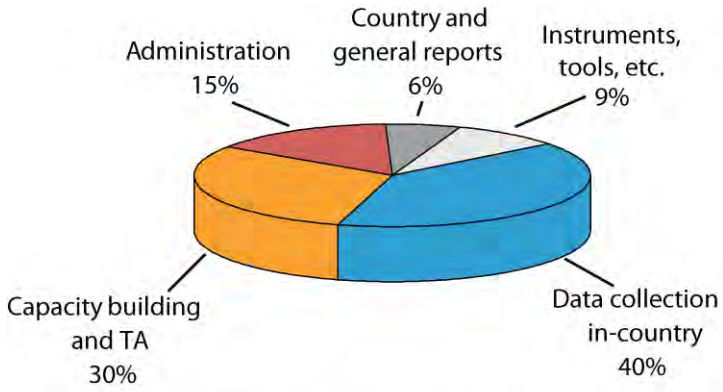
At the country level and through meetings with individual institutions and as members of the IETFs, the evaluation study was well prepared and supported by major partners. IETFs generally include members of major donors active in a country, and thus several organizations had input on the development of the country work plans and their implementation.

Most of the funding has come through the Global Fund, but some considerable additional funding was secured from PEPFAR. PEPFAR and UNAIDS also participated closely in the development of the core documentation, in workshops, and in the development of the modeling approaches that were used to calculate the impact of activities in the area of HIV/AIDS. In some countries, PEPFAR also collaborated by aligning planned studies with the evaluation study.

Use of Resources

A contract of US$11.7 million was signed for the evaluation study. Initially, these funds were intended to cover the evaluation study in 20 countries, but because India, Nepal, and South Africa withdrew (the latter replaced by Lesotho), the funding effectively covered the evaluation study in 18 countries. Figure 2.3 shows the percent distribution of contract funds by their use.

Figure 2.3
Percent Distribution of Evaluation Study Funds, by Activity



Source: Macro International Inc. financial records and budgets

Preparation of all the materials and approaches needed to conduct the evaluation study was a major undertaking. It included developing data abstraction forms for HIV testing and counseling, PMTCT, ARV, and TB; protocols for follow-up studies of TB patients and ART users; district financial questionnaires; civil society organization questionnaires; household, individual, and facility questionnaires and corresponding manuals; and the analysis plan. These activities required about 9% of the budget. The considerable body of data collection materials developed during this stage constitutes much of the Model Evaluation Platform, and as such all these activities have contributed greatly to capacity building.

By far, the largest part of funding was used to cover the cost of local data collection activities through subcontracts with local agencies. Of the total budget, 40% was assigned to this activity. The in-country cost for countries with additional data collection activities was typically about US$500,000. In countries where only existing data were to be used, the cost was about US$70,000.

The next largest proportion of the budget—30%—was used for technical assistance activities, comprising country visits and a number of workshops. Further capacity building was achieved through a Data Quality and Analysis workshop in Switzerland with the participation of all countries and financed by PEPFAR. A two-week analysis workshop for the eight countries with additional data collection countries was held in the United States, also with PEPFAR funding.

Work on country reports and the development of the final evaluation report required 6% of the resources. The drafting of the Country Impact Evaluation Reports was done by the local counterparts, but most reports underwent extensive review by members of the Evaluation Study Consortium, and the production of the final country report typically took several months to complete.

The remainder of the contract went to administration, including subcontracting activities, financial management, advancing funding to countries and partners, and other necessary activities to keep track of the work and the funding and to ensure proper disbursements of funds.

Overall, about 85% of the total contract was spent on activities that directly benefited in-country activities, through the provision of the tools, financing of local costs, technical assistance, and support for report writing. These percentages are based on budgetary data, and final numbers may change somewhat once all accounts are closed, though the general order of magnitude of the cost of the different activities is not expected to change significantly. Most activities were related to actual country work and technical assistance and capacity building.

2.10 Other Characteristics of the Evaluation Study

This evaluation study of the scale up was designed to adhere to scientific evaluation criteria while aligning to the processes and principles outlined in the IHP+ common evaluation framework such as collective action, alignment with country processes, balance between participation and independence, and capacity building.

Collective Action

The primary focus of the evaluation study was on the contribution of the collective efforts to scale up the health sector response and not the specific contribution of the Global Fund. The Secretariat

made considerable efforts to mobilize partners for the evaluation study and was most successful in engaging PEPFAR at the global level. In some countries, the IETF formed a good platform for involvement of a broad group of stakeholders. In other countries, they were too large and inactive or too much controlled by the programs and the CCM. Lack of clarity in the relationships between the IETFs and existing coordination mechanisms led, in some instances, to unnecessary delays.

Alignment with Country Processes

Performance monitoring and evaluation should build upon processes that countries have established to evaluate progress in the implementation of national health sector plans. Annual health sector reviews, health sector strategic plans, and midterm reviews are conducted in many countries, and undoubtedly the results of the evaluation study will feed into these processes. There was, however, only partial alignment with country processes. Even within a country, it is difficult for the relatively small number of actors to completely harmonize data collection, analysis, and reporting work between the various initiatives and reporting requirements.

The idea for the multicountry evaluation study was introduced in a number of countries in late 2006/early 2007 with a review of data gaps and the establishment of an IETF (11 evaluation study countries and others were invited to the Partners in Impact Forum in early 2007 to review the data gaps and to receive more details of the evaluation study). The IETFs were established independently of existing coordination mechanisms, although institutions and individuals involved in such mechanisms were generally included in the IETF. The Global Fund timeline for the evaluation was tight, aiming for all data collection and analysis to be completed by mid-2008. This provided little flexibility for country stakeholder involvement, consensus-building, or securing additional funding. Full alignment with country processes would require much earlier planning and greater consideration for country mechanisms and cycles. Even in the most optimal of circumstances, full alignment is likely to be rarely achievable, but much more can be done to maximize it.

Data Collection

The emphasis on secondary analysis of existing data was generally welcomed in countries, as there is a widespread view that not enough use is made of available data. In the majority of countries, data collection and analysis were carried out by local institutions and researchers not affiliated with the programs, using standardized tools and methods with local adaptations. The evaluation study took place at the same time as other data collection and analysis efforts, especially in the field of HIV/AIDS. There were, for instance, PEPFAR-supported triangulation studies, World Bank (Global AIDS Monitoring and Evaluation Team) reviews of the AIDS situation and trends, and UN General Assembly Special Session global reports. In some countries, the IETF succeeded in coordinating these efforts; in others, coordination was more difficult due to different timeframes.

Balance between Country Participation and Independence

In principle, evaluations should be driven by country needs and ensure active country participation without sacrificing scientific rigor and credibility and maintaining objectivity and independence. The potential tension between country ownership and independent assessment does require managing, and the country IETFs were intended to assist in this. In practice, the experience has been mixed. In some countries, the IETFs were active and provided a good platform for involvement of stakeholders. In other countries, the IETFs were less active. The Evaluation Study

Consortium successfully involved independent in-country institutions and consultants in most countries. In most Primary Data Analysis Countries, the Bureau of Statistics and research institutes played key roles in data collection and analysis, helping ensure an independent viewpoint. Some data collection efforts were not successful because there were insufficient resources to recruit independent research teams to collect the data. An example is the TB patient follow-up study, which was mostly done by district TB control officers.

Harmonized Approaches to Evaluation and Performance Assessment

The evaluation study developed common protocols and measurement tools to gather information about standardized indicators. These protocols and tools were adapted by countries as needed. Such protocols are essential to enhance data quality and comparability between populations and over time. The focus on the country progress in scaling up against the three diseases is a first step toward harmonization with a country focus as opposed to an initiative or donor focus. The evaluation study aims to ensure transparency and sharing of data within countries and with the global community. The development of sustainable data archives in countries is a large undertaking for which the World Bank's International Household Survey Network has been approached and expressed a willingness to collaborate. Standard data collection and analytical approaches have been used, in consultation with expert groups, thereby linking them to existing consensus about measurement. Three advisers to the Evaluation Study Consortium are internationally acknowledged experts in the three disease fields who play prominent roles in expert groups.

Capacity Building and Health Information System Strengthening

Systematic involvement of country institutions in evaluation activities is necessary to achieve country ownership of the data and to ensure that weaknesses in health information systems are brought to the fore with a view to systems strengthening. Evaluation should be built upon information generated by a country's health information system, based on regular well-planned data collection and analysis activities, including, for example, surveys, surveillance, and service statistics. Evaluation activities can catalyze the development of sound health information systems, especially to the extent that the evaluation timeline is in harmony with the routine data collection and analysis activities. This evaluation study made extensive use of existing sources.

Several workshops and on-the-job activities were conducted to build capacity (also see Section 2.11). Several priority areas for capacity building were identified, particularly skills to assess data quality, conduct analysis, and write reports, as well as data processing.

Funding Constraints

As a general guide, between 5% and 10% of the overall scale-up funds need to be set aside for monitoring and evaluation, with a large proportion of this going to the in-country efforts and building capacity of national and regional institutions. The amount set aside for this evaluation study—US$11.7 million—is well below 0.1% of the funds disbursed in the first five years by the Global Fund. At the country level, only limited use has been made of Global Fund funding to improve monitoring and evaluation and to strengthen health information (a major issue that is discussed in the next chapter), despite the fact that Global Fund grants are expected to include funds for monitoring and evaluation. One of the possible reasons for the limited use of these funds is that countries have trouble accessing appropriate technical assistance, as described in the final

report for Study Area 2—The Effectiveness of the Global Fund Partner Environment. Most progress has been made in funding and assistance for household surveys for HIV/AIDS (primarily through PEPFAR) and malaria and in the development of reporting systems for ART—sometimes electronic (mainly through PEPFAR and other donors). Additional PEPFAR funding was obtained late in the evaluation study period but allowed for the organization of some highly valued workshops for analysis. But even these investments are only a fraction of the total scale-up funds needed to develop mature country-driven and routine health information systems.

2.11 Building Capacity for Future Evaluations

To strengthen future evaluations there is a need for systematic predictable funding; strong country-led, long-term evaluation plans; alignment with international standards; and in-country capacity building. The Evaluation Study Consortium's major role in this evaluation study was to develop the basic approach and data collection instruments needed for the evaluation study as well as to provide limited technical assistance. The tools and procedures resulting from the evaluation study will constitute a "Model Evaluation Platform" that incorporates the experiences gained during this evaluation study and will be available for use in future evaluations.

The Model Evaluation Platform will contribute significantly to capacity building. Capacity building was also achieved through the following four workshops:

- A data quality and analysis workshop for secondary data—Glion, Switzerland, April 2008 (workshop was financed by PEPFAR)
- Modeling workshops on HIV/AIDS and malaria—Nairobi, Kenya, April 2008
- A modeling workshop for countries with concentrated HIV epidemics—London, United Kingdom, May 2008
- A data analysis workshop for countries that have conducted additional data collection—Calverton, Maryland, USA, July 2008 (workshop was financed by PEPFAR).

The evaluation study has contributed significantly to capacity building in the processing of the data collected in the different surveys. Extensive data processing assistance was provided to all countries with primary data collection. Indeed, one country that did not initially desire assistance did receive extensive help when a number of problems were identified at the tabulation stage that had not been identified during data editing. A four-week visit by the Evaluation Study Consortium data processing subcontractor was necessary to resolve these problems through close collaboration with and capacity building of local staff.

The materials and approaches developed for this evaluation study are important capacity-building instruments that will be invaluable for future evaluations. Applying the same methods and approaches in the same sample areas will provide a powerful means to study trends and to more directly relate scale up to results than was possible through a one-time cross-sectional study.

Further capacity building has occurred through the detailed comments provided on locally drafted reports, which have enhanced the understanding of the data and their use for program and policy implications.

Apart from the workshops, capacity building was largely on-the-job, as there was neither time nor resources for longer formal training exercises in all the participating countries. Indeed, the country operations in the 10 countries with no additional district data collection were mostly locally executed and overseen. Most of the assistance was provided to the eight countries with the district surveys due to the special requirements generated by the new data collection activities.

This evaluation study is affected by the absence of a solid and consistent baseline dataset upon which to base the conclusions regarding the scale up because of the lack of high-quality, routinely collected data on the three diseases and the absence of good quality financial data at the district level. The classification of districts by level of scale up posed its own problems because of the interference of factors other than the scale up. Unless explicit attention is paid to the necessary data generation at the start of a project or program, there will inevitably be major data gaps at the time of subsequent evaluations.

3 DATA AVAILABILITY, QUALITY, AND IMPLICATIONS FOR MONITORING AND EVALUATION

3.1 DATA NEEDS

This chapter describes the data availability and quality issues that affect performance monitoring and evaluation (M&E); considers what the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund), the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), and other partners have done so far to strengthen data availability and quality; and discusses what is needed to improve M&E.

From the perspective of the evaluation study, the following four key questions require a response:

- Are country health information systems (HIS) currently able to deliver the data needed to evaluate the impact of the scaling up of interventions?
- Are country HIS currently able to deliver the data needed by the Global Fund and its partners for performance-based disbursement?
- Have the tools developed by the Global Fund for its own M&E purposes, including the data quality assessment tool, the M&E toolkit, and the data quality checklist, contributed to strengthening country HIS?
- To what extent has the focus of the global health initiatives and donors on accountability been associated with improvements in country HIS?

3.2 HEALTH INFORMATION STRENGTHS AND WEAKNESSES IN COUNTRIES

M&E systems have several different objectives. Monitoring represents an ongoing activity to track project progress against planned tasks. It aims at providing regular oversight of the implementation of an activity in terms of areas such as input delivery, work schedules, and targeted outputs. Program/project evaluation represents a systematic and objective assessment of ongoing or completed projects or programs in terms of their design, implementation, and results.[1] M&E systems make extensive use of HIS and health management information systems (HMIS). HIS provide the routine data necessary to monitor developments in all areas of health care provision, mainly through the routine generation of programmatic data. HMIS focus on the data generated through the HIS but also on the management aspects of health care such as human resources, finances, transport, logistics, and infrastructure.

This report uses information from four sources to assess the quality of information in country HIS: (1) a brief review of data collection efforts since 2000 in the 18 evaluation study countries, (2) a data gap analysis undertaken by 11 evaluation study countries, (3) an independent expert review of mortality data, and (4) an assessment of data quality supported by the Health Metrics Network (HMN) in six of the evaluation study countries preceding the evaluation study. In fact, 15 of the 18 countries received grants from HMN to conduct such an assessment, but not all had completed

[1] PASSIA. 2002. Civil Society Empowerment: Monitoring & Evaluation, Seminar. Accessed March 2009. http://www.passia.org/.

it at the time of the evaluation study. Only Haiti and Peru did not receive HMN grants, and the grant for Mozambique is pending. For the rest of the countries, the grant amount varied from US$500,000 in Ghana to less than US$39,000 in Burundi. On average, grants were about US$151,000, with four countries receiving US$50,000 or less (Burkina Faso, Burundi, Democratic Republic of the Congo [DR Congo], and Lesotho). None of the grants was made available before 2006, so the time elapsed before the five-year evaluation was short, and it is unclear what time it took to spend the allocated funds and on what specific activities, although all were meant to strengthen country M&E, HIS, and HMIS.

The process of scaling up has been accompanied by greater demand for accountability and improved managing for results. Table 3.1 summarizes the data collection efforts since 2000 of countries in terms of health surveys, health facility-based information, surveillance, vital registration, and financial information, including only data collection activities that provide information relevant to the three diseases. In several areas, investments have been made to improve M&E, both at the programmatic and at the outcome level. Examples of improvements include the following:

- **Surveys:** Better data availability on health outcomes; for example, including HIV testing in national surveys and introducing malaria indicator surveys
- **Facility assessments:** Service Provision Assessments (SPAs) for HIV, malaria, and other health programs and Service Availability Mapping (SAM) to assess health service delivery in general
- **Clinical data:** Selected efforts to strengthen clinic-based information systems, focusing on the reporting of medical interventions (see disease-specific chapters) and the introduction of information technology, such as an electronic reporting system in PEPFAR-supported clinics in Zambia.

Table 3.1: Recent Data Collection Activities in Evaluation Study Countries

	Surveys: General Population	Surveys: Risk Populations	Surveys: Specific	Facility Assessment	Vital Registration	Financial Reviews
Benin	2006, 2001 DHS	2001-2002 BSS				2007 NASA
Burkina Faso	2006 MICS; *2008-2009,* 2003 DHS	2002 BSS; 2001 PLACE				2008 NHA
Burundi	2000 MICS	2003-2004 BSS				2008 NHA
Cambodia	2005, 2000 DHS; 2000 MICS	1997-1999 BSS	2000 Cambodian Household Male Survey, BSS IV NCHADS			2006 NASA
DR Congo	2006 DHS					2006 NASA
Ethiopia	2005, 2000 DHS	2005, 2002 BSS	2007 MIS	2005 HIV		2008, 2006, 2003, 2000 NHA
Ghana	*2008,* 2003 DHS; 2006 MICS/AIS	2000-2003 BSS	2007 Maternal Mortality Survey	2002 SPA		2006, 2004 NASA; 2002 NHA
Haiti	2005-2006, 2001 DHS	2006 PLACE; 2003, 2000 BSS				2006 NASA 2008 NHA
Kyrgyzstan	2005-2006 MICS; 1997 DHS	2002-2003 PLACE			YES	2006 NASA
Lesotho	2004 DHS; 2000 MICS	2004 PLACE; 2001-2002 BSS				
Malawi	2006 MICS; 2004-2005, 2000 DHS	2004 BSS		2004 Facility Census		2005 NASA 2008 NHA
Moldova	2005 DHS; 2000 MICS	2003-2004 BSS	2005 KAP Survey		YES	
Mozambique	*2008 MICS;* 2003 DHS; 2001 RHS		2008 AIS			2006, 2005, 2004 NASA 2009 NHA
Peru	*2008,* 2007, 2002-2006, 2000 DHS	2007-MSM Sex workers Prisoners				2007, 2006, 2005 NASA
Rwanda	*2007,* 2005, 2000 DHS; 2000 MICS	2005 PLACE		2007, 2001 SPA; 2004 SAM		2006 NASA 2008 NHA
Tanzania	2004-2005 DHS	2004 BSS	2007 AIS/MIS; 2003-2004 AIS	2006 SPA; 2005-2006 SAM		2005 NASA
Vietnam	2002 DHS	2000-2002 BSS	2005 AIS			2006 NASA
Zambia	2007, 2001 DHS; 2000 MICS	2005 PLACE	2008, 2006 MIS; 2005, 2003, 2000 SBS	2006 Facility Census; 2005 SPA; 2004 SAM		2006 NASA

AIS=AIDS Indicator Survey; BSS=Behavior Surveillance Survey; DHS=Demographic and Health Survey; KAP=Knowledge Attitude and Practice; MICS=Multiple Indicator Cluster Survey; MIS=Malaria Indicator Survey; NASA=National AIDS Spending Assessment; NCHADS=National Center for HIV/AIDS, Dermatology and STD (Cambodia); NHA=National Health Accounts; PLACE=Priorities for Local AIDS Control Efforts; RHS=Reproductive Health Survey; SBS=Sexual Behavior Survey

Most activity in information system strengthening has targeted HIV/AIDS. There has been no major effort to strengthen tuberculosis (TB) reporting systems, though this may, in part, reflect the maturity of TB reporting compared with HIV/AIDS reporting. In recent years, new malaria data have been generated using household surveys. Although M&E is the third of the "Three Ones" for HIV/AIDS, no significant progress has been made in integrating HIV/AIDS M&E into more general health information or statistical systems.

There have been some positive spillover effects from increasing resources for HIV/AIDS monitoring. These include greater frequency of household and facility surveys; introduction of non-HIV topics into some data collection instruments; inclusion of biomarkers in surveys (blood used for HIV testing was also used to test for anemia or syphilis); and innovations in clinic reporting systems, especially in relation to antiretroviral (ARV) monitoring. However, these improvements have been almost serendipitous; there has been no strategic approach to strengthening country information systems and no attempt to build upon potential synergies with efforts to strengthen country statistical systems and capacities.

In some cases, improvements have been fragmented along disease lines, creating problems of overlap and duplication at the country level. For instance, surveys targeting the three diseases are implemented in a poorly coordinated way by different donors. The rush to strengthen clinic-based reporting systems to support the long-term management of people on ARV therapies has resulted in the introduction of multiple information technology solutions, including electronic medical records and a range of noncompatible hardware and software.

At the start of the evaluation study, 11 countries conducted a data gap analysis.[2] Country teams identified a wide range of problems that affect the quality of monitoring performance and the ability to evaluate programs. The main cross-cutting issues concerned the lack of data on mortality and causes of death, disease and disability incidence and prevalence, health systems and health service delivery, and subnational data. Virtually all countries raised concerns about the quality of institutional- or clinic-based data and statistics. Problems cited include underreporting, inconsistencies, omission of data items, absence of data from private-sector facilities, lack of timeliness in reporting, and absence of data quality control mechanisms (Malawi, Mozambique, and Zambia). Comparisons between statistics from the routine HIS and from the district survey (Cambodia, Haiti) found a lack of congruence between the two sources; in general, the HIS reported higher values for comparable indicators than the survey.

Overall, the routine health facility information system was characterized by redundancy with overlapping information flows inhibiting an integrated analysis of data availability and quality and a failure to link across disease categories or between facility, district, provincial, and national levels. Most countries reported that the coverage and timeliness of TB data was better than for other areas. In general, there is greater confidence in the robustness of data derived from household surveys than of data from clinics, especially when it comes to information on service utilization, risk factors, and child mortality.

The findings from the data gaps assessment in the 11 evaluation study countries are reinforced by the earlier comprehensive assessment of data availability and quality conducted by countries using the HMN assessment tool.[3] Of the 18 countries in the evaluation study, six—Benin, Cambodia, Ghana, Lesotho, Moldova, and Vietnam—included the results of these assessments in their Country Impact Evaluation Reports. Findings from the assessment were remarkably consistent; inadequate policy and legislative frameworks, absence of or failure to implement national strategic plans, absence of independent mechanisms for reviewing data quality, and nonfunctioning

[2] http://www.theglobalfund.org/en/terg/announcements/impactforum/

[3] Health Metrics Network. 2007. Assessing the national health information system: An assessment and monitoring tool. Version 4.00. Geneva: World Health Organization.

coordination mechanisms were commonly cited. A particular problem identified was the absence of a regulatory framework to ensure that the private health care sector participates in the national HIS. Countries also mentioned weak capacities in data analysis and use of information technologies.

Countries in this evaluation noted serious gaps in the status of data sources from which data for the key indicators are drawn, with heavy reliance on externally funded household surveys such as Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). Problems were noted due to lack of coordination in terms of the timing of surveys and possible overlap and duplication between them, but also imbalance as major gaps in information (e.g., adult health issues) are not addressed.

The ability of routine administrative records to generate reliable and timely data on health system indicators such as the availability and distribution of human resources and services (especially from the private sector) was described as inadequate. Several countries had conducted facility assessments in an effort to fill the gaps, including Ghana, Rwanda, Tanzania, and Zambia. However, such surveys have been conducted only occasionally, and regular monitoring must rely on the incomplete and potentially biased facility reporting.

Vital statistics systems were uniformly perceived as weak, with the sole exception of Moldova. This assessment is validated by an independent expert review of the availability and quality of data on levels and causes of mortality.[4] Of the 18 countries involved in the evaluation study, only Moldova and Kyrgyzstan were judged to have medium- to high-quality data on levels and causes of death; Haiti and Peru were judged to have cause of death data of low quality or limited use. None of the other countries had usable mortality data. This raises fundamental questions about the ability of these countries to monitor impact, given the current levels of development of their HIS.

With regard to data quality for the three disease areas, the 18 evaluation study countries flagged some strengths but also many weaknesses in their HIS, which hampered the ability to evaluate impact. Further detail on data quality is provided in each of the disease-focused chapters. The general findings on data quality from the Country Impact Evaluation Reports can be summarized as follows:

HIV/AIDS

Strengths

- Data on HIV prevalence are improving through increased frequency of surveys with HIV testing.
- Antenatal clinic-based HIV surveillance is improving in several countries with increased age-specific reporting; there is considerable scope for strengthening of surveillance among risk populations, although it remains complicated, especially for the reliable assessment of trends.

[4] Mahapatra, P., K. Shibuya, A.D. Lopez, F. Coullare, F.C. Notzon, C. Rao, and S. Szreter, on behalf of the Monitoring Vital Events (MoVE) writing group. 2007. Civil registration systems and vital statistics: Successes and missed opportunities. Lancet 370(9599): 1653-1663.

- The frequency of surveys with HIV/AIDS-related questions on knowledge, behavior, and intervention coverage is increasing, although validity of behavioral data and the ability to reliably document trends remains difficult, especially in generalized epidemics.
- Data on intervention coverage by key equity stratifiers are available through household surveys.
- The availability and quality of health service delivery data on HIV/AIDS and, sometimes, other services is increasing (e.g., through special health facility assessments), but major gaps remain.

WEAKNESSES

- Data on interventions (ARV therapy, prevention of mother-to-child transmission of HIV/AIDS, and HIV testing and counseling) from health facility reports are of variable or poor quality because of the poor quality of national databases, insufficient quality control, and lack of investment in designated staff.
- Data on AIDS mortality and survival on treatment are very weak.
- Data on adherence to ARV treatment from facility reports are limited.
- Data on community interventions (care and support, orphans) through administrative records and surveys are very limited.
- Data on most at-risk populations are sketchy and often do not allow the study of trends due to data problems and representativeness of the populations on which studies are often based.
- Data quality control mechanisms are not well established or institutionalized.

TUBERCULOSIS

STRENGTHS

- Good facility- and district-based recording and reporting systems exist in most countries with accurate subnational and national information, allowing for the assessment of trends in case notification and treatment success rates.

WEAKNESSES

- Data on TB mortality in countries without civil registration systems are lacking.
- Data on disease prevalence are lacking because they can only be obtained through special surveys that are very costly because of low population prevalence requiring very large sample sizes.
- Data on equity is limited.
- Diagnostic intensity data from laboratories to help interpret trends in case notification has limited availability.
- Data on the availability of TB services is limited.

MALARIA

STRENGTHS

- Data on malaria intervention coverage by key equity stratifiers are becoming more frequently available through household surveys.
- Biomarkers for parasitemia and anemia in household surveys strengthen estimates of malaria prevalence.

WEAKNESSES

- Data on malaria mortality are lacking.
- Data on cases, admissions, and case fatality in health facilities or from surveillance facilities are limited.
- Data on availability and quality of the supply of malaria services in health facilities are limited.

HEALTH SYSTEMS

STRENGTHS

- Approaches to assessment of funding and expenditure are standardized through National Health Accounts.
- Drug monitoring systems exist in some countries.

WEAKNESSES

- Data on health system building blocks (governance, human resources, information, service delivery, medical products, vaccines, and technologies) are limited or often of poor quality.
- Data on financing flows at the district level are lacking.

From the Country Impact Evaluation Reports it is not possible to draw firm conclusions about the extent to which structural weaknesses of HIS have been addressed as a result of scaling up. However, an evaluation of the World Bank Multi-Country AIDS Program, which also covered several of the evaluation study countries, claimed to have resulted in significant strengthening of country M&E processes, as defined by the existence of a formal M&E unit, availability of M&E training materials, and a country M&E strategy and work plan (which is not always costed).[5] Despite these positive developments, data generated through the Ministries of Health were still regarded as weak, with the exception of data generated through household surveys and disease surveillance.

While the evaluation study countries were relatively confident in the completeness of reporting of TB data and reported improvements in timeliness and completeness of reporting over recent years, such improvements predate the scale up. On the other hand, there is some evidence of more attention being paid to data quality assessment in recent years. In Malawi, for example, the National AIDS Commission conducted several data gap analyses during 2007. Some countries reported that

[5] http://siteresources.worldbank.org/EXTAFRREGTOPHIVAIDS/Resources/717147-1181768523896/overview.pdf

support to monitoring and assessment workshops based on the Global Fund Monitoring and Evaluation Systems Strengthening Tool stimulated the development of a strategic plan for improving the routine HMIS for HIV/AIDS.

More recent positive developments include the increased frequency of household surveys with and without biomarkers, and, though to a lesser extent, facility assessments. But there is only piecemeal progress in facility-based reporting systems for specific interventions and health service delivery monitoring and no progress in obtaining data on cause of death through vital statistics systems.

3.3 Global Guidance to Monitoring and Evaluation Provided through Scaling-up Efforts

Scaling-up efforts have stimulated greater attention to the need to provide resources and guidance to country M&E efforts. Much of the international funding for health information has been through PEPFAR and is heavily weighted toward M&E in relation to HIV/AIDS and specifically to its own programs. Instruments such as the DHS surveys sponsored by the U.S. Agency for International Development and the MICS surveys sponsored by the United Nations Children's Fund contribute to enhanced M&E across all three diseases and beyond, as do other surveys such as the Behavioral Surveillance Surveys as noted in Table 3.1. All countries participating in this evaluation study had at least one DHS, and many had multiple DHS surveys. Facility-based reporting and surveillance systems rely on a wide array of donors, but the United States tends to be the largest funder.

The Global Fund has been systematic in encouraging country grant recipients to improve their ability to monitor results and evaluate progress. M&E is a key component of performance-based funding.[6] Each Global Fund grant agreement includes a Performance Framework, a legal document through which the recipient organization and the Global Fund commonly agree on the indicators to be used and the targets to be achieved in order to demonstrate performance and, consequently, ensure continued funding. Indicators cover the following:

- **Process:** The activities, systems, actions, and other outputs that need to be completed in the near term to achieve improvements or increases in coverage or delivery of services to target groups
- **Coverage:** The changes in key variables in the medium term that demonstrate that larger numbers of individuals in identified target groups are being reached by and benefit from improved services or interventions
- **Impact:** The changes over a longer period in sickness and death, or the burden of disease, in the target population that indicate that the fundamental objectives of the interventions have been achieved.

Tracking such indicators implies confidence in the ability of national programs and associated projects to generate high-quality data in a timely way. Furthermore, it requires realistic targets. In response, the Global Fund developed the M&E Systems Strengthening Tool, a generic instrument

[6] Low-Beer, D., H. Afkhami, R. Komatsu, P. Banati, M. Sempala, et al. 2007. Making performance-based funding work for health. PLoS Medicine 4(8): e219.

for assessing the data collection, reporting, and management systems used to measure indicators of program and project success.[7] The tool is intended to be used at the national level, within groups of projects, and within individual projects or organizations. It consists of three components in the form of checklists designed to facilitate the following:

- An assessment of the program or project M&E plan and capacities
- An evaluation of how the M&E activities are linked and integrated within the national health M&E system
- The development of a financial plan to strengthen M&E systems.

The Global Fund has also developed guidelines for submission of an M&E plan for Global Fund grants.[8] These guidelines are intended to inform the Country Coordinating Mechanisms, the Principal Recipient, the subrecipients, the Local Funding Agent, and the Fund Portfolio Managers of the minimum requirements needed for submission of an M&E plan for Global Fund grants. The M&E plan is an essential document for a country because it describes how the M&E system should be run and the measures that will be taken to strengthen it over time. It is also a required document for the Global Fund because it provides additional details to the Performance Framework.

While these various guidelines serve some useful purposes in terms of highlighting the importance of M&E, they do not directly address the availability and quality of data at the country level and how countries might draw upon Global Fund grants to improve matters. Even though the Global Fund Secretariat has recommended that countries allocate a proportion of grants to improving health information, few country proposals have focused significant energies on this component and, as a result, there has been limited progress at country level in terms of the ability to monitor health impact. A more systemic approach is needed that addresses the scope, form, and content of the implementation processes needed to strengthen a country HIS, bearing in mind specific local factors, such as the structure of government, the level of development, institutional capacities, and financial considerations.

Potentially, the focus on accountability that accompanies scaling up offers new opportunities to strengthen data compilation and management and to enhance the quality of analyses to produce reliable and comparable statistics. A new approach and resources are needed across the range of data sources required for monitoring the scale up to address priority information gaps, including the following:

[7] USAID. 2007. Monitoring and Evaluation Systems Strengthening Tool. Washington, DC: USAID. http://www.theglobalfund.org/documents/me/M+E_Systems_Strengthening_Tool.pdf.
[8] The Global Fund. 2007. Guidelines for submission of an M&E plan for Global Fund Grants. Geneva: The Global Fund. http://www.theglobalfund.org/documents/me/M_E_Plan_Guidelines_en.pdf.

- **A more systematic investment and coordinated approach of all partners is needed:** The increased demand for monitoring performance and evaluation of scaling up requires a more systematic and coordinated approach involving all major partners than is currently the case. There is a need for regular quality data on finances, service delivery, coverage of interventions, and health status over time. Global alliances and partnerships should earmark significant new resources for the development of country mechanisms to generate reliable and timely data at the national and subnational levels and should monitor the use of resources for this purpose.
- **Regular reviews based on well-functioning systems should become the foundation for evaluation:** A country HIS that provides regular data on the key indicators covering inputs, outputs, outcomes, and impact should be the basis for all regular progress reports and for evaluation of the scale up, focusing on analysis of all existing data and validation.
- **Performance-based funding mechanisms can only work with better data:** The evaluation study has exposed multiple problems in clinic- and program-based reporting systems that often form the basis for the assessment of performance against specific targets. Financial incentives may further aggravate the problems, and current efforts to deal with this are not adequate. The development of an internal quality assessment component as part of facility-based reporting systems is essential but not enough. Regular independent assessment of the quality through further analysis, facility assessment, and population-based data collection is essential.
- **Increased country capacity is essential for establishing and maintaining a good HIS and for its regular quality assessment and evaluation:** Particular attention needs to be paid to the human resources available at the level of the immediate data source and on whom the content of the HIS largely depends. Such staff is more often than not of low administrative level and subject to turnover and performance issues often associated with staff at the lower administrative levels of government. Particular solutions to this problem must be country-specific, but it can be ventured that without an adequate financial incentive program, there is the risk that data collection and reporting will remain incomplete for certain clinics, regions, or diseases. To ensure high-quality data, HIS would also benefit from the establishment of country-based institutions, independent of program implementation, with responsibilities for oversight and data quality control across all disease areas. Such agents should have the ability and resources to conduct objective analytic assessments of data and to commission special data collection activities as required.
- **Major data gaps in health systems and other indicators should be addressed:** International support and resources are urgently needed to permit performance monitoring and future evaluations. The following are priorities: (1) assist countries in the development of a coherent 10-year plan for health data collection and analysis that meets all priority data needs and includes major data sources; (2) enhance monitoring of health system building blocks and performance, with emphasis on improving data on financing, human resources, and health service delivery through district-focused information systems; (3) improve surveillance and service statistics, including through the use of appropriate information technology; (4) focus health surveys on critical unmet needs such as indicators and biomarkers for monitoring the impact and assessment of data quality; and (5) strengthen birth and death registration, including attribution of cause of death. While this is a long-term goal, investments need to be made now in order to ensure that these data are available in the future.

Key actors in bringing about these changes at country level are the Ministry of Health, the National Statistics Office, academic and research organizations, and the disease-specific programs and institutions. Donors, development partners, health partnerships, funds, and technical agencies, including the World Health Organization, HMN, the Joint United Nations Programme on HIV/AIDS, the Global Fund, PEPFAR, and the World Bank, are critical partners in providing the necessary financial resources and technical support.

Working in collaboration, all stakeholders should work toward the strengthening of the country health information and statistical architecture, including the development of a national, prioritized, and costed plan for HIS strengthening and the allocation of roles and responsibilities. The HMN Framework provides guidance on the contents and roadmap for such a plan.[9] A first step is forging agreement on a list of indicators for each disease on which each country will collect data, identifying relevant and appropriate data sources, and determining the level and frequency of data collection. The indicator list should be parsimonious and only include those that can be measured regularly without expending excessive resources. Responsibility for data collection needs to be assigned at the central and decentralized levels, with appropriate training and recruitment of staff as needed. Systems for data compilation, warehousing, archiving, sharing, and dissemination need to be developed and maintained. Reporting channels and frequencies need to be established as well as reporting modalities and quality-control measures, preferably through an independent, country-based institution. The precise modalities can only be defined on the basis of a consultative process between the local and international actors.

Indeed, the next step, financed by PEPFAR, in this evaluation study will be the organization of country-specific meetings during which appropriate next steps will be identified on the basis of the findings of this evaluation study in consultation with all country stakeholders.

[9] Health Metrics Network. 2007. Framework and standards for country health information systems. Geneva: World Health Organization.

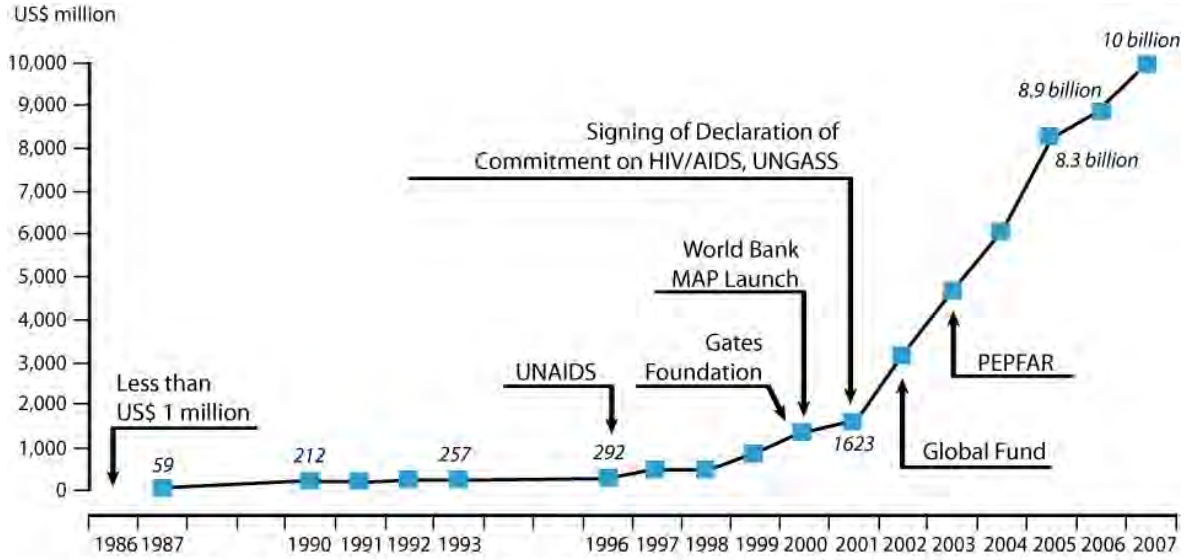
4 FUNDING FOR HIV, TUBERCULOSIS, AND MALARIA

4.1 INTRODUCTION

In 2006, the world spent a total of US$4.7 trillion on health. Eighty percent of this amount was spent by the 30 countries of the Organization for Economic Co-operation and Development (OECD), a group that make up less than 20% of the world's population. Countries in the African and Southeast Asian regions account for 38% of the world's population and for more than 50% of the global burden of disease. However, they account for only 2% of global health spending.[1]

OECD countries spent a larger share of their gross domestic product (GDP) on health (11%), compared with 4% in Africa and Southeast Asia. This translates to per capita spending of US$3,511 in OECD countries, which is 100 times more than the per capita spending in Africa and Southeast Asia. Seven countries in Africa and Southeast Asia spent less than US$10 per capita. Most of this spending was out-of-pocket spending by households. In low-income countries, the contribution of external resources is increasing and reached an average of 17% of health financing in 2006, compared with 12.5% in 2003. In some countries, external resources now comprise more than 70% of the total health expenditures.[2]

Figure 4.1
Total Annual Resources Available for HIV/AIDS, 1986-2007



Notes: [1] 1986-2000 figures are for international funds only
[2] Domestic funds are included from 2001 onwards
[i] 1996-2005 data: Extracted from 2006 Report on the Global AIDS Epidemic (UNAIDS, 2006)
[ii] 1986-1993 data: Mann and Tarantola, 1996
Source: UNAIDS and WHO unpublished estimates, 2007

There has been significant growth in resources for HIV/AIDS. Figure 4.1 shows the growth in financing for HIV/AIDS from *all sources combined,* through the years. In 2007, approximately

[1] WHO, National Health Accounts data
[2] WHO, National Health Accounts data

US$10 billion was made available for HIV/AIDS. Of this, about one-third was from domestic resources, both government and private out-of-pocket.

The other two-thirds come from external sources such that by 2005-2006, donors' annual commitments for HIV reached US$4.7 billion. This represents an average annual increase of 24% since 2000.[3] In 2007, commitments from the G8, European Community, and other donor governments totaled US$6.6 billion, with US$1.2 billion (18%)[4] being channeled through the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund).[5] Aside from the Global Fund, there are two other large funding mechanisms for HIV: the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and the World Bank's Multi-Country AIDS Program (MAP). The three account for more than half of resources going to HIV.

Global Fund annual disbursements for HIV and HIV/tuberculosis (TB) grew steadily from US$141 million in 2003 to US$711 million in 2006 (see Figure 4.2). By the end of 2008, the Global Fund had signed HIV and HIV/TB grant agreements with more than 100 countries worth US$8.4 billion, of which US$2 billion is approved in principle. Of this, US$4.3 billion has been provided to countries.[6]

PEPFAR provided the most resources for HIV. In fiscal year 2004, during its first year of funding, PEPFAR disbursed US$535 million net of funds for the Global Fund.[7] Net cumulative funds made available during 2004-2007 totaled US$11 billion (US$12 billion when including funds for the Global Fund), of which 67% (US$7.5 billion) was disbursed to 114 countries (70% or US$8.6 billion if inclusive of funds for the Global Fund).[8]

The World Bank began lending for HIV in 1989 but on a relatively limited scale until its Africa MAP began in 2000. The World Bank MAP committed a total of US$1.6 billion in HIV funding to more than 30 countries in Africa.[9] It started disbursing US$12.9 million in 2000/2001, and disbursements have now reached more than US$1 billion.[10] In addition to the MAP, the World Bank has many other AIDS lending projects and lending projects in health and other sectors that

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[3] OECD/ Creditor Reporting System: Aid Activities in Support of HIV/AIDS Control, 2000-2007. http://www.oecd.org/document/36/0,3343,en_2649_34469_39967140_1_1_1_1,00.html

[4] Kates, J., J.A. Izazola, and E. Lief. 2008. Financing the response to AIDS in low- and middle-income countries: International assistance from the G8, European Commission and other donor Governments, 2007. Geneva: Kaiser Family foundation and UNAIDS. http://www.kff.org/hivaids/internationalfinancing.cfm

[5] The Global Fund is a multilateral financing mechanism and, as such, receives funding from multiple donors, including bilateral funding from countries such as the United States. As this is an evaluation of the Global Fund, amounts are presented separately for the Global Fund. However, the estimates in this chapter were derived to ensure that there is no double counting due to the separate presentation of the Global Fund disbursements. It is also made clear in the introduction what proportion of the bilateral donor's funding for HIV and for Malaria (specifically the U.S. President's Malaria Initiative) is going through the Global Fund.

[6] "Funds committed and disbursed" database search tool (www.theglobalfund.org/programs/search/?search=3&lang=en) and "Disbursements in details" file (www.theglobalfund.org/documents/disbursementsindetail _raw.xls)

[7] See "outlays" in document www.pepfar.gov/documents/organization/98763.pdf.

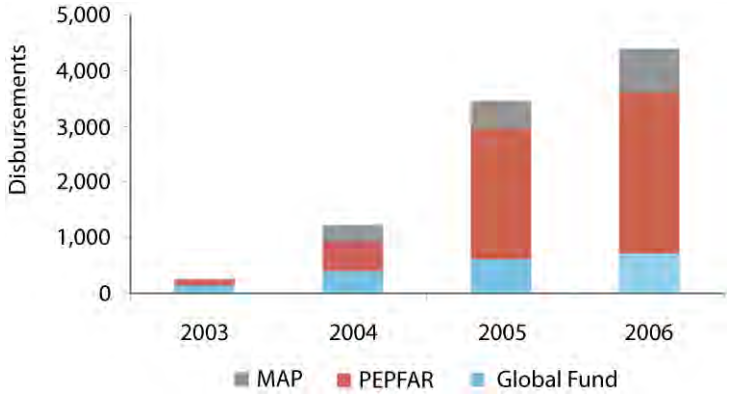
[8] See "available" and "outlays" in document www.pepfar.gov/documents/organization/110518.pdf.

[9] http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRHEANUTPOP/EXTAFRREGTOPHIVAIDS/0,,contentMDK:20415735~menuPK:1001234~pagePK:34004173~piPK:34003707~theSitePK:717148,00.html

[10] Figure 3.1 of "The Africa Multi-Country AIDS Program 2000–2006."

also have HIV components. In all, World Bank commitments to HIV now stand at US$3.97 billion, of which US$2.98 billion have already been disbursed.[11]

Figure 4.2
HIV Disbursements by Main External Contributors (US$ Million), 2003-2006



Sources:
Global Fund—Disbursements in detail (www.theglobalfund.org/documents/disbursementsindetail_raw.xls)
PEPFAR—Summary Financial Status documents of 2004 through 2008 (net of outlays for the Global Fund) (www.pepfar.gov/documents/organization/110518.pdf)
MAP—"The Africa Multi-Country AIDS Program 2000–2006," Figure 3.1 (http://siteresources.worldbank.org/EXTAFRREGTOPHIVAIDS/Resources/717147-1181768523896/ch3.pdf)

The Global Tuberculosis Control Report 2008 showed that available funding for TB control in 86 countries was US$2.7 billion in 2008 and that for the 22 high-burden countries available funding increased from US$0.6 billion in 2002 to US$2.3 billion in 2008.[12] A large part of the increase can be attributed to the Global Fund. The Global Fund has approved grants worth US$2.2 billion for TB in more than 100 countries, (including US$0.2 billion approved in principle), of which US$1.1 billion has been disbursed. Disbursements started at US$0.5 million in 2002 and increased to US$317 million in 2008.[13]

For the 22 high-burden countries combined, the total cost of TB control is estimated at US$2.2 billion in 2007, compared with US$0.6 billion in 2002. The contribution of high-burden countries' governments to the total costs of TB control excluding loans averaged 86% during the period 2002-2006. However, starting in 2007, the relative share of government funding dropped to 70%. Seven high-burden countries are dependent on external funding to cover about 50% or more of the total funding for tuberculosis in 2007.

For malaria, the Global Fund committed a total of US$4.6 billion in about 80 countries, of which US$2 billion is approved in principle. Disbursements total US$1.8 billion, starting with less than US$200 million in 2003-2004 (see Figure 4.3).[14]

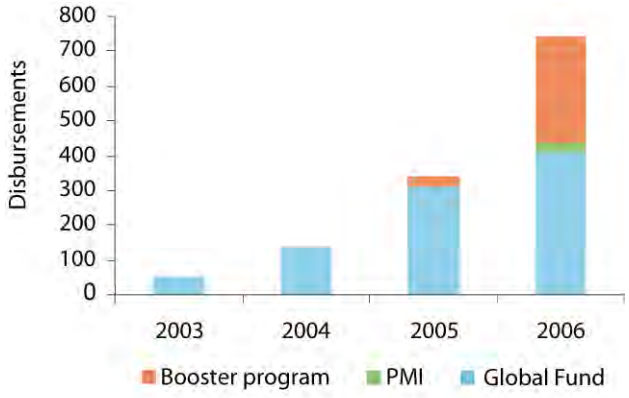
[11] World Bank AIDS website, lending page: http://web.worldbank.org/ WBSITE/ EXTERNAL/ TOPICS/ EXTHEALTHNUTRITIONANDPOPULATION/EXTHIVAIDS/0,,contentMDK:20385424~menuPK:376498~pagePK:210058~piPK:210062~theSitePK:376471,00.html
[12] *Global Tuberculosis Control* 2008 report, Figure 3.13 "Total TB control costs in 2008 in 22 high-burden countries and 64 other countries by region country reports compared with the Global Plan" and Figure 3.8 "Total TB control costs by source of funding, high-burden countries, 2002–2008."
[13] "Grants in detail" and "disbursement in detail" from www.theglobalfund.org/en/commitmentsdisbursements.
[14] Ibid.

Preceding the President's Malaria Initiative (PMI), U.S. bilateral funding for malaria remained fairly flat, while contributions to the Global Fund increased dramatically—the U.S. government's share of malaria spending through the Global Fund tripled from US$47 million in 2002 to US$147 million in 2006. However, bilateral aid is now becoming the main mode of U.S. government financing with the launch of PMI, a five-year expansion of U.S. government aid that aims to spend an additional US$1.2 billion between 2005 and 2010 in 15 African countries. In fiscal year 2006, US$30 million was made available for three countries, increasing to US$300 million in 2007 for 15 countries.[15]

The World Bank malaria global strategy and booster program has committed, since 2005, to provide US$460 million in 18 countries.[16] This represents a ninefold increase, compared with the baseline funding of less than US$50 million before 2005.

In 2007, government contributions as a share of malaria spending (government plus external financing) among the 67 countries reported in *Global Malaria Report 2008* ranged from 6% in Africa to 71% in Southeast Asia and 97% in the Americas (compared with 38%, 75%, and 98%, respectively, in 2003).[17]

Figure 4.3
Malaria Disbursements by Main External Contributors (US$ Million), 2003-2006



Sources:
Global Fund—Disbursements in detail (www.theglobalfund.org/documents/disbursementsindetail_raw.xls)
PMI—Annual report 2008
World Bank—Booster website

A review of global flows of funds up to 2006 shows that—

- Global health spending in 2006 was US$4.7 billion. On average, external resources accounted for 17% of total health expenditure in low-income countries.
- At the time of the writing of this report, the Global Fund had committed a total of US$18.5 billion in more than 100 countries, of which 65% is for HIV, 12% for TB, and 23% for malaria.

[15] See page 5 of PMI second annual report, March 2008.
[16] http://siteresources.worldbank.org/EXTAFRBOOPRO/Resources/MalariaFlyer.pdf
[17] Annex 7, Global Malaria Report 2008

- Of the three major donors studied, PEPFAR is the leading funder in HIV. For TB, the Global Fund is the main source of external financing and is expected to maintain this. The Global Fund has been the main source of external financing for malaria, but the World Bank Booster Program and PMI will probably be providing a larger share of external assistance in the future.
- Considerably more countries benefit from funding from the Global Fund, whereas the malaria and HIV program of the World Bank, PEPFAR, and PMI are focused on a smaller set of countries.

4.2 Study Methods and Data Sources

Methods

The findings of this evaluation study are based on a review of national records, existing reports, and studies on HIV, TB, and malaria funding. A desk review was done for all 18 countries. In addition to these reviews, in five Primary Data Analysis Countries (PDACs), National Health Accounts (NHA) and HIV, TB, and malaria subaccounts were conducted for 2003 and 2006. These countries are Burkina Faso, Haiti (2006 only), Malawi, Tanzania (except Zanzibar), and Zambia. The 13 countries for which only a desk review was done are the 10 Secondary Data Analysis Countries (SDACs) (Benin, Burundi, Democratic Republic of the Congo [DR Congo], Ghana, Kyrgyzstan, Lesotho, Moldova, Mozambique, Rwanda, and Vietnam), and three were PDACs (Cambodia, Ethiopia, and Peru) where the NHA component was cancelled.

The desk review concentrated on publicly available data from major donors on their disbursements. For those countries with NHA and subaccounts, primary data collection and review of documents was initiated in-country by local teams with technical assistance from the World Health Organization (WHO) and the U.S. Agency for International Development (USAID) in two of the five PDACs. NHAs track the flow of funds through the national health system from source to users (from financing sources, through financial institutions, to providers and functions) and summarize the data through key financial indicators. These complex financial flows are disaggregated into a set of discrete two-dimensional matrices where all actors and transactions of the national health financing system are uniquely classified. The NHA methodology is also applied to capture data on a specific disease area (e.g., HIV/AIDS, TB, malaria).

For analysis of time trends and rates of growth, data have been converted to constant 2006 US$ using national GDP deflators. This eliminates the effect of inflation. For legitimate cross-country comparison of per capita values, estimates have been converted to international dollars. International dollars are derived by dividing local currency units by an estimate of their purchasing power parity (PPP) compared with a US$. PPPs are the rates of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price levels between countries. These should be used particularly for commodities and services not traded in the international market. For traded goods like drugs or lab tests, US$ could be used. Both GDP deflators and PPPs (2005 International Comparison Project) are from the World Bank. These two conversions into (1) constant 2006 US$ to determine the rate of growth within a country through the years and (2) constant international dollars for per capita values for cross-country comparison of purchasing capacity are important. Readers need to be mindful that they are also the potential sources of confusion in trying to compare these standardized figures with their own data in current or nominal US$.

DATA AND DATA SOURCES

For the purposes of this report, the different types of funding information available were consulted to maximize the amount of information that can be presented. A definition of terms is provided below (see Box 4.1).

Box 4.1: Types of Reported Data on External Resources on HIV/AIDS, Tuberculosis, Malaria

- *Pledge* is generally understood to mean a non-binding announcement of an intended contribution or allocation by the donor.
- *Commitment/appropriation/approved grant* is a firm obligation expressed in writing and backed by the availability of the necessary funds for a particular project, program, sector, trust fund, or support a domestic budget. The commitment date is the date of that written agreement. Commitments are usually multiyear (i.e., they are designed to fund expenditures for several years).
- *Disbursement/obligation/available funding* is the placement of resources at the disposal of the government or implementing agency. The disbursement date is the date at which those funds are made available.
- *Expenditure/outlay* is the actual spending of funds.

Edited from Oomman, N., M. Bernstein, and S. Rosenzweig. 2008. The numbers behind the stories: PEPFAR funding for fiscal years 2004 to 2006. Washington, DC: Center for Global Development

For all the 18 countries in the evaluation study, data on both commitments and disbursements are generally available, but disbursements represent what countries have on hand and can already spend. Thus, for the desk review, it was chosen to present information on disbursement by the main donors, and in a few cases where these were not available, commitments, appropriation, or budget data were used. In five countries, expenditure data were also collected through NHAs.

Table 4.1 outlines the data sources used in the desk review and details the data sources for NHA and subaccounts studies, which have been grouped into four categories: national record reviews; existing studies; reports, publications, and databases review; primary surveys; and estimations (see Annex 4.1 for more details on data sources).

Table 4.1: Data Sources for Desk Review of Estimates of External Fund Disbursements

HIV Estimates			
Global Fund Global Fund "Disbursement in detail"	**World Bank (MAP and Other Projects)** Status of Project Execution (SOPE)* (disbursements)	**PEPFAR** OECD Database on Aid Activities (CRS)** (disbursements)	**Other External Resources** OECD Database on Aid Activities (CRS)** (disbursements)
Tuberculosis Estimates			
Global Fund Global Fund "Disbursement in detail"	**World Bank** SOPE* (disbursements)	**USAID** 2006 "budget justification to the congress," fiscal year 2007 2003-2005 USAID "Infectious Diseases" country pages	
Malaria Estimates			
Global Fund Global Fund "Disbursement in detail"	**World Bank (Booster Program and Other Projects)** SOPE* (disbursements)	**PMI** PMI country's plan of action planned activities and expenditures	
Total Health Expenditure WHO NHA database (expenditures)			

*For ongoing projects and implementation completeness, and results reports for completed projects
**Creditor reporting system

Table 4.2: Data Sources for NHA/Subaccounts for the Five Countries with NHA

Category	Data sources for NHA/Subaccounts
National record reviews	Records of government-executed budgets (Ministry of Health, other ministries, autonomous government units, boards, social health insurance) Records of government-executed budgets by programs (preventive/public health/curative/administrative), by input (current/capital), tracking external resources financing Pharmaceutical purchases through central medical stores (public) for HIV/TB/malaria/others
Existing studies and database review	See Annex 4.1 on data sources, existing studies, and databases.
Primary data surveys	Donors, nongovernmental organizations, employers, insurers' surveys
Disease attribution estimates	Studies on disease-attribution and other research to produce the estimates where the actual data (inpatient versus outpatient attribution by disease) are not available

DATA AVAILABILITY AND VALIDITY

Data availability and validity affected our analysis, especially for the SDACs. Considerable data, at the level of disaggregation needed for the analysis, were not available or only available for selected points in time from the National AIDS Spending Assessment (NASA), United Nations General Assembly Special Session (UNGASS) reports, and WHO Global Malaria and Tuberculosis reports.

The quality of data is also of concern, especially if country data reported to the United Nations are the sole source of information with no possibility of triangulation using other sources. It is known that there are differences in the amount of effort spent in collecting the data. The Joint United Nations Programme on HIV/AIDS (UNAIDS) or national AIDS coordinating councils often provide seed funding for a national team to do a NASA or UNGASS report to collect the data because they require more detail in their reporting. On the other hand, TB and malaria survey questionnaires are filled in voluntarily by a key informant(s) in the countries. If there are several sources or agents of the funds in the country (e.g., nongovernmental organizations [NGOs]—more of a problem for HIV and malaria, less for TB), a single or limited source of information might not be able to provide a comprehensive account.

It should also be noted that there is a longer tradition of financial reporting in HIV, followed by TB and then malaria. Longer experience with reporting data, together with feedback and revision, is expected to result in the improvement of the quality of the data being collected.

Table 4.3 compares NHA-reported expenditures on HIV, TB, and malaria with those reported by UNGASS, the Global Tuberculosis Control report, and the Global Malaria report.

Table 4.3: Amount of Funds from External and Government Sources by Disease, as Reported by NHA and Global Reports (US$ Million), in Countries with NHA

	HIV		Tuberculosis		Malaria	
	NHA expenditure	AIDS report	NHA expenditure	Tuberculosis report	NHA expenditure	Malaria report
External Sources						
Burkina Faso	29	34	4	1	4	13
Haiti	72	70	6	-	5	3
Malawi	45	-	1	3	34	12
Rwanda	66	80	-	1	15	-
Tanzania	176	-	3	-	37	-
Zambia	118	161	5	5	27	-
Government Sources						
Burkina Faso	3	10	0.3	0.3	4	1
Haiti	0.4	0.4	3	-	2	-
Malawi	12	-	2	0.1	16	12
Rwanda	4	4	-	0.1	0.1	-
Tanzania	71	-	2	-	48	-
Zambia	15	29	2	0.8	35	-

Sources: NHA expenditure data come from the NHA exercises done for the evaluation study; Report on the Global Aids Epidemic (www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_report.asp) Annex 7; Global Tuberculosis Control report (data provided by WHO team) UNGASS Indicator 1; World Malaria Report 2008 (www.who.int/malaria/wmr2008/).

As previously stated, the parameter of interest for the evaluation study was the estimate of resources consumed. Commitments and disbursements are primarily financial transactions, involving the transfer of resources from a source to a recipient, and do not reflect actual consumption. The pragmatic approach initially adopted in this evaluation study was to try to get the data as expenditures directly from the countries, as in health accounting, and, if not available, to get the next closest level to expenditures. One would then prefer to get the "spending" as reported by the primary recipient, rather than disbursements as reported by the funder. More specifically, in the case of the Global Fund, the better public source is the document called "disbursement request," submitted by the principal recipient, which reports funds spent (as compared with the disbursement reports from the Global Fund).

Even "spending" as reported in the disbursement requests to the Global Fund are not always accessing expenditure-level information. There are as many multiple transactions before a resource is consumed as there are primary and secondary recipients or implementers. This is why it was found in the NHA that there were inconsistencies between what the principal recipient reports as being "spent" in the disbursement requests to the Global Fund and the actual expenditures in the country. For the principal recipient, disbursement of money to the secondary recipient or implementer could be considered as "spending" on their part, and such "spending" could be verified from their accounting records by the local funding agent (see sample in Annex Table 4.1). It is clear that when the secondary recipient or implementer receives the funds, the secondary recipient or implementer still needs to provide said service or good. Actual consumption takes place after some time, as there may be problems in getting permits from local authorities or staff needs to be hired or goods purchased. There could be considerable delays up to the point when the beneficiary actually receives the goods or services. In the most difficult case, even the purchasing of drugs (e.g., a six-month supply of antiretroviral drugs) cannot be considered as being consumed at the point that

they were purchased if they are intended to build up a stockpile. However, such intention is difficult to ascertain, and most drug purchases are conveniently treated as flows on the assumption of a steady-state stock.

For PEPFAR, the situation is still more difficult as much less data are available because aid is administered at two levels—centrally or by country offices. From records analyzed by the Center for Global Development,[18] only an average of one-third of the funds go directly to country partners; the rest goes through U.S.-based institutions that then set up mechanisms to implement their own activities in the country or subcontract to local institutions, which could in turn subcontract to another organization.

The PEPFAR quarterly obligation and outlay reports[19] show that by the end of March 2008 (see Annex Table 4.2), outlays since 2004 had reached 70% of obligations (compared with 37% at the end of 2004). However, the reports available on the PEPFAR website do not supply country-by-country reporting of outlays by year. This information is only available for the country activity budgets and was only reported starting in the first quarter of 2008.

Table 4.4 shows the difference between disbursement data as reported by donors collected through a desk review and donor-funded-expenditure data collected through an NHA in the country. It should be noted that HIV/AIDS disbursements may be for multisectoral activities (e.g., care for orphans and vulnerable children), whereas only health expenditures are tracked in NHAs.

Table 4.4: Expenditures of Donor Funds as Determined by NHA and Disbursements as Reported by Major Donors (US$ Million), in Countries with NHA, 2006

	HIV		TB		Malaria	
External Resources	NHA Expenditure	Major Donor Disbursements	NHA Expenditure	Major Donor Disbursements	NHA Expenditure	Major Donor Disbursements
Burkina Faso	29	17	4	2	4	0
Haiti	72	70	6	5	5	4
Malawi	45	72	1	1	34	6
Rwanda	66	73	-	1	15	33
Tanzania	176	134	3	0.4	37	35
Zambia	118	128	5	4	27	6

Source: NHA expenditure data come from the NHA exercises done for the evaluation. Major donor disbursement data are from same reports as in Table 4.1.

Because of the data issues mentioned in this section, the reporting of good expenditure data to relate to potential impact is clearly a limitation of this evaluation study, particularly for the SDACs. There are good disbursement data from donors, usually based on their accounting records. For reasons of consistency, for the SDACs, only disbursements by major donors are used in the evaluation study.

[18] "The Numbers Behind the Stories PEPFAR Funding for Fiscal Years 2004 to 2006," CGD, 2008. This describes the estimation process for the subgrantees under Track 1. "Since the authors lack information about subgranting from Track 1 grants, they lack complete information about the designation of Track 1 subgrantees. To estimate the amount of funds going to local FBO subrecipients of Track 1 funds, they have assumed that the same percentage of Track 1 funds as country funds are subgranted to FBOs, and they have assumed that the same percentage of Track 1 subgranted funds to FBOs as country subgranted funds to FBOs go to local recipients."

[19] http://www.pepfar.gov/about/c24880.htm

4.3 RESULTS

Disbursement data on external resources for the 18 countries are presented to respond to the following questions:

- Are disbursements from the major donors for each of the three diseases (HIV, TB, and malaria) increasing?
- What is the share in contribution in terms of disbursements of the major donors (with a special focus on the Global Fund) for each of the three diseases (HIV, TB, and malaria)?
- Is there variability in disbursements from major donors across the 18 countries for each of the three diseases (HIV, TB, and malaria)?

Expenditure data from the NHAs and disease-specific subaccounts in the five PDACs are presented to respond to the following questions:

- What are the trends in health expenditures?
- Is total health expenditure increasing?
- Is the total expenditure for each of the three diseases (HIV, TB, and malaria) increasing?
- What are the trends in disease-specific expenditures?
- What are the sources of expenditures (with a special focus on the Global Fund) for HIV, TB, and malaria?
- What is the share of disease-specific expenditures in HIV, TB, and malaria compared with the rest of health expenditures?

To provide overall context to the results of the evaluation study, total health expenditures from the WHO-NHA database are presented first. Note that these are completely consistent with the NHA expenditures from the five PDACs. However *disbursement* data from main donors may not be directly compatible with these expenditure data as has been discussed in the previous section.

According to the World Bank Gross National Income (GNI) grouping,[20] all the evaluation study countries, except Moldova and Peru, are classified as low-income countries. Tables 4.5 to 4.7 present total health expenditures in absolute amounts, as a share of the GDP, and per capita.

[20] Economies are divided according to 2007 GNI per capita, calculated using the World Bank Atlas method. The groups are low income, US$935 or less; lower middle income, US$936-$3,705; upper middle income, US$3,706-$11,455; and high income, US$11,456 or more.

Table 4.5: Total Health Expenditures (Constant 2006 US$ Million), by Country, 2002-2006

Country	2002	2003	2004	2005	2006	Average Annual Growth Rate (%)
Benin	188	198	215	245	249	7
Burkina Faso	209	239	292	356	382	16
Burundi	28	28	29	31	29	1
Cambodia	304	351	394	435	426	9
DR Congo	217	281	300	338	368	14
Ethiopia	522	482	506	544	592	3
Ghana	672	676	709	758	802	5
Haiti	305	297	284	300	399	8
Kyrgyzstan	131	139	158	165	181	9
Lesotho	86	89	90	80	97	4
Malawi	176	222	256	250	277	12
Moldova	169	191	223	243	261	12
Mozambique	285	276	284	305	359	6
Peru	3,387	3,360	3,368	3,851	3,994	4
Rwanda	106	162	182	199	306	32
Tanzania	387	474	483	615	906	25
Vietnam	2,336	2,567	2,922	3,389	3,988	14
Zambia	589	630	653	578	681	4

Source: National Health Accounts database, World Health Organization, Geneva

In general, average annual growth rates for the absolute amounts of health expenditures from 2002-2006 were positive but low. Only Burkina Faso, DR Congo, Malawi, Moldova, Rwanda, Tanzania, and Vietnam reached an average growth rate of above 10%.

Table 4.6: Total Health Expenditures as a Percentage of GDP, by Country, 2002-2006

Country	2002	2003	2004	2005	2006
Benin	4.6	4.6	4.9	5.4	5.3
Burkina Faso	5.1	5.4	6.0	6.8	6.5
Burundi	3.2	3.2	3.2	3.4	3.0
Cambodia	6.3	6.8	6.6	6.4	6.0
DR Congo	3.2	3.9	3.9	4.2	4.3
Ethiopia	5.6	5.3	5.0	4.9	4.9
Ghana	6.5	6.2	6.2	6.2	6.2
Haiti	6.2	6.0	6.0	6.2	8.0
Kyrgyzstan	5.4	5.4	5.7	6.0	6.4
Lesotho	6.6	6.6	6.4	5.5	6.7
Malawi	10.0	8.5	12.8	12.2	12.4
Moldova	6.4	6.8	7.4	7.5	7.8
Mozambique	5.0	4.5	4.3	4.3	4.7
Peru	4.6	4.4	4.2	4.5	4.3
Rwanda	4.3	6.6	7.0	7.2	10.4
Tanzania	3.9	4.6	4.3	5.1	7.1
Vietnam	5.2	5.3	5.7	6.0	6.6
Zambia	6.7	6.7	6.7	5.6	6.2

Source: National Health Accounts database, World Health Organization, Geneva

As a share of GDP, only Malawi had health expenditures that were almost consistently more than 10% (see Table 4.6). This is the level of health spending more commonly associated with middle- and high-income countries (to which only Peru and Moldova belong). Changes in the share of health expenditure to GDP are because of changes in the numerator, denominator, or both. A decrease in the share of health expenditure to GDP means that the rate of growth of GDP is faster than the rate of growth of health expenditure (as shown in Table 4.5). A slow increase in the share of health expenditure to GDP, as is generally seen in these countries, means that the rate of growth of health expenditures is fractionally faster than the rate of growth of GDP. Haiti, Lesotho, Rwanda, and Tanzania show a greater than 1 percentage point increase in total health expenditure as a share of GDP in the last two years.

Table 4.7: Total Health Expenditure per Capita (Constant 2006 US$ and 2006 Int$), by Country, 2003-2006

	Constant 2006 US$				2006 Int$			
Country	2003	2004	2005	2006	2003	2004	2005	2006
Benin	25	26	29	28	59	63	69	68
Burkina Faso	18	22	26	27	49	58	69	72
Burundi	4	4	4	4	12	12	12	11
Cambodia	26	29	31	30	82	91	99	95
DR Congo	5	5	6	6	10	11	11	12
Ethiopia	6	7	7	7	24	24	25	27
Ghana	31	32	34	35	70	71	75	77
Haiti	33	31	32	42	70	66	68	89
Kyrgyzstan	27	31	32	34	91	102	106	115
Lesotho	46	46	40	49	88	88	77	93
Malawi	18	20	19	20	53	60	57	61
Moldova	48	57	63	68	130	154	170	185
Mozambique	14	14	15	17	74	74	78	90
Peru	126	125	141	145	267	264	299	307
Rwanda	18	20	22	32	49	54	58	87
Tanzania	13	13	16	23	41	40	50	72
Vietnam	31	35	40	46	101	114	130	151
Zambia	56	58	50	58	76	79	69	80

Source: National Health Accounts database, World Health Organization, Geneva

Peru and Moldova are the two low-middle-income countries in this evaluation, and, as expected, they are spending more per capita than the low-income countries. However, Vietnam and Kyrgyzstan are also spending at levels in PPP terms almost as high as Moldova. Burundi, DR Congo, and Ethiopia are spending very low amounts per capita. In US$ (not constant PPP), Burundi, DR Congo, and Ethiopia spent less than US$10 per capita per year. The Commission on Macroeconomics and Health recommended that countries on the average spend a minimum of US$38 (in US$2002 prices) to provide a basic package of services.[21]

[21] Macroeconomics and Health: Investing in Health for Economic Development, WHO, 2001. http://whqlibdoc.who.int/publications/2001/924154550X.pdf.

Table 4.8: External Funding Share (%) of Total Health Expenditure, by Country, 2003-2006

Country	2003	2004	2005	2006
Benin	17	13	21	13
Burkina Faso	25	27	28	29
Burundi	19	37	58	40
Cambodia	26	27	26	22
DR Congo	39	41	45	52
Ethiopia	16	35	38	43
Ghana	29	32	26	23
Haiti	18	18	19	66
Kyrgyzstan	9	15	8	10
Lesotho	8	11	17	14
Malawi	46	59	69	60
Moldova	3	5	2	5
Mozambique	45	51	68	60
Peru	1	1	2	2
Rwanda	42	41	59	52
Tanzania	27	20	25	44
Vietnam	3	2	2	2
Zambia	38	34	43	42

Source: National Health Accounts database, World Health Organization, Geneva

Globally, external resources increased between 2003 and 2006. Among the 18 evaluation countries, Malawi, Mozambique, and Rwanda have consistently had large proportions of their total health expenditures funded externally (see Table 4.8). Other countries also received increasing shares of external resources such that by 2006, five countries had more than 50% of their health expenditures funded externally.

IS THE TOTAL EXTERNAL FUNDING FROM THE MAJOR DONORS (GLOBAL FUND, U.S. GOVERNMENT, AND WORLD BANK) FOR EACH OF THE THREE DISEASES (HIV, TB, AND MALARIA) INCREASING?

This section describes external disbursement trends for the three diseases in the 18 countries. Table 4.9 shows that during 2003-2006, the disbursements for HIV clearly increased (more than 100% on average between 2003 and 2006). The step increase starts in most countries in 2004-2005, when the Global Fund and PEPFAR began disbursing funds. In 2006, Haiti, Malawi, and Mozambique continued to receive significant increases in disbursements.

Table 4.9: Major Donor Disbursements (Constant 2006 US$ Million) for HIV, by Country, 2003-2006

Country	2003	2004	2005	2006
Benin	9	17	19	21
Burkina Faso	13	15	17	17
Burundi	7	12	17	22
Cambodia	34	39	45	41
DR Congo	18	14	47	40
Ethiopia	63	72	142	146
Ghana	23	39	29	34
Haiti	39	41	41	70
Kyrgyzstan	0.1	3	6	5
Lesotho	3	4	9	11
Malawi	17	56	45	72
Moldova	2	3	5	6
Mozambique	23	83	80	117
Peru	1	7	7	9
Rwanda	30	54	67	73
Tanzania	41	74	117	134
Vietnam	10	15	29	44
Zambia	74	148	186	128

Sources: Global Fund, World Bank, USAID (including PEPFAR), UNAIDS

Total funding for TB increased relative to the baseline in 2003 (see Table 4.10). However, the increase is scarcely at the level that has been seen for HIV. In addition to this finding, in countries such as Ethiopia, Peru, Rwanda, Vietnam, and Zambia, the 2006 levels have nearly reverted to 2003 levels.

Table 4.10: Major Donor Disbursements (Constant 2006 US$ Million) for TB, by Country, 2003-2006

Country	2003	2004	2005	2006
Benin	0.3	1.3	1.5	0.3
Burkina Faso	0	2.0	1.3	2.4
Burundi	0.3	0.5	1.4	0.7
Cambodia	3.1	2.9	3.6	4.3
DR Congo	3.4	6.2	2.5	6.8
Ethiopia	11.8	6.1	7.6	5.6
Ghana	1.4	1.2	2.0	8.6
Haiti	3.1	6.7	2.1	4.5
Kyrgyzstan	0.6	1.0	1.1	1.0
Lesotho	0.2	0.8	0.7	0.2
Malawi	1.3	1.3	1.2	1.4
Moldova	2.1	3.2	0.3	0.3
Mozambique	0.3	1.8	0.6	6.9
Peru	3.7	6.2	13.7	5.6
Rwanda	0	4.0	2.0	1.1
Tanzania	0	0	0.4	0.4
Vietnam	0	0.5	1.9	2.9
Zambia	3.3	11.0	15.8	4.0

Sources: Global Fund, World Bank, USAID

Funding for malaria increased in the period 2003-2006 in most countries afflicted by the disease but significantly more so in Ethiopia, Rwanda, and Tanzania in 2006 (see Table 4.11). Some countries showed large declines in 2006, such as Burkina Faso, DR Congo, Ghana, Vietnam, and Zambia.

Table 4.11: Major Donor Disbursements (Constant 2006 US$ Million) for Malaria, by Country, 2003-2006

Country	2003	2004	2005	2006
Benin	4	2	1	0.4
Burkina Faso	0.7	2	4	0
Burundi	3	6	7	4
Cambodia	3	2	6	3
DR Congo	0	2	21	9
Ethiopia	22	0	22	78
Ghana	1	3	17	5
Haiti	0	3	0.3	4
Kyrgyzstan	0	0	0	0.9
Lesotho	0	0	0	0
Malawi	0	0	0	6
Moldova	0	0	0	0
Mozambique	0	7	0	5
Peru	0	0	0	0
Rwanda	0	10	5	33
Tanzania	0.5	5	25	35
Vietnam	0	4	7	3
Zambia	11	21	14	6

Sources: Global Fund, World Bank, USAID (including PMI)

WHAT ARE THE SOURCES OF DISBURSEMENTS (WITH A SPECIAL FOCUS ON THE GLOBAL FUND) FOR EXTERNAL RESOURCES FOR EACH OF THE THREE DISEASES (HIV, TB, AND MALARIA)?

The Global Fund's share of the disbursements from major donors in 2006 is shown in Table 4.12.

Table 4.12: Global Fund Share (%) of Major Donor Disbursements by Disease, by Country, 2006

Country	HIV	Tuberculosis	Malaria
Benin	32	100	100
Burkina Faso	22	100	-
Burundi	24	100	100
Cambodia	39	54	100
DR Congo	32	80	75
Ethiopia	38	79	90
Ghana	36	94	100
Haiti	27	78	100
Kyrgyzstan	47	26	100
Lesotho	43	0	-
Malawi	32	0	100
Moldova	36	0	-
Mozambique	10	86	100
Peru	90	89	-
Rwanda	18	100	100
Tanzania	20	0	64
Vietnam	4	100	100
Zambia	13	75	92

Notes:
-PEPFAR countries are in bold.
- "-" means that none of the major donors (including the Global Fund) disbursed any resources.
- This does not represent the share of Global Fund to total external disbursed funds; it is only the share of major donor disbursements, as presented in previous tables.
Sources: Global Fund, World Bank, USAID (including PEPFAR and PMI), UNAIDS

Interpretation of Table 4.12 on disbursements in 2006 should be made with caution. For example, the "lumpiness" of the disbursements may make it appear that contributions of the Global Fund in 2006 may be bigger or smaller because of the timing of disbursement and not the actual level of spending. This table should be simply taken to mean that, in general, for 2006, monies available for spending for the year are being provided by the Global Fund in these countries at a substantial level. It should also be noted that in a few PEPFAR countries, funding for HIV from the Global Fund is not a major source.

IS THERE VARIABILITY IN PER CAPITA DISBURSEMENTS FROM EXTERNAL RESOURCES ACROSS COUNTRIES FOR EACH OF THE THREE DISEASES (HIV, TB, AND MALARIA)?

To obtain further insights into the trends in funding for the specific diseases, levels of funding were compared with population size and disease burden. The latter has its limitations because it is more directly related to treatment costs and not prevention costs and only to the extent that a higher burden might spur more preventive efforts. The data show a significant variation in funding per capita for the three diseases across countries in 2006.

Table 4.13: Major Donor Disbursements (2006 Int$ and Constant 2006 US$) per Person in Need and per Capita by Disease, by Country, 2006

	HIV		TB		Malaria	
	...per PLWHA	...per capita	...per new and relapse cases	...per capita	...per person at risk	...per capita
PPP (2006 Int$)						
Benin	790	5.6	200	0.1	0.1	0.1
Burkina Faso	355	3.2	1,657	0.5		
Burundi	595	8.0	355	0.3	2.0	1.3
Cambodia	1,595	9.1	396	1.0	0.8	0.7
DR Congo	63	1.3	141	0.2	0.3	0.3
Ethiopia	580	6.7	168	0.3	6.2	3.6
Ghana	293	3.3	1,538	0.8	0.5	0.5
Haiti	1,336	15.6	725	1.0	0.9	0.8
Kyrgyzstan	4,547	3.4	536	0.6	2.6	0.6
Lesotho	75	10.2	32	0.2		
Malawi	237	15.9	166	0.3	1.5	1.4
Moldova	2213	4.3	92	0.2		
Mozambique	439	29.3	1,131	1.7	1.4	1.3
Peru	248	0.7	346	0.4		
Rwanda	1,322	21.0	377	0.3	18.0	9.3
Tanzania	299	10.6	22	0.03	2.8	2.7
Vietnam	534	1.7	97	0.1	0.1	0.1
Zambia	175	15.0	113	0.5	0.7	0.7
Exchange Rate (Constant 2006 US$)						
Benin	331	2.3	84	0.03	0.05	0.4
Burkina Faso	132	1.2	614	0.2		
Burundi	197	2.7	118	0.09	0.7	0.4
Cambodia	504	2.9	125	0.3	0.2	0.2
DR Congo	32	0.7	71	0.1	0.2	0.1
Ethiopia	157	1.8	45	0.07	1.7	1.0
Ghana	132	1.5	693	0.4	0.2	0.2
Haiti	633	7.4	343	0.5	0.4	0.4
Kyrgyzstan	1,361	1.0	160	0.2	0.8	0.2
Lesotho	39	5.3	17	0.1		
Malawi	79	5.3	55	0.1	0.5	0.5
Moldova	815	1.6	34	0.07		
Mozambique	84	5.6	215	0.3	0.3	0.3
Peru	117	0.3	163	0.2		
Rwanda	489	7.8	139	0.1	7	3.4
Tanzania	95	3.4	7	0.01	0.9	0.9
Vietnam	164	0.5	30	0.03	0.04	0.03
Zambia	128	11.0	83	0.3	0.5	0.5

Sources: PLWHA from UNAIDS/WHO. 2008. Report on the Global AIDS Epidemic. New and relapse TB cases from Global Tuberculosis Control Report, 2008. Proportion of population at risk of malaria from Snow, R.W., et al. 2008 and applied to 2006 total population.

Table 4.13 reveals that in 2006 there were relatively high disbursements per person in need in Cambodia, Haiti, Kyrgyzstan, Moldova, and Rwanda for HIV; in Burkina Faso, Ghana, and Mozambique for TB; and in Rwanda for malaria. Noticeably low per person in need disbursements are seen in DR Congo and Lesotho for HIV; Lesotho, Tanzania, and Vietnam for TB; and most countries for malaria except for Rwanda.

Relatively high disbursements per capita were seen for HIV in Mozambique, Rwanda, and Zambia and for malaria in Rwanda. Relatively low levels per capita were available for TB and malaria in most countries.

Differences between expenditures by persons in need or per capita vary in magnitude when expressed in exchange rate or PPP. For example, for TB, the highest disbursement per person in need is a hundred times more in US$ than the lowest disbursement per person in need. In PPP, the highest disbursement is 75 times more than the lowest. For HIV, in US$, the highest disbursement is 43 times more than the lowest, but in PPP terms it is 72 times more.

This analysis, which relates disbursed resources with need and per capita, reveals a wide range of disbursements available per capita or per person at risk for HIV and TB particularly, whether in exchange rate (constant 2006 US$) or in PPP (2006 Int$). Again, interpretation of Table 4.13 on disbursements in 2006 should be made with caution because of the lumpiness of disbursement data. It should also be noted that these data only include disbursements by major donors and do not capture bilateral donors other than USAID.

The following section focuses on the findings of the NHA in the five countries. This allows for an assessment of the shares of the disease-specific expenditure to the total health expenditure; the role of government, private, and out-of-pocket payments in addition to external funding; and the allocation patterns within the specific disease funding. Please see Tables 4.5 to 4.8 for information on total health expenditures.

WHAT ARE THE SHARES OF DISEASE-SPECIFIC EXPENDITURE TO TOTAL HEALTH EXPENDITURE?

Table 4.14a shows the shares of specific disease expenditures out of the total health expenditure for 2003 and 2006. All countries have shown a general trend in increasing shares of total health expenditure devoted to HIV and malaria. In two countries, the combined share of expenditures for these two diseases almost reaches 50%, and in a third country it is approaching this benchmark. As the share of HIV and malaria increase, the share of total health expenditures going to other diseases correspondingly decreases. This means that the rates of growth in expenditures in HIV and malaria were faster than those of other diseases. Table 4.14b confirms this but shows that in absolute value, expenditures on other diseases were maintained or increased in real terms. However, in three of the four countries with 2003 data, expenditures in TB decreased in 2006 in real terms.

Table 4.14a: Disease-specific Share (%) of Total Health Expenditure, 2003 and 2006, in Countries with NHA

	2003				2006			
Country	HIV	TB	Malaria	Other Diseases	HIV	TB	Malaria	Other Diseases
Burkina Faso	10	0.59	11	79	9	1.1	9	81
Haiti					18	3.0	4	75
Malawi	16	2	20	62	24	1.3	22	53
Tanzania	7	2	20	71	29	0.6	23	47
Zambia	16	2	15	67	24	11.0	15	61

Source: NHA exercises conducted for the evaluation study

Table 4.14b: Disease-specific Expenditure (Constant 2006 US$ Million), 2003 and 2006, in Countries with NHA

	2003				2006			
Country	HIV	TB	Malaria	Other Diseases	HIV	TB	Malaria	Other Diseases
Burkina Faso	25	1	25	189	36	4	36	308
Haiti					73	10	17	299
Malawi	36	5	44	137	65	3	61	147
Tanzania	34	10	94	336	263	5	209	429
Zambia	106	10	96	435	160	7	101	413

Source: NHA exercises conducted for the evaluation study

Table 4.15: Per Capita Expenditure by Disease (Constant 2006 US$ and Constant 2006 Int$) and by Source, 2003 and 2006, in Countries with NHA

		HIV		TB		Malaria		Other Diseases		TOTAL	
		2003	2006	2003	2006	2003	2006	2003	2006	2003	2006
Exchange Rate (Constant 2006 US$)											
Burkina Faso	Government	0.02	0.2	0.0001	0.02	0.02	0.3	4	8	4	9
	Private	0.3	0.3	0	0.003	2	2	7	8	9	10
	External resources	2	2								
	Total	2	2								
Haiti	Government		0.04		0.3		0.2				
	Private		0.1		0.09		1				
	External resources		8		0.6		0.6				
	Total		8		1.1		2		32		42
Malawi	Government	1	0.9	0.2	0.2	1	1	4	2	6	4
	Private	0.4	0.6	0	0	0.5	0.8	2	2	3	4
	External resources	1	3	0.2	0.1	2	2	5	6	8	12
	Total	3	5	0.4	0.3	4	4	11	11	18	20
Tanzania	Government	0.1	2	0.07	0.05	1	1	2	4	4	7
	Private	0.4	0.4	0	0	1	3	4	2	6	6
	External resources	0.4	4	0.2	0.08	0.3	0.9	3	5	4	10
	Total	1	7	0.3	0.1	3	5	9	11	13	23
Zambia	Government	1.0	1	0.4	0.2	3	3	10	10	14	14
	Private	2	2	0.1	0.0002	2	3	17	14	21	20
	External resources	7	10	0.3	0.4	4	2	11	11	22	24
	Total	10	14	0.9	0.6	9	9	38	35	57	58
PPP (Constant 2006 Int$)											
Burkina Faso	Government	0.06	0.6	0.0002	0.1	0.05	0.8	11	22	12	23
	Private	0.8	0.7	0	0.007	5	5	20	22	25	28
	External resources	4	5	0.1	0.7	0.5	0.8	8	14	12	21
	Total	5	7	0.1	0.8	5	7	39	58	49	72
Haiti	Government		0.1		0.7		0.4				
	Private		0.3		0.2		2				
	External resources		16		1.3		1				
	Total		16		2.3		4		67		89
Malawi	Government	4	3	0.7	0.5	4	4	11	6	19	13
	Private	1	2	0.0	0	1	2	7	7	10	11
	External resources	4	10	0.5	0.3	5	7	15	19	24	37
	Total	8	14	1.2	0.8	11	13	33	33	53	61
Tanzania	Government	0.4	6	0.2	0.2	3	4	8	12	11	21
	Private	1	1	0.4	0	4	10	13	8	18	19
	External resources	1	14	0.2	0.2	1	3	9	15	11	32
	Total	3	21	0.8	0.4	8	17	29	34	41	72
Zambia	Government	1	2	0.6	0.3	4	4	13	13	19	19
	Private	3	3	0.1	0.0003	3	4	23	20	29	27
	External resources	9	14	0.5	0.5	5	3	15	15	30	33
	Total	13	19	1.2	0.8	12	12	52	48	78	80

Source: NHA exercises conducted for the evaluation study

Table 4.15 shows the per capita expenditures by disease and by source. In 2006, external resources are the largest source of funds for HIV expenditures. For malaria, private sources are the largest funders (except in Malawi). For TB, both external resources and governments are the major contributors, but the contribution of external funding in 2006 has noticeably increased in comparison with 2003.

WHAT ARE THE SOURCES OF FUNDING (WITH A SPECIAL FOCUS ON THE GLOBAL FUND) FOR TOTAL HEALTH EXPENDITURE AND FOR EACH DISEASE?

Table 4.16 presents the shares of spending on general health, HIV, TB, and malaria by government, private, and external sources. This table shows that in almost all cases, the percentage share of external funding for HIV, TB, malaria, and other diseases increased between 2003 and 2006. However, the shares of external funding for HIV, TB, and malaria are considerably greater than corresponding shares for the other diseases, demonstrating the focus on these diseases by donors. For malaria, private expenditures accounted for the largest share in four out of five countries in 2006.

Table 4.16: Share (%) of Expenditures by Financing Source by Disease, 2003 and 2006, in Countries with NHA

		HIV		Tuberculosis		Malaria		Other Diseases		TOTAL	
	Source	2003	2006	2003	2006	2003	2006	2003	2006	2003	2006
Burkina Faso	Government	1	9	0.13	8	1	12	29	37	23	32
	Private	17	11		0.9	90	76	51	38	51	39
	External resources	81	81	99.9	91	9	12	19	24	25	29
Haiti	Government		0.5		32		11				
	Private		1.6		8		57				
	External resources		98		60		32				
Malawi	Government	44	18	61	60	35	27	32	20	35	21
	Private	15	12			13	17	22	22	19	18
	External resources	42	69	39	40	52	56	45	59	46	60
Tanzania	Government	14	27	25	40	39	23	26	34	28	30
	Private	40	6	46		49	59	44	23	45	26
	External resources	46	67	29	60	12	18	30	43	27	44
Zambia	Government	10	9	50	32	33	35	25	27	24	24
	Private	20	17	12	0.035	26	38	45	41	38	34
	External resources	70	74	38	68	42	27	29	32	38	42

Source: NHA exercises conducted for the evaluation study

Table 4.16 presents the shares of spending on general health, HIV, TB, and malaria by government, private, and external sources. This table shows that in almost all cases, the percentage share of external funding for HIV, TB, malaria, and other diseases increased between 2003 and 2006. However, the shares of external funding in HIV, TB, and malaria are considerably greater than corresponding shares for the other diseases, demonstrating the focus on these diseases by donors. For malaria, private expenditures accounted for the largest share in four out of five countries in 2006.

Tables 4.17 and 4.18 illustrate the extent of funding provided by the Global Fund compared with total disease expenditures and relative to other external resources, for 2006.

Table 4.17: Share (%) of the Global Fund to Total Disease-specific Expenditures, 2006, in Countries with NHA

	Share of GFATM Funds to Total Expenditures on HIV	Share of GFATM Funds to Total Expenditures on TB	Share of GFATM Funds to total Expenditures on Malaria
Burkina Faso	7	90	4
Haiti	26	50	30
Malawi	31	0	9
Rwanda	15		0
Tanzania	14	3	3
Zambia	9	42	5

Source: NHA exercises conducted for the evaluation study

Table 4.18: Share (%) of the Global Fund to Disease-specific Expenditures, Coming from External Sources, 2006, in Countries with NHA

	Share of GFATM Funds to Total External Funds for HIV	Share of GFATM Funds to Total External Funds for TB	Share of GFATM Funds to Total External Funds for Malaria
Burkina Faso	9	99	33
Haiti	26	84	95
Malawi	44	0	17
Rwanda	16		0
Tanzania	21	5	17
Zambia	12	62	19

Source: NHA exercises conducted for the evaluation study

The shares of the Global Fund relative to other disease expenditure are significant for Burkina Faso and Haiti for TB, and for HIV and malaria as well in Haiti. As a share of external resources going to specific diseases, the Global Fund constitutes a significant share of the external funds for HIV in Malawi; for TB in Haiti, Burkina Faso, and Zambia; and for malaria in Haiti and Burkina Faso.

4.4 Discussion of Policy Implications and Recommendations

Additionality of External Resources

In this evaluation, nonviolation of the principle of additionality of external resources is defined as a demonstration of an increase in expenditure in 2006 in absolute amounts compared with the level of expenditure in 2003. This assumes a conservative counterfactual where the expected expenditure is flat-lined from 2003-2006, even if some growth would have been expected. Additionality of external funds can be assessed on its impact in government spending; more specifically, additionality of the resources from the Global Fund can also be assessed on its impact of other donor funding in the country.

- **Effects on government funding:** Assessments on this can safely be drawn only from the four countries with NHA for two measurements in time. Of these, only Malawi showed decreasing government per capita expenditures in all expenditures, but malaria which remained stagnant (see Table 4.15). The main driver for the stagnant per capita malaria expenditures in Malawi

came from the government shift in treatment policy from SP to ACT in 2006, thus effectively increasing the cost of drug purchases.

- **Additionality on other external funders:** Based on the results of the NHA in the four countries with two measurements, it appears that other external funders are continuing with their current level of funding or increasing their investments, although not at the same level as the Global Fund or the U.S. government. Any statements about additionality on other external funders in countries without NHA are less reliable because of the lumpiness of disbursements, but in DR Congo and Ghana, there appears to be a decreasing investment in HIV from the World Bank.

It should be noted that the assessment of the additionality principle was against a conservative benchmark. More data should be continuously collected so that a more realistic counterfactual (using expected increase in funding rather than a flat-line) can be estimated and used as a new benchmark.

SUSTAINABILITY

Health system sustainability has been defined as the "capacity of the health system to replace withdrawn donor funds with funds from other, usually domestic, sources" and *sustainability of an individual program* as the "capacity of the grantee to mobilize the resources to fund the recurrent costs of a project once it has terminated."[22] Most definitions of sustainability also include the additional requirement that the system be able to expand its activities as needed to keep up with increases in demand resulting from economic and population growth. However, given the enormous unmet needs in the poorest countries, coupled with stagnant economic performance, some donors are now defining sustainability on the basis of the managing entity's commitment of a stable and fixed share of program costs.[23]

In the evaluation study countries with NHA in 2006, external resources provided more than 70% of all HIV funding, rising to 98% in Haiti. This is the same situation in TB (more than 60% for these countries), except for Malawi, which has not yet received funding for TB from Global Fund. This is a reversal of the common pattern of TB funding where government contributions predominate. In malaria, private expenditures still account for a large proportion of total expenditures, although the percentage contributed by external resources is increasing. To the extent that external funds increase spending per capita on needed services and decrease the burden on the poor by reducing their out-of-pocket expenditures, additional contributions from any source are welcomed.

But single-source or majority funding is always a concern when the source of the funds is unpredictable. For example, the Global Fund provides a large percentage of the external funding for TB and malaria and for some countries, large amounts for HIV. With single-source or majority funding of large amounts, the probability that the government can take over the financing in case of problems with the external funder (e.g., a Global Fund grant being suspended or not renewed) is quite low. **In these countries, Global Fund grantees could be monitored more closely to ensure**

[22] Knowles, J. C., C. Leighton, and W. Stinson, 1997. Measuring Results of Health Sector Reform for System Performance: A Handbook of Indicators. Special Initiatives Report. No. 1. Bethesda, MD, Partnerships for Health Reform, Abt Associates Inc. http://www.healthsystems2020.org /content/ resource/detail/1246/.
[23] http://www.dcp2.org/main/Home.html. DCP2

that any problems with meeting their targets are detected early and resolved quickly to avoid suspension of large amounts of funding.

As it is not expected that in the short term developing countries will be able to take over donor funding, especially if these funds are large amounts, it is also important for the donors, including the Global Fund, to determine the funding they are "expected" to continue to provide in the future, in particular with respect to antiretroviral therapy funding. The issues of predictability and, thereof, sustainability—or lack thereof—are important. **The extent to which the Global Fund approach of competitive funding applications and performance-based funding are conducive to enhancing predictable funding and continuous intervention delivery could be re-examined.**

Absorptive Capacity

Absorptive capacity can be informally gauged by relating the size of the amount to be absorbed to current expenditures. As can be seen in Annex Table 4.2, PEPFAR, with large amounts of funding going to HIV in the focus countries, is achieving about 60% expenditure of obligated funds. The Global Fund appears to be doing relatively better in disbursing and spending, perhaps because of its business practices such as funding countries with good proposals and not being limited to a relatively small set of "focus" or priority set of countries, disbursing frequently (sometimes twice in a year), and requiring the reporting of expenditures before disbursement.[24] Another factor possibly related to slower spending in PEPFAR is that only an average of one-third of its primary recipients are local organizations, whereas the Global Fund disburses directly to country recipients.[25] **It is recommended that the major donors strengthen and utilize existing country implementation mechanisms, including financial procedures that will facilitate timely fund releases while preserving accountability. It is also recommended that countries showing slow spending in relation to disbursements be proactively assisted to avoid being trapped in a vicious circle of poor absorptive capacity because of financial constraints, thereby begetting fewer funds.**

Allocative Efficiency According to Need

At the national level: Except for Burkina Faso, HIV accounts for almost one-fourth to one-third of total health expenditure among the four countries with NHA for 2003 and 2006. The share of malaria is relatively smaller, ranging from 6% to 23%. More importantly, the corresponding share of other diseases has decreased in 2006 compared with 2003. In 2006, about half of total health expenditure in Malawi and Tanzania was going to HIV and malaria alone, according to the NHA. This shows that increases in funding for other diseases have not been as rapid as for HIV and malaria. This change in priority might reflect the actual needs and, if so, should be welcomed. However, there is also a danger that the increased funding could divert attention from areas that are of equal or higher priority but are receiving lower funding. This potential is heightened if continued funding from external resources such as the Global Fund is dependent on reaching set targets and there is a relatively fixed amount of inputs like human resources, specifically health professionals.

[24] However, some PEPFAR implementers, when they do receive the funds, claim anecdotally that the administrative requirements of PEPFAR are lighter than the Global Fund's as reported in a report by the CGD. http://www.cgdev.org/content/publications/detail/14569.

[25] In 2005, PEPFAR launched a new partners initiative that aims "to work with new partners, including community- and faith-based organizations, enhancing their technical and organizational capacity and ensuring the quality and sustainability of HIV/AIDS programs by supporting community ownership." http://www.pepfar.gov/c19532.htm.

At the global level: In 2006, there were significant variations across the countries in funding per capita, particularly for HIV and TB. This raises the question of whether global funds are being allocated according to "need" and whether the big funders are able to define what their role is relative to the other funders in a country.

Provided that implementing and reporting requirements are harmonized, multiple donors are preferred rather than single-source funding (see sustainability discussion above) but only at the level that the country can absorb (see absorptive capacity discussion above). It is also clear that the potential to benefit from external resources can be further spread beyond a few "favored" countries. **It is recommended that the 2005 Paris Declaration on Aid Effectiveness be fully implemented at the country and global levels.**

DATA REPORTING

As can be seen in this report, there is a need to improve the collection and reporting of country-level expenditure information. This is because expenditures actually tell us whether the service has been provided. Disbursements and commitments only indicate that the money will be available for spending. Tracking at the country level also allows us to define the government contribution and at the same time, if an NHA is done, to determine out-of-pocket contributions and contributions from the private sector. It has been shown by the NHA and subaccounts that routine country reports consistently underestimate actual spending for a disease by a considerable amount.

Because of the large amounts of funds coming in, particularly because external resources are becoming the main source of funding for these diseases, it is important that country reporting processes be used according to the 2005 Paris Declaration on Aid Effectiveness. If this is not possible, there must be a process for yearly reporting by donors of their expenditures to the recipient government to facilitate the government's performing its stewardship function.

NHAs should be done regularly, at least once every five years. If there is a planned household survey where expenditures on health can be collected as an add-on, this opportunity should be taken, recognizing that there are limits to inferences on disease-specific household expenditures that can be made from reports of household out-of-pocket payments for health. If disease-specific household surveys are being run (e.g., a malaria indicator survey), it would be very useful if expenditures are collected together with utilization data, as has been done in Cambodia.

CHAPTER 4 ANNEXES

ANNEX 4.1: DATA SOURCES

NATIONAL RECORDS REVIEW (FOR PDACS)

Government expenditure was collected from records on executed budgets of the Ministry of Health, other ministries, and other governmental units and boards, including social health insurance institutions. Information was collected by various programs, including curative, preventive, administration, and health insurance, as well as disease control programs for HIV/AIDS, TB, malaria, and others. Information by source of financing (government revenues, external resources) and by inputs (current, capital) was also obtained through the governmental executed budgets for the countries with NHA.

Statistics on pharmaceutical imports, exports, production, and purchases are collected from a central statistical office for retail sale, health institution for pharmaceutical purchases, trade commissions, central medical stores (public), and IMS data (public and private). These data sources allow estimating total pharmaceutical production and consumption, as well as pharmaceutical purchases for HIV/AIDS, TB, malaria, and other diseases. Health-related National Accounts statistics are the source of data on final consumption in health. Health care facilities' (private/public) records provide information on expenditure and utilization both for general health and specifically for HIV, TB, and malaria. However, a facility survey provides more detailed information on utilization, thus, allowing for data validation.

Business or economic surveys provide information on health and non-health expenditure by various sectors' employers, by type of facility, input, and volume of sales.

Health management information systems are a source for service utilization data for HIV, TB, and malaria. However, the quality and availability of country information varies and could only serve for validation purposes. More information will be provided from district financial surveys, but it will be limited by the possibility to extrapolate district-level information to the national level in case the sample is not statistically representative.

EXISTING STUDIES, REPORTS, AND DATABASES REVIEW

Data on Global Fund approved, disbursed, and spent funding were collected from the Principal Recipient Disbursement Requests publicly available online at http://www.theglobalfund.org/. These data was triangulated with other sources described below.

Data on HIV funding were obtained from the UNAIDS UNGASS 2008 report, NASA reports from the countries, and the UNAIDS 2006 Report on the Global AIDS Epidemic. Information on PEPFAR funds was collected from the PEPFAR Country Operational Plans and the Creditor Reporting System. World Bank Country Operational Plans were used to collect data on World Bank MAP funding as well as on World Bank funding for non-MAP countries.

Data on TB expenditure were obtained from the WHO 2008 Global Tuberculosis Control Report, which presents data from 156 countries.

Data on malaria expenditure were obtained from the WHO Global Malaria Control Report 2008 provided by the WHO Roll Back Malaria Department, which started data collection in 2007 for the years 2002-2006. We also used the PMI 2007 First Annual report of March 2007 available at http://www.fightingmalariagov/resources/pmi_annual_report.pdf.

We also searched the latest publications on resource flows for HIV, TB, and malaria.

All data are presented in current dollars as they were reported in the UNAIDS and WHO sources. To adjust for the varying value of the dollar in regard to the span of years covered by the study (2002-2007) and to ease the estimating, all amounts are converted into 2006 constant dollars.

Primary Data Surveys

Primary data surveys were conducted for the countries with detailed NHA and HIV, TB, and malaria subaccounts. These surveys include donors, NGOs, employers, and insurers' primary data surveys, as well as household surveys and health facility surveys.

Donor and NGO surveys produce the information on financing for HIV, TB, and malaria-related programs broken down by beneficiaries and implementing institutions as well as by funded services and goods.

Employer surveys and insurers' surveys are the source for information on disease-specific revenues and expenditure by benefits provided for the employees or insured population.

Household surveys are used to obtain information on health and disease-specific expenditure. They also provide the information on specifically targeted disease services and utilization rates for HIV, TB, and malaria.

The health facility financial survey is an instrument for obtaining data for health and in particular for disease-specific expenditure (targeted and non-targeted) and utilization in public and private facilities and at the district level. Utilization is surveyed at (1) the outpatient level through the number of outpatient visits/consultations due to HIV, TB, and malaria by age and sex and (2) at the inpatient level through the proportion of hospital days/discharges and occupancy rates for HIV, TB, and malaria. The facility financial survey allows for deriving the proportion of outpatient visits due to HIV, TB, and malaria at the facility level and aggregating it to the national level. This produces the disease-attributable fraction for outpatient care that then could be applied to that facility expenditure for outpatient care.

The health facility financial survey also provides information to estimate the proportion of hospital days/discharges due to HIV, TB, and malaria at the facility level and allows for aggregating it to the district level. It produces the disease-attributable fraction for inpatient care that then could be applied to that facility expenditure for inpatient care.

Methods for Attribution of Spending to Specific Diseases

Actual expenditures for HIV, TB, and malaria were captured for producing data in the format of NHA and subaccounts. The NHA approach collects such information to the extent possible (e.g., from government records, health information systems, patient records, datasets, donors, NGO

surveys) for personal and programmatic spending. Programmatic spending can usually be directly attributed to specific diseases. This is considered targeted spending and can be tracked by disease. Non-targeted expenditures (e.g., facility use by patients with malaria) are not usually available at the level of detail needed to track disease-specific resources. For example, non-targeted expenditure at the provider level is not always disaggregated into inpatient and outpatient categories. When this is the case, separate studies of health providers are conducted to apply estimation techniques and distribute expenditure to an exhaustive grouping of diseases. This is referred to as distributional disease-specific techniques.

Disease-specific expenditure for HIV, TB, and malaria is estimated using two approaches. First is by disaggregating total health expenditure by particular disease. The total expenditure of the service at the organizational, facility, or district level is obtained through secondary data sources, and then the total expenditure is disaggregated to the units of services (or products) depending on the richness of available data. The disaggregation by disease is produced by dividing the total expenditure of the facility by the number of utilization units (e.g., patients treated as outpatients or number of hospital days). The utilization units are derived with the use of utilization data and/or costing data and then applied as attribution proportions (weights) for each disease and/or function. This approach is also used to break down disease-specific expenditure at the functional level (e.g., by inpatient and outpatient services and in more detail, if required).

Capital expenditures are disaggregated by disease if they can be directly attributed (e.g., Cluster of Differentiation 4 machines to HIV/AIDS when possible). For capital expenditures that are not directly attributable to HIV, TB, or malaria (e.g., laboratory buildings), they are mentioned but not included in the analysis.

ANNEX 4.2: ANNEX TABLES

Table 4.1: Example of a Global Fund "Disbursement Request"

C. Program Expenditures

All amounts are in US$	Budget for Reporting Period	Actual for Reporting Period	Variance
1. Total actual expenditures vs. budget	**32,699,668.00**	**34,036,797.00**	(1,337,129.00)
1a. PR's total expenditures	0.00	0.00	0.00
1b. Disbursements to subrecipients	32,699,668.00	34,036,797.00	(1,337,129.00)
2. Health product expenditures vs. budget *(already included in "Total actual" figures above)*	**22,600,301.00**	**20,703,566.00**	**1,896,735.00**
2a. Pharmaceuticals	10,554,972.00	10,554,972.00	0.00
2b. Health products, commodities, and equipments	12,045,329.00	10,118,591.00	1,896,735.00
3. Total actual expenditures vs. budget	**32,699,668.00**	**34,036,797.00**	(1,337,129.00)
1a. PR's total expenditures	0.00	0.00	0.00
1b. Disbursements to subrecipients	32,699,668.00	34,036,797.00	(1,337,129.00)
4. Health product expenditures vs. budget *(already included in "Total actual" figures above)*	**22,600,301.00**	**20,703,566.00**	**1,896,735.00**
2a. Pharmaceuticals	10,554,972.00	10,554,972.00	0.00
2b. Health products, commodities, and equipments	12,045,329.00	10,118,591.00	1,896,735.00

Table 4.2: PEPFAR Outlays versus Obligations 2004-2007

FF 2004-s2007 Report Q2 2008

The Emergency Plan for AIDS Relief Summary Financial Status by Appropriation as of March 31, 2008
FY 2004-2007 Appropriations
(Dollars in Thousands)

Appropriation/Program	Total Available FY 2004-2007	FY 2004-2007 Obligations	FY 2004-2007 Outlays	Obligations as a % of Available	Outlays as a % of Obligations
Foreign Operations:	**10,390,091**	**9,800,485**	**6,523,634**	**94.3**	**66.6**
Child Survival and Health Programs	3,135,594	3,095,290	2,220,352	98.7	71.7
HIV/AIDS Programs	*1,519,619*	*1,501,985*	*1,123,820*	*98.8*	*74.8*
The Global Fund	*1,140,640*	*1,140,639*	*1,096,532*	*100.0*	*96.1*
TB/Malaria[2]	*475,335*	*452,666*	*n/a*	*95.2*	*n/a*
Global HIV/AIDS Initiative	7,083,593	6,549,866	4,238,744	92.5	64.7
Foreign Military Financing	7,054	7,054	2,490	100.0	0.0
Other Accounts[1]	163,850	148,276	62,047	90.5	41.8
HIV/AIDS Programs	*108,967*	*97,158*	*62,047*	*89.2*	*63.9*
TB/Malaria[2]	*54,883*	*51,117*	*n/a*	*93.1*	*n/a*
Labor-HHS-Education:	**2,586,603**	**2,473,312**	**2,106,455**	**95.6**	**85.2**
Health and Human Services (HHS)	1,152,993	1,039,702	946,656	90.2	91.1
Global AIDS Program (GAP)	*511,763*	*497,551*	*443,807*	*97.2*	*89.2*
CDC HIV/AIDS International Research	*22,783*	*22,783*	*22,287*	*100.0*	*97.8*
Prevention of Mother-to-Child Transmission	*148,992*	*148,913*	*119,707*	*99.9*	*80.4*
The Global Fund	*446,315*	*347,315*	*347,315*	*77.8*	*100.0*
TB/Malaria	*23,140*	*23,140*	*13,541*	*100.0*	*n/a*
HHS/National Institutes of Health Research	1,421,685	1,421,685	1,154,120	100.0	81.2
Department of Labor	11,925	11,925	5,679	100.0	47.6
Department of Defense:	**16,862**	**16,645**	**14,589**	**98.7**	**87.6**
Total Allocated Emergency Plan	**12,993,556**	**12,290,443**	**8,644,678**	**94.6**	**70.3**
Total Emergency Plan	**12,993,556**	**12,290,443**	**8,644,678**	**94.6**	**70.3**

[1] "Other Accounts" include the following appropriations: the Economic Support Fund (ESF), FREEDOM Support Act (FSA), Support for East European Democracy (SEED).
[2] Information on outlays for CSH and Other TB and Malaria programs is not available at this time.

Table 4.3: Total Expenditure on Health per Capita, Constant 2006 US$

	2002	2003	2004	2005	2006
Benin	24	25	26	29	28
Burkina Faso	16	18	22	26	27
Burundi	4	4	4	4	4
Cambodia	23	26	29	31	30
DR Congo	4	5	5	6	6
Ethiopia	7	6	7	7	7
Ghana	32	31	32	34	35
Haiti	34	33	31	32	42
Kyrgyzstan	26	27	31	32	34
Lesotho	45	46	46	40	49
Malawi	14	18	20	19	20
Moldova	42	48	57	63	68
Mozambique	15	14	14	15	17
Peru	129	126	125	141	145
Rwanda	12	18	20	22	32
Tanzania	11	13	13	16	23
Vietnam	29	31	35	40	46
Zambia	54	56	58	50	58

5 SCALING UP AGAINST HIV/AIDS: SITUATION, TRENDS, RESULTS

5.1 INTRODUCTION

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO), during 2007, 2.7 million people were newly infected with HIV and 2 million died due to HIV-related causes, bringing the total number of people living with HIV to an estimated 33 million (uncertainty range 30.3-36.1 million).[1] The global HIV epidemic has continued to grow in terms of numbers of people infected, but there has been a leveling off of the adult HIV prevalence at 0.8% since about 2000.

Recent United Nations (UN) reports on the AIDS epidemic present a general picture of the epidemic. The 2008 Global UNAIDS report draws heavily upon 147 country reports on national progress in implementing the 2001 United Nations General Assembly Special Session (UNGASS) Declaration of Commitment on HIV/AIDS. As increased funding for HIV programs in low- and middle-income countries has become available, there are positive signs in terms of reducing AIDS deaths and preventing new infections, although, progress appears uneven. The 2008 WHO report on universal access, also mainly based on country-reported data, documents considerable progress toward providing HIV interventions in low- and middle-income countries, including antiretroviral therapy for advanced HIV infection, HIV testing and counseling (HTC), HIV prevention among high-risk populations, and prevention of mother-to-child transmission of HIV/AIDS (PMTCT).[2]

There are several international HIV/AIDS-related goals. The sixth global Millennium Development Goal (MDG6)—to have halted by 2015 and begun to reverse the spread of HIV/AIDS—appears to have been achieved already. The 2001 UNGASS Declaration of Commitment goal—a 25% reduction in HIV prevalence among young people (15-24 years) in the most affected countries by 2005 compared with 2000-2001—is more specific; several countries have reported significant progress toward this goal. Treatment goals became more prominent in 2003 with the "3 by 5" treatment goal, the 2005 G8 commitment to universal access to treatment, and a 2006 UNGASS declaration on universal access by 2010.

This chapter will briefly describe the evaluation approach, including data sources, and then focus on the trends in funding, access to and coverage of interventions, risk behavior, care and support, HIV transmission, and mortality in the 18 evaluation study countries.

5.2 EVALUATION APPROACH

Country epidemics differ according to predominant routes of transmission, populations most affected, and scale of spread. In addition, the phase of the epidemic differs across and within countries, with prevalence rising in some and declining in others. These heterogeneities affect the

[1] UNAIDS). 2008. Report on the global AIDS epidemic 2008. Geneva: UNAIDS. Available at http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_report.asp.
[2] WHO, UNAIDS, and UNICEF. 2008. Towards universal access: Scaling up priority HIV/AIDS interventions in the health sector. Progress Report 2008. Geneva: WHO. Available at http://www.who.int/entity/hiv/pub/towards_universal_access_report_2008.pdf.

selection of the appropriate mix of prevention and treatment interventions, which in turn complicates multicountry evaluation.

The evaluation approach is based on the hypothesis that investments for scaling up prevention and treatment services will lead to increased availability, quality, and coverage of interventions that have an effect on HIV transmission through at least one of three biological mechanisms: reducing the risk of exposure to HIV, reducing the likelihood of transmission, and limiting the duration of infectivity in infected persons.[3] In addition, survival benefits from treatment programs are assessed. In summary, the evaluation follows the stepwise framework (see Chapter 2), whereby increasing national and international investments (inputs) leads to improvements in the quality (process), availability (outputs), and coverage (outcome) of preventive and treatment interventions (impact), which in turn translate into reduced HIV incidence, morbidity, and mortality.

To assess whether scaling up has these effects, the trend analysis primarily focuses on establishing trends between the beginning of scaling up HIV funding (2003-2004) and the most recent data points (mostly 2006-2007). The evaluation approach aims to consider the extent to which changes in coverage of key interventions and epidemiological outcomes have been greater in countries with higher levels of HIV funding and, within countries, in districts with more extensive service delivery.

The ultimate impact indicators for an evaluation are measures of HIV transmission and AIDS-related mortality. Despite the availability of a reliable and low-cost antibody test to determine HIV prevalence in individuals, an evaluation of trends and relating those trends to interventions is complicated. Reliance on trends in HIV prevalence to estimate the rate of new infections is problematic because prevalence is an insensitive and lagging measure of HIV incidence.[4] Another challenge is the way large changes in the pattern of the epidemic can happen in response to relatively small changes in risk.[5] A third complicating factor is that historical trends indicate that HIV transmission started to level off almost a decade ago in many countries, which complicates the assessment of the effects of scaling up.

Exploring the impact of prevention and treatment programs at a national scale requires observation of trends and a counterfactual constructed by predicting what would have happened in the absence of funding for programs. Using statistical models to predict the course of the epidemic, it is in

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[3] Boerma, J.T., B. Schwartlander, and M. Carael. 2007. Monitoring and evaluation of prevention and control programs for HIV/AIDS and other STDs. In K.K. Holmes et al. (eds.), Sexually transmitted diseases. New York: McGraw-Hill, pp. 1895-1911. See Rugg, D., G. Peersman, and M. Carael (eds.). 2004. Global advances in HIV/AIDS monitoring and evaluation: New Directions for Evaluation. San Francisco: Wiley Periodicals, p. 103.

[4] Direct measurement of incidence remains difficult. Incidence is an order of magnitude lower than prevalence and thus requires much larger sample sizes to detect changes. A test for incident infections would permit the identification of current patterns of risk and targets for prevention interventions and would show whether prevention interventions are leading to changing patterns of incidence. Such a test, the HIV-1 subtypes B, E, and D IgG-capture enzyme immunoassay (BED) test, is increasingly used to measure incidence. Unfortunately, it gives erroneous and unstable measures of new infections. (http://www.cdc.gov/hiv/topics/surveillance/resources/factsheets/BED.htm).

[5] The spread of HIV infection in a population depends on the extent to which the frequency of potentially infectious contacts reaches a certain threshold beyond which each infection causes more than one new infection and thus a geometric increase in prevalence. Around this "tipping point," expected HIV prevalence is very sensitive to small changes in risk, rendering difficult both prediction of the growth of the epidemic and evaluation of interventions, and preventing a reliable association to be made between measures of risk behavior and the past and future spread of infection.

theory possible to create a counterfactual of no decline in risk and compare it with observed declines to determine whether they represent changes in risk, either because the decline is greater than expected or has a distinctive shape to suggest behavioral change.

DATA SOURCES

The evaluation took place in countries with considerable activity in terms of HIV-related data collection, analysis, and reporting to international agencies on various initiatives. The country evaluation teams were provided with spreadsheets to systematize data extraction from existing datasets and were encouraged to make use of all available information, such as the UNGASS country reports (most of which were completed in early 2008), national analysis and synthesis studies on AIDS (such as analyses supported by the Global AIDS Monitoring and Evaluation Team/World Bank, work on triangulation studies supported by the U.S. President's Emergency Plan for AIDS Relief [PEPFAR], and annual health sector reviews), national surveys, and research studies. Data from a range of data sources and reports were used to assess data quality and to address the different components for the analysis.

- **Resources:** Funding data were obtained from national sources and international estimates, which are described in Chapter 4 on financing. Recent National Health Accounts with an HIV subaccount, National AIDS Spending Assessment (NASA), and disbursement data from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) and international donors are the main data sources. The focus was on external funding flows, for which more reliable data are available.
- **Service delivery and quality:** Facility assessments, with or without record reviews, were the main data source. The district comprehensive assessment (DCA) in selected countries included a Facility Census, which provides detailed data on the availability of different components of care. The evaluation study also included a community survey of civil society organizations working in the field of HIV/AIDS in selected countries.
- **Coverage of interventions:** Clinical data provide numerator data for the estimation of coverage of interventions such as antiretroviral treatment (ART) and PMTCT. Population-based surveys provide data on utilization for selected interventions such as PMTCT and HTC. Surveys also provide information on exposure to prevention interventions and coverage of home-based services, such as care and support to orphans and vulnerable children.
- **Risk behaviors:** Trends in risk behaviors can be obtained from general household surveys and special high-risk population surveys. A review of existing surveys can provide some information, although the measurement of behavioral trends is fraught with problems, and the results have to be interpreted with caution. The DCA countries asked sexual behavior questions of women of reproductive ages. Trends among high-risk populations such as sex workers, injecting drug users (IDUs), and men who have sex with men (MSM) were assessed by countries on the basis of existing data.
- **HIV prevalence and incidence:** Country surveillance systems, including population-based surveys with HIV testing, are the main source of data on trends in prevalence, focusing on prevalence trends among young people as a proxy for incidence. Two evaluation study countries—Tanzania and Zambia—had two national surveys with HIV testing, thus, enabling

the estimation of HIV incidence in adults. Several countries have conducted one national survey with HIV testing.

- **Mortality:** Civil registration systems with accurate cause of death certification and coding are the preferred source of HIV-related mortality data. Only two of the 18 countries have a (partially) functional civil registration system (Moldova and Kyrgyzstan). Demographic surveillance studies that use verbal autopsy and data from selected hospitals may provide some data but cannot fill this gap.

COUNTRY GROUPING

Using a combination of geographical and epidemiological characteristics, the countries have been divided into four groups to allow sufficient specificity in the presentation of the results in this chapter:

- Southern Africa with HIV prevalence levels of more than 10% in 2007 (UNAIDS, 2008): Lesotho (23.2%), Malawi (11.9%), Mozambique (12.5%), and Zambia (15.2%)
- Eastern Africa with HIV prevalence levels between 2 and 6%: Burundi (2.0%), Ethiopia (2.1%), Rwanda (2.8%), and Tanzania (6.2%)
- Cambodia, Haiti, and west and central Africa with HIV prevalence levels in the range of 1% and 3%: Cambodia (0.8%), Haiti (2.2%), Benin (1.2%), Burkina Faso (1.6%), Democratic Republic of the Congo (DR Congo) (1.2-1.5%), and Ghana (1.9%)
- Concentrated epidemics with urban pregnant women prevalence levels below 1%: Kyrgyzstan (0.1%), Moldova (<0.1%), Peru (0.5%), and Vietnam (0.5%)

INTERVENTIONS

AIDS interventions include behavioral, biomedical, and structural preventive interventions and treatment and care. The response aims to be multisectoral, and the mix of interventions depends on the type of epidemic. In low-level and concentrated epidemics, the emphasis should be on interventions targeted to populations most at risk. In generalized epidemics, the response should include a range of general population interventions as well. In most countries with generalized epidemics with national levels of HIV infection below 2-3%, the HIV transmission risks and people living with HIV are primarily located in urban areas, which have implications for program planning and implementation. In countries with higher prevalence, urban-rural differences are less pronounced, and a major part of transmission takes place within long-term relationships.

The evaluation study focused on a subset of interventions for more detailed assessment based on their share of the scale-up budget, evidence of efficacy, and effectiveness in research studies and potential for accurate measurement of exposure to the intervention. The main interventions related to health services—HTC, PMTCT, and ART—meet these criteria and are addressed extensively in this report. As data on exposure to many prevention interventions are hard to obtain, trends in risk behavior are used to assess the combined effects of a large number of preventive interventions, from school sex and AIDS education programs to condom promotion and mass media messages. For the large number of community-based care programs, mostly for families affected by HIV/AIDS, some aspects of coverage can be gauged from household surveys and data from civil society organizations,

but it is very difficult to measure the intensity and quality of services and, therefore, the ultimate impact on the beneficiaries. Other interventions such as male circumcision play a major role in the epidemic and are now promoted as an intervention but have not received significant funding during 2004-2007.

5.3 Data Availability and Quality

This section provides an overview of the availability and quality of data in countries used to document levels, trends, and differentials in HIV risks, as well as coverage and exposure to interventions.

Southern African Countries

Zambia has conducted two national surveys with HIV testing, Lesotho and Malawi conducted one survey, and Mozambique has not yet conducted a survey (see Table 5.1). All four countries have HIV surveillance systems based on antenatal clinics in place, which provide annual or biannual data on antenatal clinic attendees. There are, however, considerable reporting delays, with the most recent surveillance reports available by the end of 2008 corresponding to years not more recent than 2-4 years earlier. Zambia has carried out five national sexual behavior surveys since 1998, supported by the U.S. Agency for International Development. There is almost no information on most at-risk populations (MARPS), except for some behavioral surveillance among female sex workers (FSWs) in Malawi and Zambia. It should be kept in mind, however, that HIV prevalence among females age 20-34 in the general population is often well more than 25% in these southern African countries, much higher than in FSW populations in most countries with lower general population HIV prevalence.

Table 5.1: Surveillance and Monitoring Data Collection in Southern African Evaluation Study Countries

Country	Lesotho	Malawi	Mozambique	Zambia
General population	ANC clinics—biannual survey	ANC clinics (54), (biannual survey)	ANC clinics (37 sites)	ANC clinics—large number but long intervals (2-4 years)
	DHS 2004	DHS 2004	No national survey	DHS 2002 and DHS 2007; sexual behavior surveys—five since 1998
Health service data	District reporting, incomplete but improving	District reporting based on TB system, quarterly reporting, good	Health unit reporting through district and provinces has major gaps, especially PMTCT, HTC	ART direct, multiple systems; PMTCT through HMIS, incomplete; HTC multiple estimates
MARPS	-	BSS among FSW urban	-	BSS among FSW

HTC = HIV testing and counseling; ANC = antenatal clinic; DHS = Demographic and Health Surveys; BSS = Behavioral Surveillance Surveys; HMIS = Health Management Information System; TB = tuberculosis

The reporting systems for HIV interventions in health units are fragmented, inefficient, and often incomplete. ART reporting tends to be considered of better quality than for PMTCT and HTC, as there is more direct reporting to national levels and there are fewer clinics. The Malawi Impact Evaluation Report provides an example: "[The] multiplicity of players and the lack of proper coordination in the HIV/AIDS data collection present an opportunity for over- or underreporting the data. That is, the data that is reported at the national level may not represent the 'true' data that is available at grass-root level of the health delivery system. For example, there is double counting for

data on voluntary counseling and testing (VCT). Women who first visit a VCT center and test positive are recorded as such at the VCT center. If these women fall pregnant they are also recorded as positive cases [at] the antenatal clinics. The implication is that at national level these women [who tested positive] are counted twice. If the work of VCT centers and antenatal clinics were coordinated the problem would not arise."

Eastern African Countries

Tanzania conducted two national HIV prevalence surveys in the last five years (see Table 5.2). Ethiopia and Rwanda conducted a Demographic and Health Survey (DHS) with HIV testing in 2005, and Burundi had a poorly documented survey with HIV testing in 2002. Ethiopia, Rwanda, and Tanzania now have fairly extensive surveillance systems that rely on antenatal sentinel clinics. Zanzibar has a concentrated epidemic and aims to focus on MARPS, especially sex workers.

Table 5.2: Surveillance and Monitoring Data Collection in Eastern African Evaluation Study Countries

Country	Burundi	Ethiopia	Rwanda	Tanzania
General population	ANC clinics (8)	ANC clinics; last published data 2005	ANC clinics (37 sites)	ANC clinics, expanded system (24 clinics in 6 regions since 2001); last published round 2005
	National survey, 2002	DHS 2005	DHS 2005	AIDS Indicator Surveys 2003-2004 and DHS 2007-2008
Health service data		Facility reporting improved	Almost comprehensive electronic reporting system for ART (TRAC net); paper reporting for HTC and PMTCT (MOH)	ART direct, multiple systems; PMTCT, through HMIS, incomplete; HTC multiple estimates
MARPS		FSW (BSS)		FSW, MSM in Zanzibar; research studies mainland

MOH = Ministry of Health; MSM = men who have sex with men; TRAC = Treatment and Research on AIDS Center (Rwanda)

Reporting of HIV interventions through health services has greatly improved in Ethiopia where the data are accessible on the Internet. Rwanda was an early adopter of an electronic reporting system of aggregate data, which has allowed good compilation of service data. The facility-specific databases archive monthly data for a key set of ART program indicators. Tanzania, on the other hand, is an example of a country with a weak health management information system and multiple parallel reporting systems for HIV interventions, often with conflicting data.

Several countries have developed monitoring systems for reporting on non-health and community-level program data. An example is the Tanzania output monitoring system for HIV/AIDS (TOMSHA). Such programs are used for program management, but rarely have completeness and accuracy allowed these data to be accessed easily and used for the computation of population and program statistics and trends over time.

Cambodia, Haiti, and West and Central African Countries

All six countries in this group have conducted a national survey with HIV testing since 2003 and have fairly good HIV surveillance systems based on antenatal clinics to monitor prevalence in mostly urban locations (see Table 5.3). There is some surveillance of risk populations, notably FSWs, but efforts are limited to an occasional research study in several countries. Cambodia is in a

transition stage where monitoring of one of the main risk populations, IDUs, still has to be put in place, while surveillance among FSW and pregnant women continues. The main risk population in the west African countries are FSWs, although there is limited knowledge about the size of this population in several countries.

Deficiencies in reporting of HIV interventions by health facilities were found in all countries. There are major inconsistencies due to incomplete and inaccurate reporting, lack of systematic compilation of data, and fragmentation. For instance, the Haiti Country Impact Evaluation Report concluded that the evaluation was heavily complicated by the lack of a single monitoring and evaluation system, which is needed not only for HIV but for the health system in general.

Table 5.3: Surveillance and Monitoring Data Collection in Cambodia, Haiti, and West/Central African Evaluation Study Countries

Country	Cambodia	Haiti	Benin	Burkina Faso	DR Congo	Ghana
General population	ANC clinics, time series	ANC clinics and PMTCT (37% of women)	ANC clinics (50, 2007); time series since 2001 (7 urban)	ANC clinics (13, 2006)	ANC clinics (24 sites in 2006)	ANC clinics, (40 sites since 2004)
	DHS 2005	DHS 2006	DHS 2005-2006	DHS 2003-2004	DHS 2006; BSS young people 2005	DHS 2003
Health service data	District and direct reporting	District reporting; incomplete, fragmented	District and direct reporting; incomplete	ART direct, PMTCT through HMIS; good reporting rates	Direct program reporting, incomplete	Regional reporting system (hospitals); incomplete
MARPS	FSW surveillance in cities; IDU not yet; MSM limited	FSW capital city, 2007	FSW surveillance every 2 years, urban, 5 provinces: 2004, 2006; prisoners; truck drivers	No data collection since 2004	No data	2002, 2006 FSW survey; 2003 client study; 2006 urban MSM study

CONCENTRATED EPIDEMICS

Monitoring of the size and risk of HIV infection in risk populations is a challenge for all countries, and there are few countries with reliable HIV trends over time that might facilitate an evaluation. Furthermore, the measurement of the exposure to interventions is complicated, and this further affects the ability to evaluate large-scale programs.[6] It is difficult to obtain an overall picture of the situation, as data are lacking and monitoring challenges are substantial, although there are some improvements, for instance, in the availability of studies of relevance to understanding sexual behavior and HIV among MSM, with an encouraging amount of new data coming from Sub-Saharan Africa.[7]

Peru and Vietnam have fairly extensive surveillance of pregnant women attending antenatal clinics and various surveillance systems for most at-risk populations (see Table 5.4). This includes not only

[6] Country reporting on most at-risk populations in the context of UNGASS monitoring in 2008 was poor. The data received indicated that prevention service delivery for populations most at risk is inconsistent and highly variable within and between regions, with many lacking access to essential prevention services such as condoms and sterile needles. Risk populations in concentrated epidemics, especially IDU, face additional barriers to HIV treatment access.

[7] Cáceres, C.F., K. Konda, E.R. Segura, and R. Lyerla. 2008. Epidemiology of male same-sex behavior and associated sexual health indicators in low- and middle-income countries: 2003-2007 estimates. Sexually Transmitted Infections 84(Suppl. 1): i49-i56.

HIV testing but also risk behavior assessment and sometimes exposure to interventions. Moldova and Kyrgyzstan have partially adequate surveillance systems and are intensifying their monitoring efforts among MARPS.

Table 5.4: Surveillance and Monitoring Data Collection in Evaluation Study Countries with Concentrated Epidemics

Country	Moldova	Kyrgyzstan	Peru	Vietnam
General population	Testing twice all pregnant women	Annual HIV surveillance since 2004, annual STI surveillance since 2002	Annual or biannual surveillance at hospitals and health centers since 2002	Large number, same clinics, time series
	2005 DHS	2005-2006 MICS; 1997 DHS	General population surveys (part of PREVEN) 2002, 2005, 2006, 2007	AIS 2005 (behavior); city surveys with HIV testing
MARPS	Behavioral and HIV sentinel surveillance studies, 2004, 2007	Annual surveillance since 2004 on IDU, CSW, MSM and prisoners; 2002-2003 PLACE	FSW Surveillance by MOH; sex worker study in 20 cities 2006 (PREVEN); MSM in cities for 2002, 2006	Cities, annual (FSW, IDU); MSM limited; IBBS 2005-2006

STI = sexually transmitted infection; MICS = Multiple Indicator Cluster Survey; PREVEN = Prevención Comunitaria de Enfermedades de Transmisión Sexual (Peru); AIS = AIDS Indicator Survey; CSW = commercial sex worker; PLACE = Priorities for Local AIDS Control Efforts; IBBS = Integrated Biological and Behavioural Survey

Peru's comprehensive monitoring system includes MSM and sex workers in a large number of cities, regular surveillance of antenatal clinic attendees, and population-based surveys among different subpopulations in urban areas. The country analysis shows gaps and data quality concerns and recommends that further investments are needed to include data on health promotion and prevention, enhance the interoperability of different databases (e.g., lab, clinic, epidemiological and health insurance data) and the use of computer-based tools and the Internet, including data warehousing and better feedback to health workers.

In Vietnam it was noted, "There is no coordination between HIV/AIDS reporting and other health reporting systems and there is no coordination or standardization between different donor reporting systems and the national system. All donors have separate and parallel reporting tracks at different levels and these differ from the national routine reporting in all aspects such as forms, log books, reporting frequency, indicators and timeliness."

5.4 FUNDING

Global resource flows for HIV/AIDS have increased from US$1.4 billion in 2000 to an estimated US$10 billion in 2007, with two-thirds committed through bilateral and multilateral funding streams.[8] During the period 2003-2004 and 2005-2006, US$11 billion and 17 billion, respectively, were available. Two major initiatives account for the bulk of the increase—including PEPFAR, which since 2003 has made available US$18.8 billion (for HIV and tuberculosis), and the Global Fund, which has signed grant agreements worth US$9.5 billion (US$3.3 billion of which is contributions from the U.S. government, also counted in the PEPFAR total). The World Bank, the third largest donor, has committed about US$1.3 billion between 2001 and 2005, mainly through

[8] Joint United Nations Program on HIV/AIDS (UNAIDS). 2008. Report on the global AIDS epidemic 2008. Geneva: UNAIDS. Available at http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_report.asp.

its Multi-Country AIDS Program. Chapter 4 presents more details regarding the amounts and sources of HIV global funding. For the 18 evaluation study countries, cumulative funding from all sources during 2003-2006 amounts to about US$2.9 billion, or about 15% of the global total. The average increase within this period is threefold, from US$350 million in 2003 to US$1 billion in 2006. The Global Fund disbursed US$556 million to the 18 countries during 2003-2006.

This section aims to address the following questions:

- What is the level and trend of external HIV funding in countries?
- What is the contribution of the Global Fund, PEPFAR, and other major financing mechanisms and donors to external funding of HIV?
- How much is spent on treatment and care compared with prevention (from most recent country reports on UNGASS Indicator 1)?
- How large is the share of HIV relative to total health spending in countries?

Southern African Countries

Major increases in external funding were observed in all four countries in this group during 2003-2006 (see Figure 5.1.A). Zambia has the highest level of per capita external funding, which increased from US$6 in 2003 to about US$10 in 2006. Funding levels in Malawi, Lesotho, and Mozambique increased from less than US$2 in 2003 to over US$5 per capita in 2006. Funding per person living with HIV/AIDS (PLWHA) in 2006 was US$75 in Lesotho, around US$200 in Malawi and Zambia, and more than US$400 in Mozambique (international dollars).

Figure 5.1.A
Per Capita External Funding for HIV (US$), by Country and Year (2003-2006)

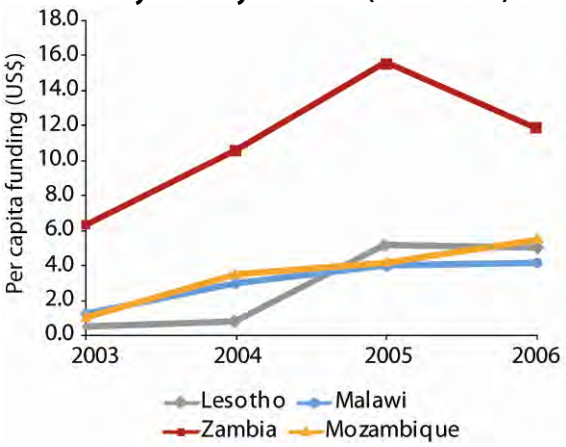
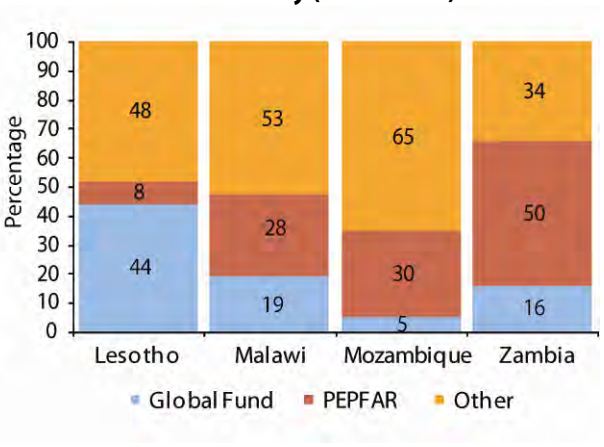


Figure 5.1.B
Percentage of External Funding, by Major Donor and Country (2003-2006)



Source: WHO desk review for the Global Fund Five-Year Evaluation of HIV funding sources and level 2008

The Global Fund is the largest source of financing in Lesotho, accounting for 44% of all external resources during 2003-2006 (see Figure 5.1.B). In the other three countries, the Global Fund contributes less than 20% of external funding and the PEPFAR share is considerably larger. In Zambia, half of the resources are provided by PEPFAR. According to the National Health Accounts (NHA), domestic HIV contributions of total HIV funding in Zambia were stable around 10% for 2003 and 2006; in Malawi, they were nearly 50% in 2003 and just under 20% in 2006.

The proportion of the HIV funding spent on treatment and care in 2006 was about 40-50% in Malawi, Mozambique, and Zambia, but only about 20% in Lesotho. The proportion spent on prevention is less, ranging from 10-30% in all four countries, with Malawi and Lesotho at the lower end with only about 10%.

A comparison of total health expenditures with external HIV funding gives an idea of the relative importance of HIV. HIV external funding constituted a large part of the national health expenditure for the period 2003-2006: 20-25% in all countries except Lesotho (7%).

Eastern African Countries

Increases in external funding were observed in all four countries in this group during 2003-2006 (see Figure 5.2.A). Rwanda has the highest level of external funding, which increased from US$3 in 2003 to nearly US$8 per capita in 2006. In other countries, per capita funding ranges from about US$1 in 2003 to not more than US$3 in 2006. Funding per person living with AIDS (PLWA) in 2006 was US$300 in Tanzania, US$600 in Ethiopia and Burundi, and US$1,300 in Rwanda (international dollars).

Figure 5.2.A
Per Capita External Funding for HIV (US$), by Country and Year (2003-2006)

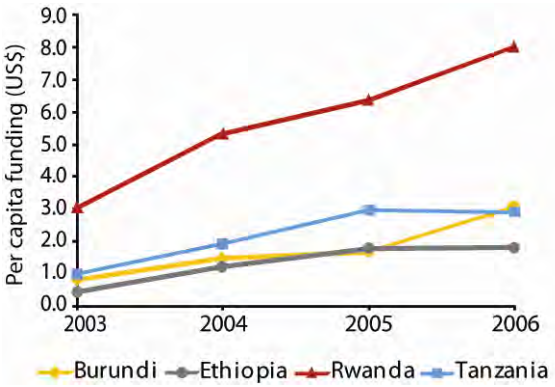
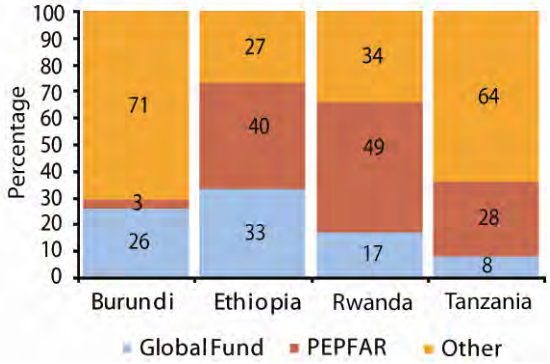


Figure 5.2.B
Percentage of External Funding, by Major Donor and Country (2003-2006)



Source: WHO desk review for the Global Fund Five-Year Evaluation of HIV funding sources and level 2008

During 2003-2006, compared with PEPFAR, the Global Fund is the largest external contributor in Burundi (26%) and also contributed a large share of funding in Ethiopia (33%) (see Figure 5.2.B). PEPFAR was the major contributor in the three PEPFAR focus countries, including Ethiopia, Rwanda, and Tanzania (30-40%). According to the NHA, domestic HIV contributions accounted for 15% of total HIV funding in 2003 to about 30% in 2006.

The proportion spent on treatment and care was 25% and 30% in Tanzania and Rwanda, respectively, in 2006 and about the same amount for prevention. No data were available for the other countries.

The proportion of external HIV funding of total health expenditure for Tanzania, Ethiopia, and Rwanda was respectively 14%, 20%, and 25% during 2003-2006. In Burundi, however, HIV funding accounted for 49% of total health expenditure.

CAMBODIA, HAITI, AND WEST AND CENTRAL AFRICAN COUNTRIES

Cambodia and Haiti's HIV funding were already much higher than in most African countries in 2003.

Overall, increases in external funding in these five countries have been modest, with the exception of Haiti, which nearly doubled from US$4 in 2005 to more than US$7 in 2006 (see Figure 5.3.A). External funding for HIV in Benin doubled also, but from only about US$1 in 2003 to US$2 in 2006. Burkina Faso and Ghana's funding level increased from US$1 to US$2 per capita. External HIV funding to the Democratic Republic of Congo increased nearly three times during 2003-2006, but has remained the lowest with still only US$0.70 per capita in 2006. Funding per PLWA in 2006 was US$1,400-1,600 in Cambodia and Haiti, US$300-400 in Burkina Faso and Ghana, US$800 in Benin, and less than US$100 in DR Congo (international dollars).

Figure 5.3.A
Per Capita External Funding for HIV (US$), by Country and Year (2003-2006)

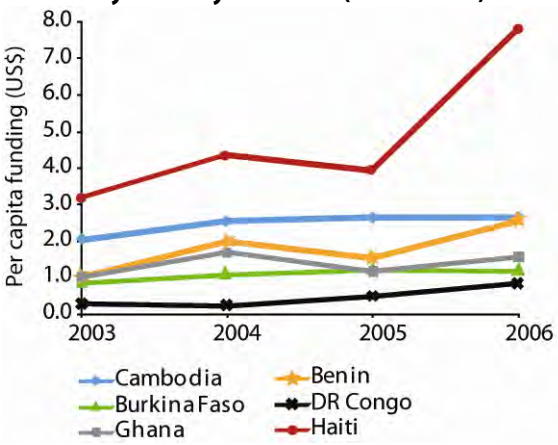
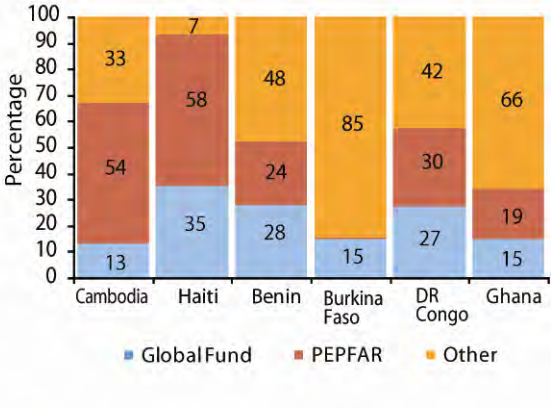


Figure 5.3.B
Percentage of External Funding, by Major Donor and Country (2003-2006)



Source: WHO desk review for the Global Fund Five-Year Evaluation of HIV funding sources and level 2008

The Global Fund share of external HIV financing varies from 13% in Cambodia to 35% in Haiti (see Figure 5.3.B). PEPFAR is almost nonexistent in Burkina Faso, but equally large or larger than the Global Fund in all other countries. According to the NHA, domestic HIV contributions in Burkina Faso accounted for 1% of total HIV funding in 2003 to about 8% in 2006; in Haiti, these contributions were less than 1% in 2006 (no estimate available for 2003).

The proportion spent on treatment and care was 20-30% for all countries, except for Haiti where it was about 45%. The proportion spent on prevention was also about 20-30%, except in Cambodia where it was 45%.

The share of the external HIV funding to the total health expenditure, 2003-2006, is 5-10% in all countries, except slightly higher in Haiti (about 15%).

CONCENTRATED EPIDEMICS

External funding for HIV in all four countries increased during 2003-2006, especially Moldova and Kyrgyzstan, the latter mainly through the Global Fund. Also in Vietnam, funding levels more than doubled, mainly through PEPFAR (see Figures 5.4.A and 5.4.B). While there were some significant

increases in these countries, they all remain well below US$2 per capita, a much lower level than in countries with generalized epidemics.

Figure 5.4.A
Per Capita External Funding for HIV (US$), by Country and Year (2003-2006)

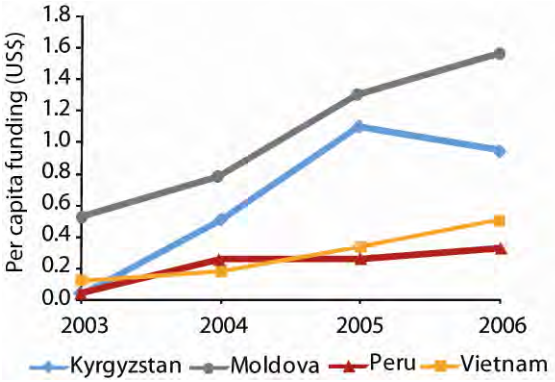
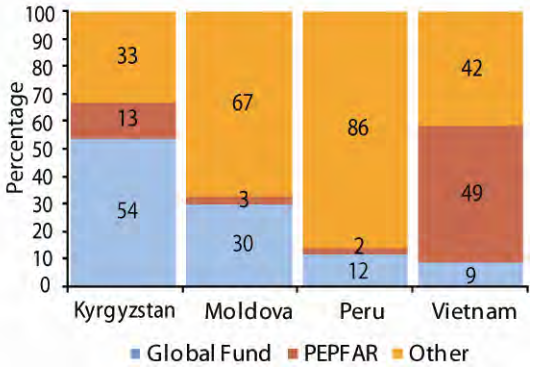


Figure 5.4.B
Percentage of External Funding, by Major Donor and Country (2003-2006)



Source: WHO desk review for the Global Fund Five-Year Evaluation of HIV funding sources and level 2008

The proportion spent on treatment and care of PLWHA is expectedly low in these countries (10-20%), except in Peru where 44% was spent on treatment and care. On the other hand, the proportion of HIV funding spent on prevention is expectedly higher, with about 80% in Moldova and Kyrgyzstan (but only 30% in Peru). No comparable figures are available for Vietnam.

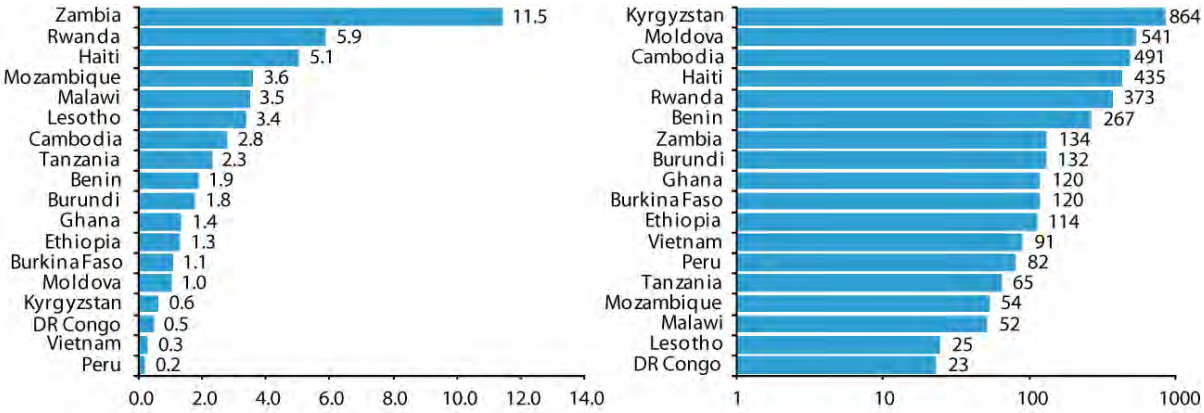
The share of the external HIV funding to the total health expenditure in 2003-2006 was under 1% in every country except in Kyrgyzstan where HIV funding was nearly 3% of total health expenditure.

CONCLUSIONS

Levels of per capita funding have increased in all countries, but at a markedly different pace and level between groups and countries within groups. Groups of countries that received the highest amounts of HIV funding are the eastern African and southern African countries, where disease burden is highest (see Figure 5.5). Conversely, countries with concentrated epidemics have received relatively less funding. Several groups with countries receive considerably more per capita funding than their "peer" countries with similar epidemic and regional characteristics, including Zambia, Rwanda, and Haiti. Within groups of countries, there are also particular countries where funding increases fall behind, such as large population countries, including Ethiopia and DR Congo.

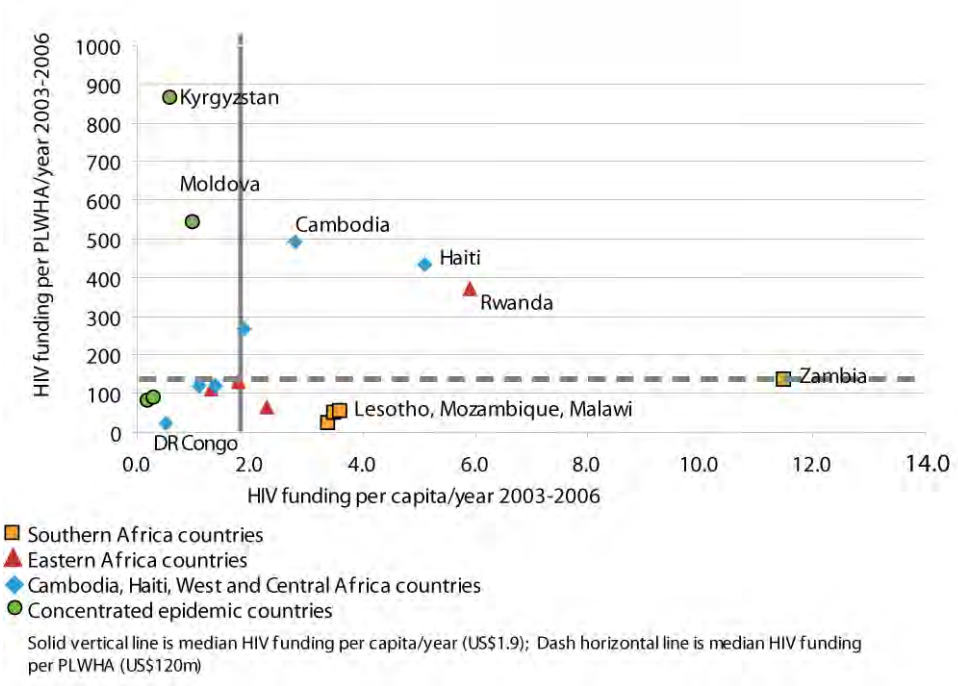
In terms of external funding per PLWHA, there are countries with very high funding levels, including especially those with concentrated epidemics (Kyrgyzstan, Moldova), lower-level epidemics (Cambodia and Haiti), and also Rwanda (see Figure 5.6). On the other hand, DR Congo and countries in Southern Africa (Lesotho, Malawi, Mozambique) generally receive relatively low levels of external funding per PLWA. Zambia is an outlier because it receives a very large amount of per capita funding, but funding per PLWHA actually only falls on the median.

Figure 5.5
External HIV Funding, 2003-2006, per Capita and per PLWHA, per Year (Constant 2006 US$), by Country



Source: WHO desk review of HIV funding sources for the evaluation study 2008

Figure 5.6
External HIV Funding per PLWHA, 2003-2006, and per Capita per Year, by Country (Constant 2006 US$)



Source: WHO desk review for the Global Fund Five-Year Evaluation of HIV funding sources and level 2008

Overall, the Global Fund finances 18% of external HIV funding and is the largest donor in one-third of the 18 countries. In the seven PEPFAR focus countries, U.S. funds are the largest contribution. The proportion spent on treatment and care is positively associated with the groups with higher prevalence. That is, the most is spent on care and treatment in the southern African countries and the lowest proportion in countries with a concentrated epidemic, as is expected. Conversely, the reverse situation is observed in spending on prevention activities: the lowest

proportion is spent on prevention in the southern African countries and the highest proportion in countries with concentrated epidemics.

External HIV funding presents a significant share of total health expenditures in groups that comprise countries with higher HIV prevalence. In countries with concentrated epidemics, the share is very small.

In six countries, HIV external funding comprised more than one-fifth of the total health funding for 2003-2006, including the three eastern and three southern African countries. The potential for negative and positive effects on the health systems are probably greater in these countries, even though this must be considered against a backdrop of increasing overall health funding.

5.5 Access and Coverage

A major part of scaling up of interventions against HIV/AIDS has focused on three interventions that are delivered through health services: HTC, PMTCT, and ART. WHO/UNAIDS guidelines in 2007 recommend that in countries with generalized HIV epidemics, health workers should advise HTC to all persons seen in health facilities. In countries with concentrated and low-level epidemics, HTC should be recommended to people with signs and symptoms suggestive of HIV infection, such as tuberculosis, and to children exposed to prenatal HIV.[9]

In 2007, UNAIDS, the United Nations Children's Fund (UNICEF), and WHO estimated that about 420,000 children acquired HIV infection from their mothers during the pregnancy, delivery, or breastfeeding, down from 460,000 in 2001.[10] Interventions to reduce the number of HIV infections in infants include primary prevention of HIV infection among women of childbearing age, prevention of pregnancy among women living with HIV, and prevention of HIV transmission from women living with HIV to their infants. A comprehensive package also includes appropriate diagnosis and treatment as well as care and support to mothers living with HIV and their children.[11]

By the end of 2007, WHO and UNAIDS estimated that 2,990,000 persons were receiving ART, compared with an estimated 400,000 at the end of 2003.[12] This includes 200,000 children on treatment, up from about 75,000 in 2005, and translates into an estimated 31% coverage of the estimated number of people needing treatment in 2007. Several international goals have been set directing efforts to improve coverage and ensure equitable access to treatment in the context of UNGASS, MDG, and PEPFAR.[13]

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[9] WHO and UNAIDS. 2007. Guidance on provider-initiated HIV testing and counseling in health facilities. Geneva: WHO. Available at http://www.who.int/hiv/pub/guidelines/9789241595568_en.pdf.

[10] UNAIDS. 2008. Report on the global AIDS epidemic 2008. Geneva: UNAIDS. Available at http://www.unaids.org/en/KnowledgeCentre/HIVData/GlobalReport/2008/2008_Global_ report.asp.

[11] World Health Organization (WHO). 2003. Strategic approaches to the prevention of HIV infection in infants: Report of a WHO meeting, Morges, Switzerland, 20-22 March 2002. Geneva: WHO. Available at http://www.who.int/hiv/pub/ mtct/en/StrategicApproachesE.pdf.

[12] WHO, UNAIDS, and UNICEF. 2008. Towards universal access: Scaling up priority HIV/AIDS interventions in the health sector. Progress Report 2008. Geneva: WHO. Available at http://www.who.int/entity/hiv/pub/towards_ universal_access_report_2008.pdf.

[13] UNGASS Political Declaration on Universal Access to Prevention, Treatment, Care and Support in 2006. Member states commit to moving towards universal access to HIV prevention, treatment, care and support by 2010; Millennium

This section describes progress in access and coverage of HTC, PMTCT, and ART, in the four regional/epidemiological groups of countries. It then presents results from the DCA Facility and Household Surveys on service environment, readiness to deliver services, and coverage.

SOUTHERN AFRICAN COUNTRIES

Table 5.5 summarizes the situation in terms of service provision and utilization in 2003/04 and 2006/07. In the countries with trend data, the number of service delivery points and density for ART, PMTCT, and HTC have increased dramatically. The estimated coverage rates for services among those in need of these services show similar increases, although major gaps remain.

Table 5.5: Scale up of ARV Therapy, Prevention of Mother-to-Child Transmission, and HIV Testing and Counseling, 2003/04 and 2006/07, Four Southern African Countries

Indicator	Lesotho		Malawi		Mozambique		Zambia	
ART	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**
Number of facilities	-	71	24	163	24	154	-	218
Sites per 1,000 people needing ART	-	0.8	0.1	0.6	.1	0.4	-	0.7
ART coverage (%)	4	45	5	35	3	24	7	46
PMTCT								
Number of facilities	9	37	31	60	24	386	181	817
Sites per 1,000 pregnant women	0.2	0.6	<0.1	0.1	<0.1	0.5	0.5	2.2
Pregnant women tested and counseled (%)	-	40	-	25	-	38	-	82
HIV+ pregnant women receiving prophylaxis (%)	6	32	4	32	3	46	18	47
Testing and counseling								
Number of facilities	-	166	146	600	87	569	-	1102
Sites per 100,000 people age 15-49	-	17.1	2.6	9.8	1.0	5.8	-	20.2
People age 15-49 who used HTC in year (%)	-	19	5.0	11.0	2.0	5.3	0.7	1.9

Sources: Number of ART, PMTCT, and HTC sites from Country Impact Evaluation Reports (data show latest year if both years available, or 2008) and in some cases differ from the latest UNGASS reporting; site density is calculated using 2007 population estimates from UN Population division; estimates of the number of pregnant women is calculated from UN Towards Universal Access, 2008, and the estimated percentage of pregnant women receiving prophylaxis is from this source; estimated ARV coverage and need is from UNAIDS Report on the Global AIDS Epidemic, 2008 and Country Impact Evaluation Reports and in some cases differs from latest UNGASS reporting; percentage of people using HTC calculated from number of clients reported in Country Impact Evaluation Reports and population estimates from the UN Population division.

ART started in the private sector in 2001 and expanded into the public sector with Global Fund and other donor support in 2003. Lesotho made significant progress in delivering ART services with almost one site per 1,000 people in need of ART and with an increase in ART coverage from 4% to 45%. Funding for ART declined in part due to a decrease in Global Fund Round 2 funding, but the priority of at least one-third of HIV funding for treatment was maintained. ART services are available in all districts, but unevenly; there are too many patients for some ART sites, and in others uptake is slow. Remote areas are still underserved. Obstacles to better coverage are numerous, including lack of human resources, weak infrastructure, availability of appropriate equipment, and

Development Goal (MDG) 6. Ensure equitable and sustainable access to antiretroviral therapy to at least 75% of those in need by 2015; PEPFAR. 2 million people on ARV treatment in the 15 focus countries by 2008.

weak data collection systems that do not permit adequate patient follow-up. The PMTCT program in Lesotho was launched in 2003 and has also expanded to 0.6 sites per 1,000 women; about 4 out of 10 women are tested and counseled. However, there has been inconsistent support to expand access and there is much to be done to ensure services available within two hours of walking distance. Private sites are not regulated and they start or stop services without informing the central level. There has been recent introduction of a more efficient antiretroviral (ARV) treatment regimen for pregnant women, but so far there is limited access. HTC in Lesotho started in 2004, and the government launched the Know Your Status (KYS) campaign for full coverage by 2007. This facilitated services being implemented in all districts, but there is still a lack of access in remote areas. Training of mobile outreach has helped improve coverage. By 2007, 19% of adults were tested and counseled. The KYS campaign has aided to reduce stigma.

ART in Malawi was introduced in the private sector in 2002, and the public sector followed suit in 2003. Malawi's ART roll-out is well documented because of its well-functioning quarterly reporting system. Coverage increased from 5% to 35%, with 0.6 sites per 1,000 people in need. By December 2005, every district had at least one ART center. Mozambique increased ART access and coverage eight-fold during 2004 to 2007, although still only one in four people in need were receiving ART. People in the northern areas are particularly underserved. ART coverage is still low compared with other countries in the group, apparently associated with difficulties in managing more remote sites. The government recognizes the low ART coverage rates, but it also recognizes that human resources, in the face of such rapid scale up, become overworked and potentially unsustainable if not managed.

Scaling up PMTCT services has been much slower, and there were 0.1 sites for 1,000 pregnant women in 2007. In Malawi, 11% of antenatal care clinics provide PMTCT and 32% of women testing HIV positive received nevirapine (NVP) during 2006-2007. The PMTCT program, initiated in 2002, had a more rapid roll-out: about half of the health centers with antenatal care facilities are now considered to offer PMTCT and nearly half of HIV-positive pregnant women received antiretroviral drugs for prophylaxis. One in 20 people used HTC services in the last year. The number of HTC service points quadrupled during the scale-up period, and the coverage rates more than doubled (5% to 11%).

Zambia rapidly scaled up access and coverage of all three services. There were 0.7 sites per 1,000 people needing ART, and coverage was estimated just below 50% by 2007. There were 2.2 facilities per 1,000 pregnant women offering PMTCT by 2007, the highest of any country in the evaluation study, and 82% of pregnant women received testing and counseling. The major challenge is the large number of women who do not receive ARVs for prophylaxis after testing HIV positive. And, although access to HTC has much improved, still only 2% of adults used these services in 2007.

Eastern African Countries

The four eastern African countries also show dramatic increases in access and utilization of HIV services during 2003/4 through 2006/7 (see Table 5.6). In Burundi, the epidemic is strongly concentrated in urban areas and so are services: 44% of PMTCT sites are urban, and 70% of people on ART are in Bujumbura. The entry points for treatment were mostly via medical consultation (72%) and HTC centers (20%). In Bujumbura, more women than men utilize HTC centers.

Table 5.6: Scale up of ARV Therapy, Prevention of Mother-to-Child Transmission, and HIV Testing and Counseling, 2003/04 and 2006/07, Eastern African Countries

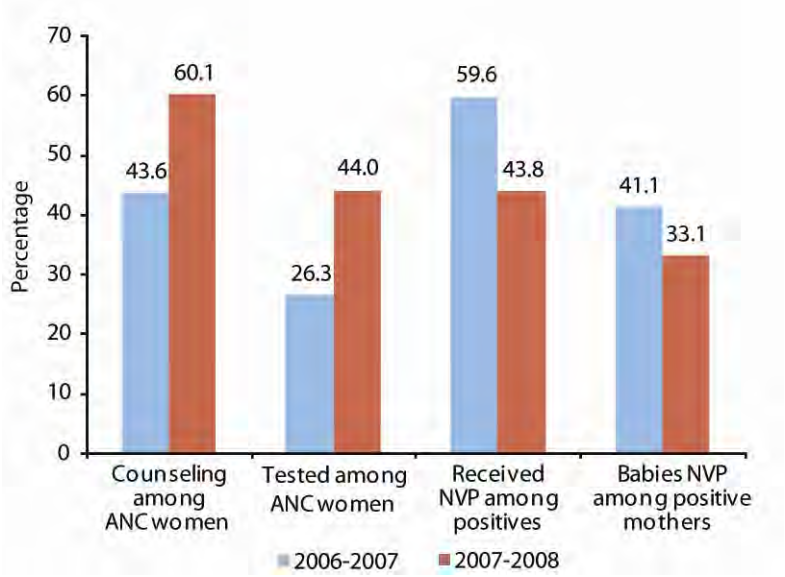
Indicator	Burundi		Ethiopia		Rwanda		Tanzania	
ART	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**
Number of facilities	19	46	-	272	32	165	-	204
Sites per 1,000 people needing ART	0.4	1.0	-	0.9	0.5	2.4	-	0.5
ART coverage (%)	6	23	4	29	10	48	1	31
PMTCT								
Number of facilities	9	38	-	-	117	290	-	544
Sites per 1,000 pregnant women	<0. 1	0.1	-	-	0.3	0.7	-	0.4
Pregnant women tested and counseled (%)		5	2	7	44	>90 *	-	33
HIV+ pregnant women receiving prophylaxis (%)	4	14	2	7	35	60	2	32
Testing and counseling								
Number of facilities	105	187	525	1230	135	313	42	71
Sites per 100,000 people age 15-49	3.0	4.7	1.5	3.1	2.9	5.5	0.2	0.4
People age 15-49 who used HTC in last year (%)	2.6	5.2	-	4.9	4.1	15.6	-	19 †

* Rwanda rates of pregnant women counseled and tested exceed 100%, indicating that they reportedly tested more women than there are estimated pregnant women. Possible explanations for this are (a) women are tested twice during pregnancy; (b) the number of tests reported in the evaluation report is too high (numerator overestimated); or (c) the number of pregnant women is underestimated (denominator underestimated).
† Tanzania coverage estimated from campaign data.
Sources: See Table 5.5 footnote.

In late 2006, Ethiopia launched the Millennium AIDS Campaign. Accelerating the uptake of HTC was accomplished through an intensified social mobilization effort and improving access to ART. Focusing on hospitals and health centers, the number of HTC sites increased from 525 in 2004 to 1,230 in 2008. The monthly rate of testing increased dramatically from June 2006 to June 2007, from 40,000 to about 160,000 clients per month, and further to 320,000 per month from July 2007 to March 2008. The latter figure translates into HTC utilization of about one in ten Ethiopian adults 15-49 years (12% of men and 9% of women). HIV prevalence dropped from 7.4% to 4.0% among HTC clients, indicating broader utilization of the service as general adult population prevalence is below 2%.

The comparison of PMTCT clinic indicators in Ethiopia between June 2006 and June 2007 and July 2007 and March 2008 shows that the quality of the PMTCT services has improved with regards to selected indicators but deteriorated on others. While more women who attended antenatal care in a PMTCT clinic received pretest counseling and HIV testing, fewer HIV-positive women and their babies received NVP (see Figure 5.7). However, the increase in the testing identified more HIV-positive pregnant women so that there was a slight improvement in ARV coverage for PMTCT. Out of 100 HIV-positive women who attended antenatal care in a PMTCT clinic, 16 and 19 received NVP in 2006-2007 and 2007-2008, respectively. The PMTCT clinics are missing many opportunities. If the low antenatal attendance is taken into account, coverage figures drop below 10%. Only 69% of urban and 24% of rural women made an antenatal visit during their last pregnancy (DHS 2005).

Figure 5.7
Percentage of Women Attending Antenatal Care Receiving Pretest Counseling and HIV Testing; Percentage of HIV-positive Women and Their Babies Receiving Nevirapine, Ethiopia, 2006-2008



Source: Ethiopia ANC Statistics

The number of ART sites in Rwanda increased more than fivefold in the four-year scale-up period. Two-thirds of antenatal care (ANC) clinics offered PMTCT services in 2008 Ministry of Health/Treatment and Research on AIDS Center [MOH/TRAC] Plus). The availability per 1,000 pregnant women is the highest in this group, and indeed among the highest of all evaluation countries in Africa. Not surprisingly, Rwanda also has the highest ART coverage in 2007 (48%). ART is free since 2004 and is heavily subsidized by numerous external donors. There has been a substantial increase in PMTCT availability, resulting in very high testing and counseling coverage of pregnant women at ANC equally across the country. Most pregnant women receive prophylaxis (60%). In terms of HTC coverage of the general population, Rwanda shows a highest utilization rate through regular services (16%) compared with many other countries.

ART coverage in Tanzania remains relatively low (31%) due in part to a slow start in rolling out treatment (only 1% coverage in 2004) and the relatively low number of treatment sites per 1,000 people in need. PMTCT access also appears to be improving, with a very large number of sites in 2007 and one-third of HIV-positive pregnant women treated with prophylaxis. A large increase in testing and counseling in Tanzania was associated with the national campaign conducted during 2007-2008 with strong involvement of the country's president. The regional reports added up to a total of 1.54 million men and 1.88 million women tested and counseled, corresponding to 19% of the population age 15 and over. The regional HIV prevalence rates among men and women tested in the campaign correspond well with the HIV prevalence rates by region observed in the 2007 Tanzania HIV and Malaria Indicator Survey (THIS), indicating that participation was not limited to people seeking treatment.

Cambodia, Haiti, and West and Central African Countries

Access to ART has rapidly expanded in all countries, and by 2007 all countries had more than one ART facility per 1,000 people needing ART (see Table 5.7). There are facilities all over the country, but mainly located in urban areas where the need is greatest.

Table 5.7: Scale up of ARV Therapy, Prevention of Mother-to-Child Transmission, and HIV Testing and Counseling, 2003/04 and 2006/07, Cambodia, Haiti, and Central African Countries

Indicator	Cambodia		Haiti		Benin		Burkina Faso		DR Congo		Ghana	
ART	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**22006/7**	**2003/4**	**2006/7**
Number of facilities	4	49	-	46	14	48	-	76	45	22.4	3	95
Sites per 1,000 people needing ART	0.1	1.2	-	1.3	0.9	2.4	-	1.6	<0.1	1.8	<0.1	1.1
ART coverage (%)	14	67	10	41	14	48	7	35	4	24	3	12
PMTCT												
Number of facilities	-	99	38	97	-	204	44	413	159	394	-	408
Sites per 1,000 pregnant women	-	0.3	0.2	0.4	-	0.6	0.1	0.7	0.1	0.1	-	0.6
Women tested and counseled (%)	-	19	-	42	-	54	-	10	2	6	1	16
HIV+ women receiving prophylaxis (%)	6-9	25-41	13	22	-	70-100	5	18	2	9	1	10
Testing and counseling												
Number of facilities	74	197	30	105	-	89	-	118	184	594	-	422
Sites per 100,000 people age 15-49	1.0	2.6	0.6	2.2	-	2.1	-	1.7	0.7	2.1	-	4.7
People age 15-49 who used HTC in year (%)	-	3.5	0.8	7	-	4.3	1.5	3	0.3	2	0.1	0.3

Sources: See Table 5.5 footnote.

In Cambodia, there was at least one ART facility in 20 of the 24 provinces, and 68% of ART sites were urban. Coverage estimates in Cambodia in 2007 cover more than half of those in need, and 36% live in Phnom Pehn. PMTCT sites have been scaled up since 2003: about one in five women get tested and counseled, and the number of women receiving prophylaxis has increased about fivefold since 2003. The number of HTC sites more than doubled since 2003, and 3% of adults were tested and counseled in the last year. Some countries report the testing rates among most at-risk populations. In Cambodia in 2005, only 4.1% of respondents 15-49 indicated that they knew their HIV status, but HIV testing rates among sex workers and MSM were reported to be well over 50%.

In Haiti, 9 out of 10 clinics were urban, and seven provinces have no rural ART clinics at all. Although ART coverage estimates in Haiti are fairly good (41% in 2007), a patient follow-up study showed that adherence to ART regimens is poor. For instance, baseline staging was done for 77% of patients, Cluster of Differentiation 4 (CD4) counts and weight measurements at specified intervals for only 20% and 50% of patients, respectively. Haiti has made the most progress increasing the proportion of antenatal clinics providing the minimum package of PMTCT services: 17% in 2003, 29% in 2004, and 73% in 2007. The majority of sites that do not offer PMTCT are rural. PMTCT sites in Haiti have more than doubled in the period, and more than 40% of women were counseled and tested in 2007, and one in five women received prophylaxis. The number of HTC sites more than tripled, while coverage increased ninefold to the highest level among this group of countries.

The number of sites in Benin tripled, and nearly half of people needing ART are on treatment. PMTCT services are provided in more than 200 clinics, but according to the Benin Impact Evaluation Report many of these sites were not functional due to lack of provisions. In any case, in 2007, more than 50% of women were tested and counseled, and 70% received prophylaxis. Most improvements in HTC coverage came between 2006 and 2007. However, despite being free and anonymous, less than half of people tested received results, purportedly due to "sociological" reasons.

In Burkina Faso, most ART scale up has been recent, and ART coverage reaches about one-third of people in need. PMTCT sites have increased by a factor of nine, and women receiving prophylaxis has tripled since 2003. The proportion of people covered was about 3% in 2007.

DR Congo had a fivefold increase in the number of facilities providing ART during the scale-up period, corresponding to coverage of 24%. One-fourth of ART centers are in Kinshasa, and nearly 40% of DR Congo's patients on ART live in Kinshasa. The number of PMTCT sites doubled in the same period, as did the proportion of women counseled and tested. The proportion of HIV-positive pregnant women on prophylaxis more than quadrupled to 9%. The number of HTC sites tripled in the period, and the coverage in 2007 was estimated 2%.

Ghana's ART program has rolled out more slowly than in the other countries as shown by low density and low estimated coverage in 2006/07. The ART program had its most important growth in 2005-2006 when the government subsidized treatment. All regions have ART services available, but coverage is still low. PMTCT availability has also increased rapidly since 2004 with a density of sites comparable to other countries in the group. However, the percentage of HIV-positive pregnant women receiving ARVs is still low. HTC has increased rapidly since 2004. It has the highest density of sites among countries in this group, and sites have been established in every region. However, although the number of HTC clients has increased remarkably, coverage among adults has remained very low. In Ghana, the public sector is responsible for about 64% of 422 HTC centers in 2008. The

private sector administered 28% of centers and faith-based organizations, and nongovernmental organizations (NGOs) administered 8%.

CONCENTRATED EPIDEMICS

Country data indicate a considerable expansion of services and utilization for ARV therapy, PMTCT, and HTC between 2003/04 and 2006/07 (see Table 5.8).[14] Most of the data gaps refer to the earlier period when numbers of facilities were small. ART services have expanded the fastest.

Table 5.8: Scale up of ARV Therapy, Prevention of Mother-to-Child Transmission, and HIV Testing and Counseling, 2003/04 and 2006/07, Four Countries with Concentrated Epidemics

Indicator	Kyrgyzstan		Moldova		Peru		Vietnam	
ART	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**	**2003/4**	**2006/7**
Number of facilities	-	6	-	3	-	62	-	202
Sites per 1,000 people needing ART	-	9.8	-	3.8	-	2.8	-	3.0
ART coverage (%)	-	14	8	58	12	48	14	26
PMTCT								
Number of facilities	-	-	-	3	-	-	<5	170
Sites per 1,000 pregnant women	-	-	-	0.1	-	-	<0.1	0.1
Pregnant women tested and counseled (%)	-	27	>95 (1)	>95 (1)	34	70	1	2
HIV+ pregnant women receiving prophylaxis (N)	-	3	31	73	161	502	161	433
HTC								
Number of HTC sites	-	(2)	10	13	-	-	122	228
Sites per 100,000 people age 15-49	-	-	0.5	0.6	-	-	0.3	0.5
People age 15-49 who used HTC (%)	-	7	12	16	-	12 (2)	0.1	0.3

(1) 2004 Moldova policy recommends testing women twice during pregnancy.
(2) HIV testing but not necessarily HTC is provided in all medical institutions and organizations irrespective to its ownership type (about 1,000 state medical organizations and an unknown number of private ones).
Sources: See Table 5.5 footnote.

Global Fund Round 2 provided Kyrgyzstan the first funds for implementing ART services and procuring drugs and equipment in 2005. These services are decentralized to provinces. Estimated ART coverage is the lowest in the group, despite the density of ART treatment sites being the highest. The number of people receiving ART from 2005-2007 was 182 total, among which 25 patients on ART died in the same period. Stigma is a major obstacle to universal care, treatment, and support. PMTCT services have been supported solely by the Global Fund since 2005; a total of 71 HIV-positive pregnant women since 2005 have been identified and offered services including testing, nutrition, prophylaxis, and infant observation. Fifty-three infants were born to these mothers, of which 31 received ARV prophylaxis for preventing transmission. HIV testing is available in any medical facility, but the number of people tested is not routinely reported by all facilities, in particular the private ones. Public facility reporting on HIV testing indicates about 7% of the population age 15-49 was tested in 2007.

Moldova has three ARV and PMTCT treatment sites (each site providing both services) and full coverage of blood transfusion services screened for HIV. Policies to test pregnant women twice have resulted in virtually universal screening. Harm reduction activities for higher-risk populations are

[14] The table provides the numbers of HIV-positive women receiving ARV prophylaxis as coverage estimates are very uncertain in concentrated epidemics.

mainly provided by NGOs. Service delivery points (prevention and treatment) for IDUs, including inmates, increased from six in 2000 to 29 in 2007. Prevention programs targeting other high-risk groups, including sex workers, MSM, and mobile populations, have also been scaled up; support programs for PLWA have been as well. Moldova expanded access to services, including 15 regional laboratories for diagnostic services by 2007; officially designated HTC sites were piloted in 2007 with an aim to expanding in the next year.

In Peru, the Global Fund provided funds for the purchase of ARV drugs in 2004 and 2005. From 2006 the government absorbed the bulk of the costs for ART. ART accounted for about one-fourth of the HIV funding during 2004-2006. The number of service delivery points increased from 20 in 2004 to 62 in 2006 to 74 in 2007, with all facilities in urban areas. The number of people receiving ART linearly increased from almost none at the beginning of 2004 to more than 6,000 by the end of 2007, about half of those estimated to be in need. Two-thirds are men, and just over half are living in Lima. Annual loss to follow-up among ART patients has been below 5% since the beginning of the program and was 1.4% in 2007. Program data indicate that one-year survival rates were 93% for the 2005 and 2006 cohorts.

In Peru, the number of sites providing HTC, mostly in sexually transmitted infection (STI) clinics, has increased gradually since 1997 and continued to increase at the same pace since 2004. All HTC clinics are located in urban areas. Overall, the service uptake doubled in 2006-2007, compared with the year before. The data also suggest that increasing numbers of MSM, male and FSWs, and prison populations are HIV tested and counseled, but reliable data are hard to collect.

PMTCT interventions in Peru have been implemented since 1996, and guidelines were revised in 2005. The proportion of antenatal clinics offering PMTCT services increased from 44% in 2004 to 61% in 2006 to 68% in 2007. The Coastal regions have better access than the Amazonian regions, but rural and urban access are fairly equal. The proportion of pregnant women tested increased from 34% in 2003-2004 to 70% in 2007. The number of women receiving ARV prophylaxis increased from 161 in 2004 to 433 in 2007, nearly half of those who need it. There have been notable efforts to increase HTC, especially among pregnant women; but increases among high-risk groups and the general population are variable between regions. Density of HTC services has remained constant in this period, but there are current efforts to expand, with Global Fund support, in order to reach more at-risk populations. The Global Fund has also supported increased HTC among prisoners.

The number of people on ART has been increasing rapidly since 2005 to the end of 2007, including 6% who are children. Overall coverage has reached 26%, nearly doubled from 2003. The Global Fund reported to support about one-third of the people on ART, even though the Fund contributes only 4% of HIV funding. The majority are funded by PEPFAR, which reported to support 11,700 people on treatment. In Vietnam, a review of data from eight ART sites showed that 81% of adults and 93% of children were still alive and on treatment after one year. The number of facilities providing PMTCT increased from virtually none to 170 in 2006; however, the increase could have been steeper if not for administrative and economic barriers described in the Vietnam Impact Evaluation Report. The number of HTC sites increased from 122 to 228 in 2003 and 2006, respectively, with a concomitant threefold increase in uptake of HTC, although utilization remains low among the general population. More importantly, more than 80% of the risk populations did not know their HIV status by 2006.

Conclusions

In all countries, there have been significant gains in ART access and coverage, increasing many-fold from 2003 to 2007. As the situation stands in 2007, the overall range of ART access and coverage between countries within groups is similar, but with some outliers. Among the first two groups of countries with generalized epidemics, ART access is less than one site per 1,000 needing treatment, except for Rwanda with a higher density (2.4 per 1,000). The third and the fourth group of countries have a higher density of services, at least in part because of a smaller pool of people needing services (i.e., smaller denominator). In terms of ART coverage, the range is wide in every group of countries, ranging from about one-quarter to half of PLWA on treatment, but with particularly low outliers in Ghana (12%), Kyrgyzstan (14%), and Cambodia (67%) with higher coverage.

In all countries, there have also been significant gains in PMTCT access and coverage. For groups of countries with generalized epidemics, the density of PMTCT sites is between 0.1 and 0.7 per 1,000 pregnant women. In concentrated epidemic countries, where data are available, the density is expectedly lower. For testing and counseling of pregnant women, the coverage range roughly corresponds to prevalence ranges in groups of countries—that is, the first group of countries with higher HIV prevalence also has a higher coverage range (25-82%). The second and third groups of countries have a lower range (5-50%, with Rwanda as an outlier at 90%). Peru and Moldova, among the countries with lowest prevalence, buck the trend with the highest proportion of pregnant women covered (70% and 90%, respectively). For coverage of HIV-positive women receiving prophylaxis, the range is wide but rarely more than 50%, except for outliers including Rwanda (60%) and Benin (70-100%).

In all countries, there have been significant gains in HTC access and coverage. For HTC, a similar positive relationship is seen between countries with higher HIV prevalence being related to better access to HTC services. The density of HTC services in the first group of countries ranges from six to 20 per 100,000, in the second group from three to six per 100,000 (except Tanzania with 0.4), in the third group about two per 100,000 (with Ghana as outlier, 4.7), and the concentrated epidemic countries with less than one site per 100,000 population. There is not a clear trend; however, in the utilization of HTC services in terms of country groups, within each group there is a wide range of coverage between countries, which results in considerable overlap between groups.

The increase in HTC coverage across all countries points to circumstantial evidence of gains made in lowering stigma barriers. However, recent population-based surveys show that stigma is still an issue, especially in countries with concentrated epidemics where key groups at high risk confront discrimination and social marginalization.

What some of these results show is that major discrepancies remain in treatment coverage. Although the speed of the increase in this short timeframe has been remarkable, most countries today are still well below 50% for PLWA needing treatment or prophylaxis. If current scale-up trends continue in access and coverage, then it bodes well for attaining universal coverage. One of the key issues is that coverage of HTC is low in many countries, and while this might be expected in countries with low prevalence, in higher prevalence countries the coverage rates certainly will need to increase significantly. Lesotho, for example, with the highest prevalence among the evaluation countries, still had less than 20% of the population tested and counseled in the last year. An additional challenge in

the future scale up will be that services will need to be made accessible to populations that are probably more difficult to reach than those that have already been covered.

5.6 Prevention and Behaviors

HIV prevention requires a range of behavioral, structural, and biological approaches.[15] Exposure to HIV prevention interventions is difficult to measure, as they may range from media messages and community campaigns to school and workplace programs, condom social marketing, and targeted behavioral change communication for high-risk populations or structural community interventions. The focus of this section is on documenting the desired results of such intervention efforts—that is, changes in risk behaviors.

Sexual behavior indicators rely entirely on household and risk population surveys. Standardized survey module indicators have been developed to collect and summarize sexual behavior data. The reliability and validity of such data have been the subject of much debate and many research studies.[16] Several reports have reviewed trends in selected indicators of risk behavior in countries and globally. In the context of this evaluation study, the specific interest lays in the question whether scaling up of interventions in recent years has had any demonstrable effects on behavior, and whether any factors can be identified that contributed to possible success.

In terms of the emphasis on prevention as a funding priority, there is wide range between countries of the proportion of external funding that is invested into prevention activities (see Section 5.4). In the absence of more detailed data on the cost of prevention activities by country, a crude exercise was undertaken to examine the estimated amount per capital of external HIV funds per person for prevention (i.e., the latest UNGASS reported proportion spent on prevention was applied to the estimated HIV funding per capita per annum, 2003-2006). The results show that most countries vary in total prevention spending, from US$0.10 to US$1.50 per capita, per year. Four countries spend more than US$1 on prevention (Rwanda, Cambodia, Mozambique, and Zambia), four countries spend between US$0.50 and US$1 (Tanzania, Haiti, Kyrgyzstan, and Moldova), and six countries spend less the US$0.50 (Burkina Faso, DR Congo, Ghana, Lesotho, Malawi, and Peru). (Note: The four remaining countries did not report prevention spending to UNGASS, so it was not possible to compare these countries.) Zambia is the only outlier, spending almost US$3 per capita on prevention. Although this tells us where countries stand relative to one another in the amount of spending on prevention, it does not shed light on what the spending threshold is in order for behavior to change to have a measurable impact on HIV transmission.

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[15] Merson, M.H., J. O'Malley, D. Serwadda, and C. Apisuk. 2008. The history and challenge of HIV prevention. Lancet 372(9637): 475-488.

[16] Cleland, J., J.T. Boerma, M. Carael, and S.S. Weir. 2004. Measurement of sexual behaviour. Sexually Transmitted Infections 80(Suppl. II). Perhaps the most important lesson from analyses of large numbers of data sets is that the reliability of sexual behavior data is fairly good: Nationally representative sample surveys with the same methods and survey questions often give results that are fairly consistent with previous surveys. Much less is known about the validity of the results. Some studies among young people have used biomarkers to indicate that reporting of sexual exposure correlated poorly with HIV or sexually transmitted disease prevalence. An additional problem is that an evaluation of behaviors and their potential effect on HIV transmission would require very detailed information on who is using preventive measures (such as condoms) and with whom. Only more detailed studies can begin to capture such information, which allows assessment of the effects of concurrency, use of condoms in specific situations, etc.

SOUTHERN AFRICAN COUNTRIES

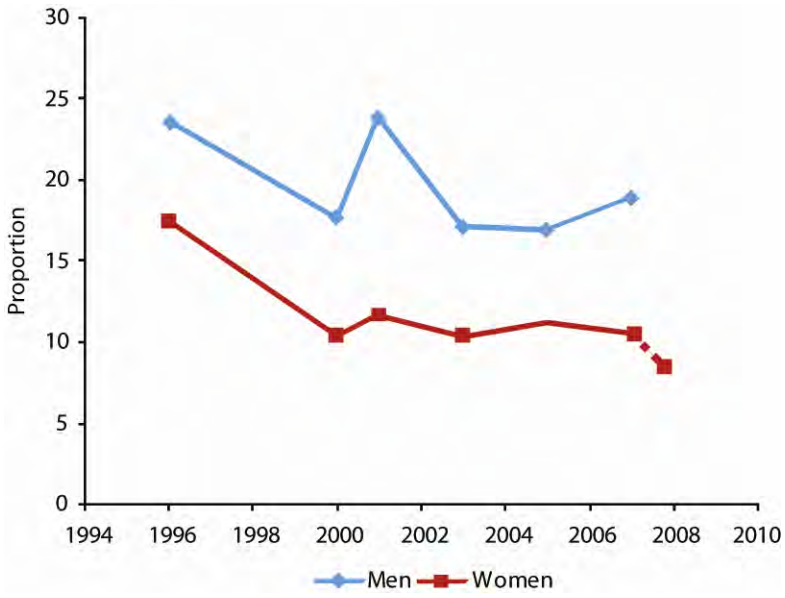
There is patchy evidence of scaling up of various preventive interventions. For instance, the numbers of free government condoms distributed in Malawi doubled between 2004 and 2006 to 24 million (about 9 per adult man/woman); Mozambique distributed 65 million in 2007 (15 per man/woman), up from 42 million in 2006; and Lesotho distributed 17 million in 2006 (43 per man/woman).[17] Some countries report the coverage of school and workplace programs. For instance, in 2006 in Zambia, 60% of schools were providing HIV education based on life skills in the last academic years. In Malawi, 71% of large enterprises had workplace programs in place by 2007. The content and quality of these education interventions, however, were not available.

Only Malawi and Zambia have conducted multiple surveys since 2000 that allow an assessment of trends in the general population. In Malawi, the DHS surveys were carried out in 2000 and 2004, and a Multiple Indicator Cluster Survey (MICS) in 2006. The DCA Household Survey took place in nine districts in 2008 and interviewed only women. From 2000 to 2004, there was a decrease in multiple partnerships and an increase in reported condom use with nonregular partners among young men. MICS 2006 collected only data for young people (age 15-24) and showed that among men the proportion reporting sex with a non-marital non-cohabiting partner went down from 62% in 2004 to 57% in 2006, and reported condom use went up from 47% to 60%. For women there was little change (reported condom use up from 35% to 40% and nonregular partner unchanged at 14%).

Zambia conducted six national surveys—either DHS surveys or Sexual Behavior Surveys—between 1996 and 2007. Reported condom use at the last act with a nonregular partner remained fairly constant between 1996 and 2005 at about 40% and increased to 50% in 2007. The proportion of sexually active men and women who engage in higher-risk sex, that is with a nonregular partner in the past year and not using a condom at the last act, is shown in Figure 5.8. In Zambia, there was an improvement—that is, a decline in the proportion having unprotected sex with nonregular partners—for men and women between 1996 and 2000, but since then there has been little change. The DCA 2008 sample characteristics are fairly similar to the national sample, although slightly more urban. It shows a level of higher-risk sex among women of 9% (i.e., those who had unprotected sex with a nonregular partner in the past year).

[17] In theory, condom distribution figures could be used to validate the self-reported use of condoms. It is however difficult to estimate the number of sexual acts from survey data, and results with various methods have not been very successful. See See Meekers, D., R. van Rossum. Explaining inconsistencies between data on condom use and condom sales. BMC Health Services Research 5: 5. Available at http://www.pubmedcentral.nih.gov/articlerender. fcgi?artid=545997.

Figure 5.8
Proportion of Sexually Active Men and Women who Have Had Unprotected Sex with a Non-marital Non-cohabiting Partner in the Past Year, Zambia, 1996-2008



Source: Population-based Surveys 1996-2008

In high prevalence epidemics, substantial HIV transmission also occurs among married and cohabiting partners. Recent analyses in urban Rwanda and Zambia indicate that a large proportion of new HIV infections are acquired from the marital or cohabiting partner.[18] Enhancing HTC and condom use is a recommended intervention, but in general condom use among couples remains very low. In Zambia it was 3% in 2000 and 2004.

There are limited data on FSWs, but those that are available generally indicate high levels of reported condom use. Trend data are only available in Zambia, where reported condom use among sex workers along border and transportation routes was 82% at the last act (2006), compared with 93% in 2000 and 2003 Behavioral Surveillance Surveys.

Eastern African Countries

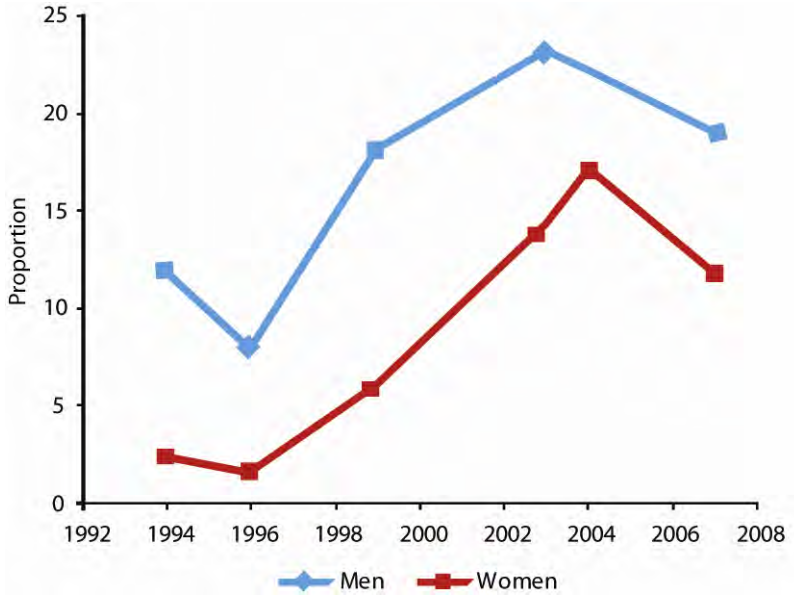
Also in eastern Africa, condom distribution through the social marketing program and the public sector went up. In Tanzania, condom distribution has increased considerably, from 59 million in 2005 to 121 million in 2007. This is about 15 condoms per adult man or woman per year.

Rwanda and Ethiopia both conducted DHS surveys in 2000 and 2005. In Rwanda, there was a slight increase in the proportion of men engaging in unprotected sex with a nonregular partner (from 6% to 8%), due to a decrease in reported condom use at the last act with a nonregular non-cohabiting partner (from 51% to 41%). In Ethiopia, there was a clear improvement, as the proportion of men reporting unprotected sex with a higher-risk partner in the last year fell from 14% to 4%.

[18] Dunkle, K.L., R. Stephenson, E. Karita, E. Chomba, K. Kayitenkore, C. Vwalika, L. Greenberg, and S. Allen. 2008. New heterosexually transmitted HIV infections in married or cohabiting couples in urban Zambia and Rwanda: An analysis of survey and clinical data. Lancet 371(9631): 2183-2191.

In Tanzania, six national surveys between 1994 and 2007 show that multiple partnerships were reported more frequently between 1994 and 2003, but that there has been a modest decrease in recent years.[19] Reported condom use at last sex with a higher-risk partner has increased at a rate of 1-2% per year during 1994-2007. The proportion of sexually active men and women who engage in higher-risk sex—that is, with a nonregular partner in the past year and not using a condom at the last act—increased until 2004 and recently declined (see Figure 5.9).

Figure 5.9
Proportion of Sexually Active Men and Women who Have Had Unprotected Sex with a Nonregular Partner in the Past Year, Tanzania, 1994-2007



Source: Population-based Surveys 1994-2007

Few data are available on most at-risk populations from the four countries. In Zanzibar, the epidemic is concentrated, as opposed to the generalized epidemic on mainland Tanzania. Program efforts have increasingly turned to risk populations, but no reliable trend data are available.

Cambodia, Haiti, and West and Central African Countries

Also, in low prevalence generalized epidemics, country prevention programs employ a wide range of multisectoral interventions to reduce risk behaviors, especially unprotected sex with a nonregular partner. In Cambodia, HIV education based on life skills, with significant Global Fund financing, was provided to one-fourth of primary and secondary schools by 2006-2007. The amount and nature of the education information was not available, however. In Ghana in 2006, more than half of the schools had at least one teacher trained and who taught the curriculum during the last academic year. In DR Congo, Burkina Faso, and Haiti, less than 5% of schools have been reached. In some countries, investments are made to support programs for out-of-school youth (e.g., as supported by PEPFAR in Haiti), but no data are available from any country about exposure to or impact of these interventions.

[19] It is noted that between the 1996 and 1999 surveys the interview questions were modified, which may partly be responsible for the increase in reporting of risk behaviors.

Condom distribution, through social marketing and other channels, is an important component of scaling up. In Ghana, the numbers of condoms distributed hovered at 26-37 million per year during 2003-2007, two-thirds through the social marketing foundation. This corresponds with about six or seven condoms per adult man per year. In DR Congo, the number of condoms distributed increased from 5 million in 2004 to 21.5 million in 2007, which is still less than two condoms per year per adult man.

In Cambodia, prevention programs reported high levels of exposure to interventions (HIV/AIDS education) among MSM by 2005, and for FSWs considerably earlier. According to behavioral surveillance surveys in 2007, reported condom use at last act is well above 90% among sex workers and 87% among MSM. In Haiti, reported condom use among FSWs in the capital city was 90%.

Two countries have data to ascertain trends in the new millennium through comparable DHS household surveys. In Benin, a reduction of male risk behaviors could be observed between 2000 and 2005; the proportion of men age 15-49 who had sex with a non-marital non-cohabiting partner in the last year declined from a high of 52% to 31%, and the proportion that used a condom at last sex increased from 30% to 40%. In Haiti, levels of risk behavior are higher than in any other country, and there is evidence of only limited change during 2000-2005; the proportion of men engaging in unprotected sex with a higher-risk partner during the last year declined from 41% to 36% but was still higher than in any other country with two data points since 2000.

CONCENTRATED EPIDEMICS

Most intervention packages in countries with concentrated epidemics aim to enhance knowledge among most at-risk populations, reduce stigma and discrimination of marginalized groups, reduce unprotected sex through condom use, provide treatment of sexually transmitted infections (STIs), and reduce needle sharing by supporting needle exchange programs. Table 5.9 shows low levels of unsafe behaviors in most at-risk populations. These data have to be interpreted with caution, as surveys among risk populations may be subject to substantial selection bias.

Table 5.9: Percentage of Condom and Injecting Equipment Use in Most At-Risk Populations

		Kyrgyzstan		Moldova		Peru		Vietnam	
MARPS	Indicator	2003/4	2006/7	2003/4	2006/7	2003/4	2006/7	2003/4	2006/7
FSW	Reported condom use last client	81	84	98	93		96	90	97
MSM	Reported condom use at last anal sex with male partner	68	81	63	48	46	47		61
IDU	Use of sterile equipment at last event		77		96				89

In Peru, most interventions are focused on urban populations, as this is where the most at-risk populations and the HIV epidemic are concentrated. The expansion of preventive interventions included public and commercial sector condom provision, supported by the Global Fund financing. These condoms were mainly distributed among FSWs, with a relatively small proportion going to MSM. Condom social marketing and sales all indicate increasing condom access, while surveys indicate increasing condom use pre-2006 in most population groups. An important exception is

MSM, for which surveillance data show no increase (46% reported condom use with last male sexual contact in 2006).

In Vietnam, the 2006 Integrated Biological and Behavioral Survey (IBBS)revealed considerable overlap of the sex work and IDU populations and high prevalence of high-risk behaviors, including needle sharing among IDUs and unprotected sex among sex workers, IDUs, and MSM. Behavioral change communication interventions appeared to be more successful in reaching the general population during 2002-2005, as shown by higher levels of correct knowledge of transmission and prevention methods among young people than sex workers, IDUs, and MSM. Also, the levels of exposure to interventions among risk populations were still considered too low in 2006.

Condom promotion programs have been implemented in 314 of 639 districts in 58 provinces/cities and in Centers for Treatment, Education, and Social Support for IDUs and sex workers in 12 provinces. In 33 provinces covered by the U.K. Department for International Development (DFID) and World Bank projects, which are currently the biggest projects working on harm reduction in Vietnam, 13.7 million condoms were distributed in the first 10 months of the year 2007. In this project area, coverage of harm reduction activities among FSWs has increased from 26% in 2005 to 65% in 2007. Reported condom use among FSWs increased considerably to more than 90%, which is much higher than found in the 2006 IBBS. Reported condom use with nonregular partners, presumably mostly commercial sex partners, in the general population varies from 40% to 70% in various surveys in 2005, similar to the level in 2002.

The number of needle/syringe provision programs and needle/syringes distributed increased rapidly in the 33 provinces of DFID and World Bank projects. Forty-three percent of IDUs in the project sites were reached by the HIV prevention program. The average number of needles/syringes distributed per IDU per month has increased from 2.4 in 2006 to 10.7 in 2007. Positive results were seen in the high proportion of IDUs using sterilized injecting equipments—89% in 2006. However, in some provinces with high HIV prevalence, the number of communes implementing the program remains low, accounting for less than 10%.

In summary, data on exposure to interventions and risk behaviors in most at-risk populations are too limited to systematically evaluate progress in most countries. However, a further discussion on MARPS interventions funding, delivery mechanisms, and measurement issues is presented as a special discussion at the end of this section.

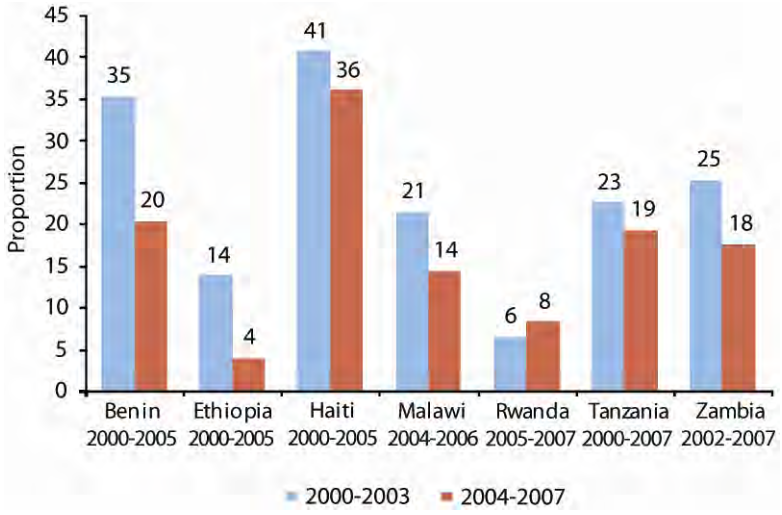
Conclusions

The recent trends in sexual behavior can only be examined for a limited number of countries with mostly generalized epidemics. The data from household surveys suggest a decrease in higher-risk sexual behavior in the countries with two surveys within the last decade (see Figure 5.10). The number of men reporting a non-marital non-cohabiting partner in the last 12 months has decreased in most countries, although it remains common. The proportion of men using a condom at last sex with a non-marital non-cohabiting partner reached levels of about 30% or more in most countries but has increased gradually in recent years. It is not clear to what extent these trends can be attributed to interventions, as there is also some evidence that there were similar improvements prior to 2000, and exposure to the wide array of interventions is difficult to measure. Rwanda was the only country with changes in the wrong direction, but the prevalence of unprotected sex with a non-marital

non-cohabiting partner is much lower than in the other countries with generalized epidemics. Comparison with the level and trends of expenditure on HIV/AIDS or on prevention programs are particularly difficult because there are multiple data limitations, and it is difficult to distinguish countries that are doing very well in terms of behavioral changes compared with countries that are not.

In general, given the lack of convincing evidence from countries of wide-scale behavioral change, it is possible that the US$0.50-1.00 per capita is not enough prevention spending to effectively change behavior; on the other hand, the prevention programs may not be designed such that they have the desired effect on behavior. Either way, data collection mechanisms for measuring prevention interventions will also have to be improved in order to determine their effects on disease trends.

Figure 5.10
Proportion of Men who Had a Nonregular Partner in the Last Year and Did Not Use a Condom at the Last Act with Such a Partner, 2000-2007



Source: Population-based Surveys 2000-2007

SPECIAL DISCUSSION

Prevention Activities with Attention to More At-Risk Populations

HIV transmission is more prevalent among people whose behavior puts them at higher risk of contracting the disease. These people include those in the general population who, for example, occasionally participate in high-risk sexual behavior and those who are in MARPS whose lifestyle exposes them to a greater risk of infection. MARPS typically refer to groups such as commercial (female and male) sex workers, IDUs, and MSM. Other more at-risk groups include mobile populations such as truck drivers, prisoners, labor migrants, and the military.

HIV prevention programs typically include testing and counseling services, prevention of mother-to-child transmission, behavioral change communication, community outreach programs, and condom distribution. Some countries provide harm reduction programs specifically aimed at reducing transmission among MARPS groups. These may include targeted education campaigns, needle exchanges, free STI screening and treatment, and case management and referral services. Blood safety initiatives are also common preventive measures to combat transmission.

Although all countries promote such prevention activities, countries with concentrated or low-level epidemics logically devote a larger portion of their resources to activities targeting people with high-risk behavior and MARPS than countries with generalized epidemics. These countries are, therefore, the focus of this discussion. Five countries with low-level or concentrated epidemics in this evaluation study include Cambodia, Kyrgyzstan, Moldova, Peru, and Vietnam.

The purpose of this discussion is to present some of the main issues in these five countries regarding the funding of prevention programs, types of prevention interventions, delivery mechanisms of prevention activities, and measurement issues regarding prevention activities. The evidence presented is based on experiences of countries participating in the evaluation study, with information coming from Country Impact Evaluation Reports, Global Fund grants, and UNGASS financial reporting.

Funding of Prevention Activities

The most recent financial information reported to UNGASS shows that about 80% of total HIV funding is spent on prevention in Moldova (2006) and Kyrgyzstan (2007); in Cambodia, it is 45% (2006) and in Peru, only 32% (2007). In Vietnam, a breakdown of spending was only available for the national HIV budget, showing that for 2004, 2005, and 2006 about 45% was allocated to prevention (Government of Vietnam).[20]

A further breakdown of amounts spent into specific prevention categories is practically impossible to do in detail from existing information. Table 5.10 shows that for all evaluation study countries with concentrated epidemics (except for Peru), most prevention expenditures do not fall into any specific UNGASS prevention category—60-100% of prevention activities are in fact undefined. For example, Kyrgyzstan spends 82% on prevention activities, but 95% of this is unspecified in the most recent UNGASS report. Moldova spends 77% on prevention, but 72% of that is unspecified. Cambodia is medium, spending about 44% on prevention, and of that amount, about half is unspecified (58%). Peru, spending only 28% on prevention, has only one-third of that amount unspecified. Rarely is even 20% of prevention money spent in a single prevention category, with the exception of Cambodia and Peru, where condom distribution accounts for one-fifth of prevention spending.

[20] While the UNGASS financial reporting and the reporting for the Global Fund Evaluation were not entirely independent (since in both cases it is the country that is reporting), the consistency in proportions spent is fairly good: The Cambodia country report estimate is the same as the UNGASS 2006 estimate; Vietnam evaluation report estimates 42-46% spent on prevention from 2004 to 2006 and there is no corresponding UNGASS estimate; Kyrgyzstan reports to UNGASS 2006 that 82% of HIV expenditures are spent on prevention (no estimate from country report); Moldova evaluation report estimates are similar to the UNGASS 2007 report if country estimates for prevention and diagnostic services are combined (69% vs. 76%, respectively); and Peru country report estimate is similar to the UNGASS 2005 estimate (25% vs. 32%, respectively). The funding levels, on the other hand, do not match as well. Notably, the UNGASS spending estimates reported by most countries are substantially lower than the funding estimates reported in country reports in the same year. This is at least partially explained by absorption capacity, where the annual funding exceeds the annual amount that is spent, and sometimes substantially. Moldova is an exception, where the country report showed a much higher spending estimate for the UNGASS indicator than the country estimated in their country report. This is probably due to the fact that results of the detailed funding and spending analysis carried out during this evaluation were not available at the time the country reported estimates to UNGASS.

Table 5.10: Proportion of HIV Spending that Is Being Used for Prevention and Care Activities, by Country

Latest reporting year	Total HIV spending (US$ millions)	Percentage of total on prevention expenditures	Percentage of prevention expenditures spent on specific preventions						
			HTC	PMTCT	BCC *	FSW, MSM, IDU†	Condom distribu-tion††	Unspeci-fied	Total
Cambodia (2006)	44.2	45.2	13.0	-	3.4	3.1	22.0	58.5	100.0
Kyrgyzstan (2006)	7.9	81.7	1.4	-	0.8	2.5	0.2	95.2	100.0
Moldova (2007)	8.2	76.9	5.2	3.7	14.4	5.3	-	71.5	100.0
Peru (2007)	28.0	32.3	-	15.8	10.8	21.4	19.7	32.4	100.0
Vietnam (2006)	47.2	-	-	-	-	-	-	100.0	100.0

(-) indicates no data available or none reported
* Communication for social and behavioral change
† Programs for sex workers and their clients for MSM and programs for harm reduction for IDUs
†† Condom social marketing, public and commercial sector condom provision, and female condom
Source: UNGASS Indicator 1, 2008 Report on the Global AIDS Epidemic, UNAIDS

It was also not possible to discern funding amounts for specific prevention activities from Global Fund grants in these countries. However, a desk review of approved grants funded by the Global Fund in Cambodia, Kyrgyzstan, Moldova, Peru, and Vietnam reveals a total of 45 grant project objectives with about half having a substantial focus on preventive activities among vulnerable groups.

The Mix of Prevention Interventions

HTC and PMTCT services are discussed at length elsewhere in the report and will, therefore, not be addressed here. Regarding exposure of MARPS to HIV prevention programs in these five countries with low-level or concentrated epidemics, there is generally high exposure (75-95%) with a couple of notable exceptions (see Table 5.11).[21] For example, Vietnam has been the least successful in reaching out to all three risk groups (FSW, IDU, and MSM). The Vietnam Impact Evaluation Report (2008) addresses several weaknesses in the overall prevention strategy:

> "BCC activities have been carried out with the participation and coordination of many sectors and civil society. Although there is a slight increase in knowledge within key populations at higher risk, the increase still remains relatively low. The quality of the BCC services has been limited, which is shown by a low rate of FSW access to preventive services. The program still has several constraints: orientation, methods, forms, and quality of BCC activities remain slow to change to meet social requirements. The program has not yet covered remote areas and could not reach all high-risk groups, minorities, and countryside people. Good models of BCC intervention for targeted groups have not yet expanded." Further, "The harm reduction program has been strongly supported by international partners. The program has mainly focused on providing information, condoms and needles/syringes, and referral to VCT services targeting IDU, FSW, and mobile populations. However, interventions targeting mobile populations and MSM are

[21] Percentage of most at-risk populations reached with HIV prevention programs is defined as the percentage of high-risk persons in each group who (1) know where to go to receive an HIV test; (2) were given a condom in the last 12 months; and (3) for IDUs, were given sterile needles and syringes in the last 12 months (UNGASS Indicator 9).

still limited. Migrants and mobile populations are included in both the National Strategy and Law; however, there is no specified strategy or program to ensure their access to prevention, treatment, and care and support services as yet."

Table 5.11: Percentage of Most At-Risk Populations Reached with HIV Prevention Programs, 2007 (UNGASS Indicator 9)

	Female sex workers (%)	Intravenous drug users (%)	Men who have sex with men (%)
Cambodia	na	na	na
Kyrgyzstan*	89	78	77
Moldova	96	89	86
Peru	80		44
Vietnam*	65	43	26

* Methodology is not harmonized with UNGASS guidelines
Source: 2008 Report on the global AIDS epidemic, UNAIDS

In Peru, despite funding and efforts to design and promote extramural activities geared primarily to MSM, this group has not been sufficiently reached. The Peru Impact Evaluation Report (2008) sheds some light on possible reasons. First, although outreach programs have started to be implemented in civil society, important parts are still provided through the traditional health care system—and visits of MARPS to health facilities are low. Second, Peru spends a substantially smaller proportion on prevention vis-à-vis other countries with concentrated epidemics (see Table 5.11). Finally, prevention programs need to be further tailored to specific groups—for example, to transvestites, transsexuals, and bisexuals.

Cambodia, although not reporting on the percentage of MARPS reached by prevention programs, demonstrates good potential in reaching FSWs and their clients. The national program has implemented the 100% condom use program in 22 of 24 provinces/cities, designed to increase the prevalence of condom use among brothel-based FSWs. In addition, diagnosis and treatment of all STIs in communities and especially female commercial sex workers and their male clients is provided free of charge. HIV/AIDS education programs have also been consistently implemented countrywide. To ensure the acceptability and optimize the effect of educational materials, these have been designed in many forms and delivered in different forms of media, ranging from small group discussion to drama on radio or TV.

Condom Distribution

One of the most common prevention activities reported by most countries, not just those with a concentrated epidemic, was that of condom use and condom distribution. Most evaluation study countries reported an increasing amount spent on condom distribution and/or an increasing number of condoms being distributed or consumed. However, this information is not necessarily reported in a standard way, and it is recommended to consult the Country Impact Evaluation Report to appreciate the context in which these data are presented by countries. What follows are a few of the highlights from these reports. Condom distribution in DR Congo saw a 330% increase between 2004 and 2007; Ghana saw a 40% increase in male condoms distributed between 2004 and 2007 and a decrease in female condoms. In Haiti (2008), 25 of 35 community-based organizations (CBOs) interviewed reported distributing condoms (no quantity of condoms distributed was provided). In Lesotho (2008), there were reports of condom shortages, but mostly due to logistics—a National Condom

Management Strategy is being developed to avoid this problem in the future. In Peru, there was a 150% increase in condom distribution from 2005 to 2006, with just over half used in STI/HIV programs. Furthermore, in Peru, "MARPS have guaranteed access to free condoms. The Peruvian law ensures the supply on a monthly basis. However, there are not enough data to correctly evaluate the distribution of condoms." Rwanda reports increased condom promotion but states that "an ongoing need to intensify prevention efforts and to integrate prevention and treatment scale up using all effective approaches—and paying particular attention to the needs of vulnerable groups." Vietnam reports widespread distribution of condoms through peer networks and increased coverage of FSWs from 26% (2005) to 65% (2007).

Due to the inconsistent information on condom funding and condom distribution, it is difficult to draw conclusions beyond the fact that there appears to be an increase in both inputs (funding) and outputs (condoms) during the scale-up period.

Scattered information on condom utilization among FSWs with their last client in countries with concentrated epidemics reveals that condom coverage is high in both 2005 and 2007: Cambodia, 96% and 99% in 2005 and 2007; Kyrgyzstan, 84% in 2007; Moldova, 93% in 2007; Peru, 96% in 2007; and Vietnam, 90% and 97% in 2005 and 2007 (UNGASS Indicator 18). This indicator also breaks down estimates for male sex workers, but only Peru reported a separate estimate: only 42% of male sex workers used a condom during last sex in 2007.

Condom coverage among MSM indicates a weaker tendency to use a condom than FSWs with their clients (UNGASS Indicator 19). In 2007, the percentage of MSM using a condom with their last client was highest in Cambodia and Kyrgyzstan (86% and 81%, respectively), then Vietnam (61%), and Peru and Moldova (47% and 48%, respectively). The low indicator in Peru is most worrisome because much of the epidemic is concentrated among MSM. Among male IDUs in 2007, information on condom use at last sex is even scarcer and more variable: Kyrgyzstan (11%), Moldova (73%), and Vietnam (36%) (UNGASS Indicator 20). The low coverage of this indicator is of particular concern in Kyrgyzstan, where most infections currently occur in IDUs. The percentage for Moldova differs from that in the Moldova Impact Evaluation Report, which was 67.9% for male IDUs in 2007, an increase from 60% in 2004.

The reader is reminded again that some Country Impact Evaluation Reports may present information differently from that reported to UNGASS, and this needs to be closely examined for methodological differences and other contextual factors that may vary.

Harm Reduction

Moldova reports an expansion of harm reduction interventions, mainly since 2003, which are mostly implemented through the Soros Foundation, which acts as the umbrella organization for NGOs. Harm reduction activities include information outreach and condom distribution, needle exchanges, and methadone treatment among high-risk groups. It is notable that this extends to the penal system. The number of delivery points, particularly for IDUs, have increased over time (see Table 5.12).

Table 5.12: Harm Reduction among MARPS, the Number of Service Delivery Points 2000-2007, Moldova

	2000	2001	2002	2003	2004	2005	2006	2007
IDU	6	6	7	15	17	28	29	29
CSW	0	0	0	1	2	5	5	5
MSM	0	0	0	0	1	1	2	2

Source: Soros Foundation, Harm Reduction Program (Moldova)

Reported percentage of safe injection at last event was 81% in 2004 and 96% in 2007.

Vietnam reports that 53% of infections are among IDUs, 85% of these being men. Although needle sharing is reported by approximately 30% of IDUs, there has been a three-fold increase in the supply of clean needles in Vietnam between 2006 and 2007 (from 2.4 to 10.7 needles per IDU per month).

The percentage of blood units screened for HIV in a quality-assured manner is generally high (UNGASS Indicator 3): 99% in Peru, 97% in Cambodia, 88% in Kyrgyzstan, and 74% in Moldova (100% of blood units are screened, but only 74% of blood samples are screened with quality assurance). Vietnam did not report on this indicator.

Delivery Mechanisms for HIV Prevention

Unlike HIV diagnosis and treatment activities that are mainly provided through the health sector, prevention activities are likely to be provided outside of the traditional health system, such as through NGOs or CBOs, schools, and workplaces. Many countries, in their Country Impact Evaluation Reports, acknowledged such efforts but rarely tried to quantify them. For countries undertaking primary data collection in selected districts, the consortium provided the implementing teams with a survey instrument to adapt and use to capture the quantity (target groups and catchment area, funding) and types of services provided (disease-specific or other focus) by community-based organizations (NGOs, CBOs, FBOs), schools, and workplaces.

Burkina Faso conducted an exemplary CBO survey orchestrating a team of nine people to field it (one coordinator, two supervisors, and six interviewers).

Burkina Faso CBO Assessment

The CBO assessment carried out by the Burkina Faso team consisted of first contacting key informants (e.g., district administrative offices, social service offices, and others) in selected districts and listing all CBOs and NGOs. On the basis of predefined criteria, including their size in terms of the percentage of the target population they covered in the district, a selection of eligible CBOs would constitute the sample selected for further quantitative and qualitative data collection (e.g., using structured interviews, a review of activity reports, and a standardized questionnaire instrument). Note that the qualitative aspect was entirely conceived by the team to harmonize with and enhance the standard quantitative instrument.

In total, 356 CBOs were listed in the 13 districts, 132 were eligible based on population coverage, and 77 were finally selected for in-depth interviews. A few key results provide a profile of this sample of CBOs:

- Ninety-one percent are located in the district capital.
- Average size is 374 members (and 88% have less than 500 members).
- Ninety percent of personnel are volunteers.
- One-third covers 33% or more of the target population in the district; only 13% cover more than 75%.
- The majority were founded between 2002 and 2005.
- Ninety-eight percent are engaged in HIV-related activities, 31% in tuberculosis-related activities, and 27% in malaria-related activities. (Note: Activity mix is not mutually exclusive.)
- Among CBOs with HIV-related activities, these include prevention education[22] and condom distribution and, to a lesser extent, support for orphans and vulnerable children.
- Among CBOs with malaria activities, prevention education is the main activity, and there is some insecticide-treated bednet distribution and treatment.
- Among CBOs with TB activities, anti-cough campaigns and support groups are the most common activities.
- Few CBOs provide treatment for the three diseases because the health sector covers this aspect, but some psychosocial, food, and material support is provided.
- Most CBOs would like to extend their reach but do not have the financial resources to support further expansion; they are mostly reliant on external funding.
- Most CBO/NGOs do not sufficiently document their activities and, thus, a rigorous evaluation with solid baseline information was not adequately established (paraphrased from French). The recommendation resulting from this finding was for CBOs to, first and foremost, collaborate with each other, to define norms and standards for reporting, and to ensure that a future evaluation can measure the effectiveness of their interventions.

Measuring the Impact of Prevention Activities

Population-based surveys will typically provide estimates for the general population on reported condom use, HTC, and use of PMTCT services. However, these surveys do not provide intervention coverage or impact measures among MARPS. There are important methodological challenges inherent in measuring intervention scale up and coverage among MARPS. First, because the epidemic is concentrated among groups that may conceal themselves or otherwise be hard to identify, difficulties arise in accurately enumerating them. The inaccuracies in enumeration result in questionable denominators and, therefore, uncertainties in the precision of point estimates. Second, once identified, collecting information on sensitive risk behaviors relevant to HIV transmission may

[22] HIV prevention education takes place in several fashions: organized chats and debates, educative discussions, film critiques, radio emissions, theatre forums, and educational games and awareness events.

not be reliable; although, this may be improved as trust is built, for example, through participation in harm reduction programs.

The second major difficulty in measuring intervention coverage and impact for MARPS is due to a lack of standardized reporting streams in countries. In each country there is a complex mix of multisectoral prevention programs targeting diverse high-risk groups. These activities are increasingly carried out outside of the public health system in a range of sectors, such as school systems, transportation ministries, civil society, and private industry, so mechanisms to systematically collect data are virtually nonexistent. There is not a central depot where information is destined, housed, and made available to researchers or decisionmakers. This was witnessed first-hand in this evaluation study. Until such a mechanism is in place, special studies and an array of data collection strategies must be mounted to ensure proper data collection from each of these entities.

The Global Fund grants reviewed for the five countries with low-level or concentrated epidemics defined a number of service delivery areas (SDAs) per each project objective. These SDAs further defined specific indicators and targets that provide the framework to capture related process and output information relevant to these efforts (and each objective is likely to have 3-6 indicators and 2-3 targets per indicator). Data collection by the principal recipients on each of these indicators is a valuable attempt to quantify delivery or prevention activities, but major challenges remain in streamlining this information into a national channel as well as in designing approaches to measuring related outcomes of interventions.

In conclusion, the story emerging from evaluation study countries with a sharp focus on MARPS interventions is that, although they may implement a diverse array of prevention strategies, the potential coverage and effects of these activities have not been quantified such that they permit a comparison of trends over time for comparable populations. While it is acknowledged that important efforts to accurately monitor high-risk groups are being undertaken, and with some success as described in Country Impact Evaluation Reports, there remain challenges to improve accuracy, comparability, and availability of information for evaluation purposes. An important issue concerning the efficient use of routine data on high-risk populations is the need to avoid piecemeal data collection and to align a minimum set of information from multisectoral efforts—public and private, health, and other sectors—with existing reporting streams.

5.7 Analysis of DCA Results

Stepwise Framework: Evidence from the DCA

This section takes a step away from the trend analyses in funding, access, and behavior and focuses on a cross-sectional analysis of data from the DCA. The DCA data provide information on HIV services, service delivery context, and service utilization across a selection of subnational areas in seven countries. These data, when aggregated to district-level observations, also provide the unique opportunity to examine linkages between intermediate variables in the evaluation framework stepwise approach (see Framework, Chapter 2), namely, selected Process (e.g., readiness), Output (e.g., service availability), and Outcomes (e.g., service utilization) variables. This exercise is carried out in the absence of impact data either because the latter are not available or because it is too early to expect detectable changes in disease burden. Therefore, establishing preliminary linkages between these intermediary steps—the steps between initial funding inputs and ultimate impact—will provide

the supportive platform from which plausibility statements may be made about impact. In short, if investments relate to better availability of services in terms of readiness and density, and this, in turn, is associated with higher coverage in the corresponding population, then it is plausible to suggest that this will eventually have an impact on reducing disease burden, depending on the effectiveness of the intervention and the epidemiological context.

Cross-sectional data collected for the DCA include two major sources, a Facility Census or Survey in seven countries, and a Household Coverage Survey in four countries. Table 5.13 presents the number of nonrandom subnational areas selected in each country (simply referred to as "districts"), the number of health facilities in the Facility Census or Survey, and the number of households and women surveyed in the Coverage Survey. There are a total of 64 districts or other administrative units across the seven countries, and countries with both a Facility Census and a Household Coverage Survey that is representative at the district level will be included in a more in-depth analysis of linking service availability and coverage estimates at the district level. These three countries are Burkina Faso, Haiti, and Zambia, with a total of 31 districts. The facility estimates from countries that conducted nonrandom Facility Surveys (Ethiopia, Malawi, and Peru) are presented as descriptive information but are not included in the analysis because the data from the Household Survey and the Facility Survey do not refer to the same populations.

Table 5.13: Summary of DCA Data Collection, Number of Primary Sampling Units (PSU), Number of Health Facilities, and Number of Households and Women Interviewed

	Burkina Faso	Cambodia	Haiti	Zambia	Ethiopia*†	Malawi*	Peru*	Total
Number of subnational areas (PSU)	13 (districts)	7 (operational districts)	9 (départements)	9 (districts)	11 (regions—*woreda*)	9 (districts)	6 (major urban areas)	64
Number of health facilities	555	207	210	338	158	113	358	1,939
Number of households	8,049	-	4,451	4,650	8,514	-	-	25,664
Number of women	9,189	-	6,041	4,873	7,807	-	-	27,906

* Nonrandom sample of facilities
† Unweighted sample of households/women
Source: DCA Facility Assessments and Household Coverage Surveys 2008

HIV Service Delivery Context

While in most countries at least half of health facilities offer at least HIV prevention outreach, relatively fewer are likely to offer diagnosis and clinical services (see Table 5.14). The three services that will be more closely examined in this analysis are HTC, PMTCT, and ART.

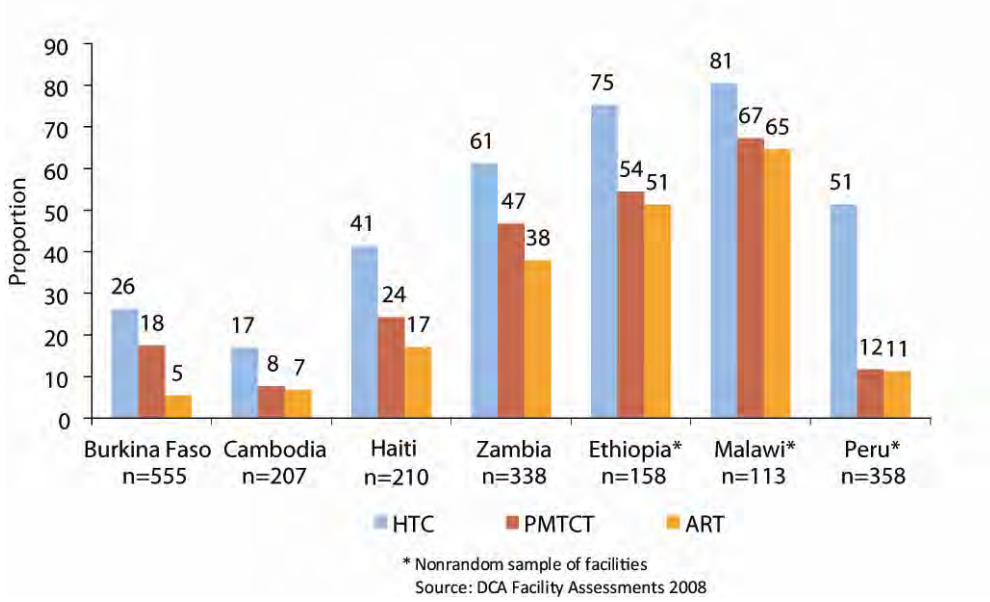
Table 5.14: The Proportion of Health Facilities Offering Specific HIV Services, by Country, 2008

	HTC	PMTCT	ART	Post Exposure Prophylaxis	Youth Friendly Services	HIV Prevention Outreach	Number of Health Facilities
Burkina Faso	26.3	17.5	5.4	27.8	21.6	46.7	555
Cambodia	16.9	7.7	6.8	24.1	48.3	60.9	207
Zambia	61.2	46.7	37.9	48.7	47.6	54.6	338
Haiti	41.4	24.3	17.1	30.8	45.2	49.1	210
Ethiopia*	75.3	54.4	51.3	47.0	22.8	57.0	158
Malawi*	80.5	67.3	64.6	51.0	57.3	73.5	113
Peru*	51.4	11.7	11.2	na	na	na	358
Total	44.8	27.1	20.7	38.1	36.6	54.2	1,939

*Nonrandom sample of facilities
na = not available
Source: DCA Facility Census and DCA Facility Survey 2008

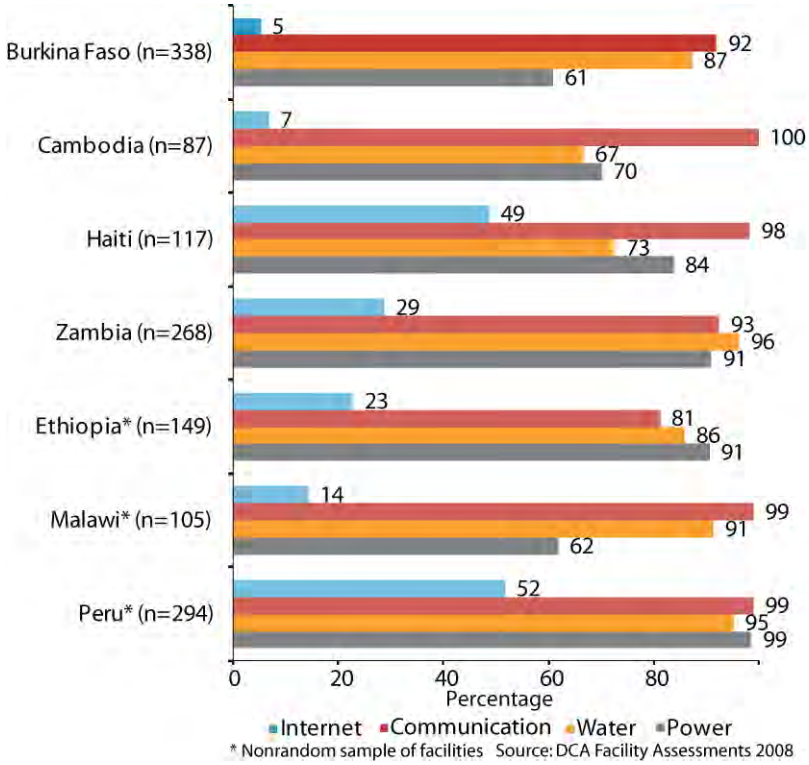
Figure 5.11 shows that a range of 20-60% of facilities offer HTC, 5-45% offer PMTCT, and 5-40% offer ART. Among the four countries with a Facility Census, facilities in Zambia are most likely to provide these services, while those in Burkina Faso and Cambodia are the least likely to do so.

Figure 5.11
Proportion of Health Facilities Offering Specific HIV Services, 2008



Among all facilities that offer any HIV services, 80-100% had a means of communication either by landline telephone, cellular phone, another phone within walking distance from the facility, or by radio call (see Figure 5.12). A slightly lower proportion of facilities (65-100%) had access to an improved water source—that is, piped water or other protected water source within 500 meters of the facility. Facilities in Haiti and Cambodia were least likely to have improved water, with less than 75% of facilities reporting access.

Figure 5.12
Among Facilities Offering Any HIV Services,
the Percentage with Basic Elements of Infrastructure, 2008



In Peru, virtually all facilities have continuous power, while only 60-70% of facilities in Burkina Faso, Cambodia, and Malawi have a sufficient power source (electricity grid, a generator or solar supply, or continuous battery power). The requirements for Internet are the most lacking, although about half of facilities in Peru and Haiti have a connection.

In every country except for Haiti, facilities that offer HIV services are mostly public (see Table 5.15). Zambia and Cambodia each have about one-third of HIV services delivered via private-for-profit facilities; Haiti has about one-fifth offered through NGOs or other civil society organizations. In most countries, about 70% of facilities surveyed were located in an urban area; on the one hand, this reflects characteristics of the purposefully sampled districts and, on the other hand, it shows a selection preference of rolling out HIV services, at least initially, in areas with better resources.

Table 5.15: Percentage of Surveyed Health Facilities Offering HIV Services Located in Urban Areas and the Distribution by Type of Administration Authority, by Country, 2008

	Burkina Faso	Cambodia	Haiti	Zambia	Ethiopia*	Malawi	Peru*	All Facilities
Urban location	67.5	29.9	68.5	72.8	71.8	9.5	100.0	60.5
Administrative authority								
Public	79.0	71.3	30.8	53.4	92.6	71.4	61.9	67.8
Private for profit	9.5	28.7	18.8	31.7	0.0	2.9	22.4	15.7
Civil society (incl. NGO, FBO, CBO)	9.5	0.0	21.4	7.1	0.7	22.9	6.5	9.5
Other admin.	2.1	0.0	29.1	7.8	6.7	2.9	9.2	7.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of facilities with HIV services	338	87	117	268	149	105	294	1,064

* Nonrandom sample of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

STEP 2 IN STEPWISE FRAMEWORK: PROCESS

The Process step in the evaluation approach is the second of five steps. In this analysis, process is defined by the readiness of a facility to provide quality services. For each of the three HIV services (HTC, PMTCT, and ART), the minimum criteria for readiness are examined. A summary interpretation of readiness criteria in the four countries with a DCA Facility Census is provided in Table 5.16 (see Tables 5.1.A-5.1.C in Annex 5.1).

Table 5.16: Summary of Results—Criteria for Minimum Standards

	Trained Staff	Guidelines Available	Drugs	Diagnostic Support
HTC	High levels of trained staff in "HIV/AIDS counseling and testing" and "HIV/AIDS testing including rapid testing" in Burkina Faso and Zambia (75-90%); Cambodia and Haiti (65-75%)	Availability of guidelines about the same as trained staff	na	High levels of HIV diagnostic supplies in Burkina Faso, Haiti, and Zambia (80-90%); Cambodia less (55%)
ART	Majority of facilities have staff trained on "Opportunistic infections" (65-80%); fewer on "TB/HIV infection" (40-65%)	Availability of guidelines about the same as trained staff	Cambodia shows high levels of available WHO-recommended drugs, followed by Zambia, Haiti, and Burkina Faso	Low availability of CD4 count machines (7-50%), with highest availability in facilities in Haiti; lowest in Cambodia
PMTCT	High levels of training in Burkina Faso, Haiti, and Zambia (80-90%); and Cambodia (60%)	Availability of guidelines about the same as trained staff	High levels of NVP and/or azidothymidine (AZT) in every country (85-100%)	na

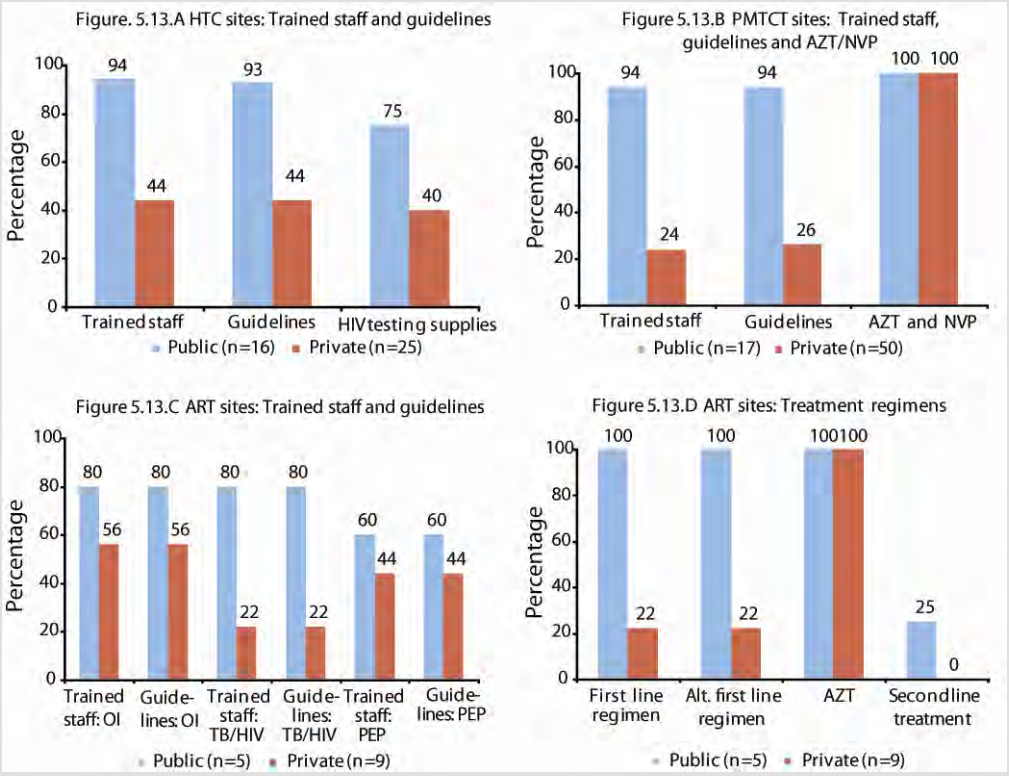
na = not available

Box 5.1
Are Public Facilities More "Ready" than Private Facilities in Delivering Services?
Example of PMTCT in Cambodia

In Cambodia, seven operational districts with populations ranging from 132,000 to 289,000 were selected in which to conduct the DCA Facility Census. Among a total of 207 health facilities visited, 87 reported providing HIV services including counseling and/or clinical services. This number includes public (62) and private (25) facilities. Among the public facilities, specific ones are designated by the government as official HTC (16), PMTCT with—at minimum—counseling services for pregnant women (17), and/or ART sites (5).

The private clinics in Cambodia are not regulated by the government, and so the national disease experts recommended an analysis be done to examine certain readiness indicators in public sites separately from the private sites. Readiness is defined as having recently trained staff and guidelines in the pertinent service area as well as having basic drugs and supplies. The main outcome of this analysis is summarized in the four figures below (see Figures 5.13.A-5.13.D). Without exception, the public facilities in selected DCA districts were more likely than private facilities to benefit from having trained staff with available guidelines and having drugs and supplies.

Figures 5.13A-5.13.D
Readiness Indicators, Including Percentage of Facilities with Trained Staff, Available Guidelines, and Basic Drugs and Supplies, by Public and Private HTC (A), PMTCT (B), and ART (C, D) Sites, 2008



Source: Cambodia Facility Census 2008

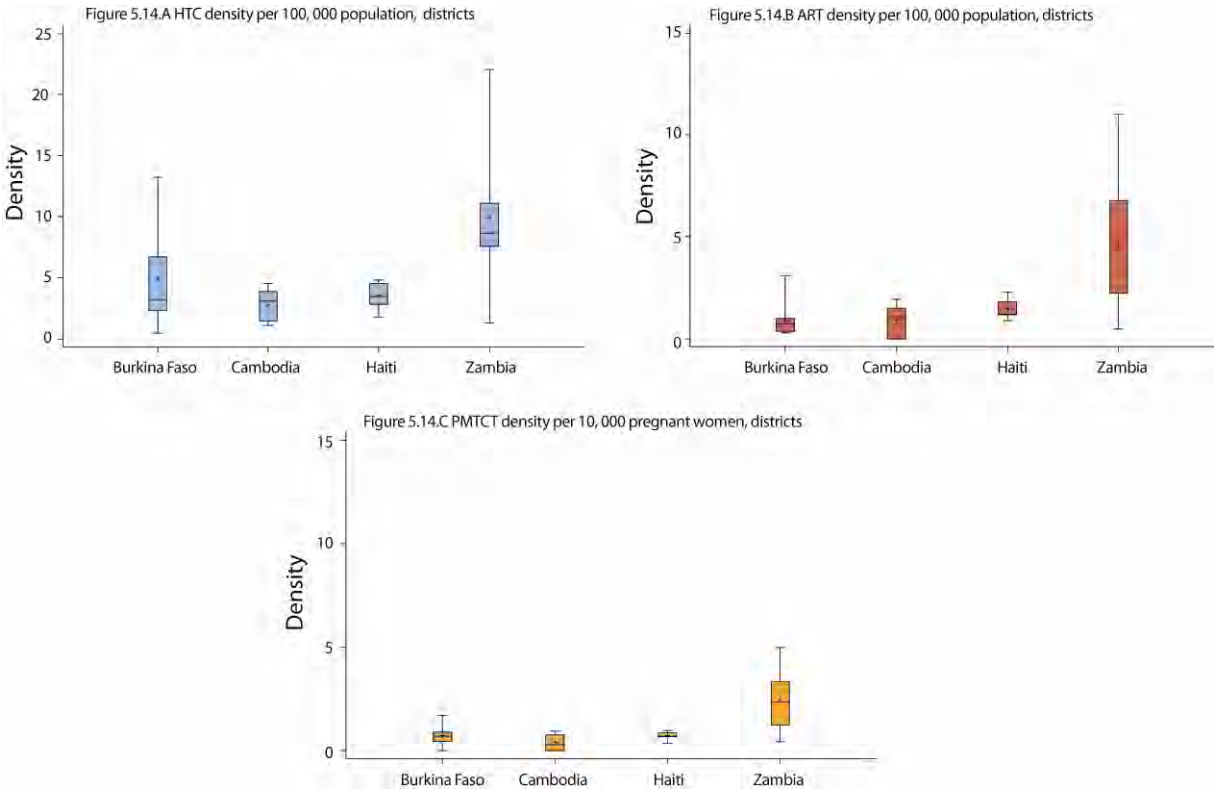
Overall, clients seeking care at official public sites are more likely to receive services delivered by trained staff, find guidelines at their disposition, and benefit from standard, nationally approved first-line and alternate first-line treatment regimens.

STEP 3 IN STEPWISE FRAMEWORK: OUTPUT

The Output step in the evaluation approach is the third of five steps. In this analysis, the output variable is defined as availability of a specific service measured as the density of services per 100,000 population. For each of the three HIV services under examination (HTC, PMTCT, and ART), the density of service availability in countries with a full Facility Census is shown in a series of boxplots (see Figures 5.14.A-5.14.C). In these plots, the cross indicates the mean density value, the horizontal line indicates the median, and the top and bottom of the box represent the third and first

quartile within which is the interquartile range. The vertical "whiskers" are drawn to the minimum and maximum values.

Figures: 5.14.A-5.14.C
Service Density in Districts, 2008



Source: DCA Facility Census, Burkina Faso, Cambodia, Haiti, and Zambia 2008

In all three plots, Zambia's districts show considerably higher densities of each service than do Haiti and Burkina Faso. The variation in service availability between districts in Zambia is also the greatest. These plots also provide insight into the extent to which services are made accessible equitably across districts. In the countries with shorter "whiskers," like Haiti, services are equitably distributed, but availability is low in every district. In Zambia and, to a lesser extent, in Burkina Faso, the longer whiskers indicate at least one or several districts with better (or worse) access to services. Although the density of ART facilities in Zambia is higher than the other countries, it has to be kept in mind that the HIV prevalence is also more than four times higher than in the other countries. The same observation applies for PMTCT services.

STEP 4 IN STEPWISE FRAMEWORK: OUTCOME

The Outcome step in the evaluation approach is the fourth of five steps, and the last of the intermediary steps. The outcome variables are defined as coverage estimates for HIV-related indicators. Table 5.17 summarizes aggregated district estimates for four of the main HIV indicators collected in the DCA Coverage Survey (see Tables 5.2.A-5.2.D in Annex 5.2). Zambia, followed by Haiti, shows the highest coverage rates, with Burkina Faso and Ethiopia having lower rates. Of note, however, is the insight gained from examining these indicators by socioeconomic background characteristics to evaluate discrepancies in service utilization by education level, residence, and household wealth. Indeed, there is a strongly positive association where women with higher education

levels, from richer households, and from urban areas fare better than others for each of the four variables in each country.

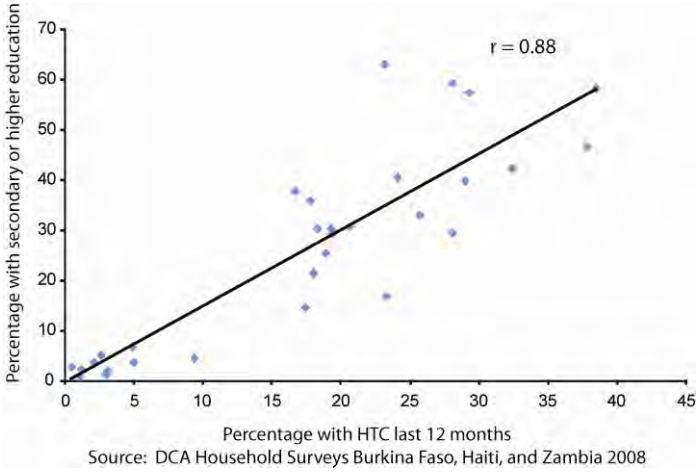
Table 5.17: Coverage of Selected HIV Indicators, by Country

	Burkina Faso	Ethiopia (unweighted sample)	Haiti	Zambia
Number of women	9,133	7,457	6,024	4,815
Percentage with a comprehensive knowledge about AIDS	15.5	12.5	28.5	n/a
Percentage who received results from last HIV test taken in the past 12 months	7.5	14.4	16.7	29.4
Percentage of women who gave birth in the last two years who were counseled, who were offered and accepted an HIV test, and who received results	10.5	7.7	22.1	34.6
Number of women age 15-24	2,470	1,043	1,641	1,198
Percentage of youth 15-24 who have been tested for HIV and received results in the past 12 months	10.5	17.8	22.6	38.7

Source: DCA Household Surveys 2008

Figure 5.15 illustrates the strong association between women's education levels and, for example, the proportion of women who accessed HTC in the last year. A similar relationship is seen with the other coverage variables and socioeconomic characteristics.

Figure 5.15
Percentage of Women with HTC and Proportion of Women with Secondary or Higher Education, DCA Districts in Three Countries, 2008



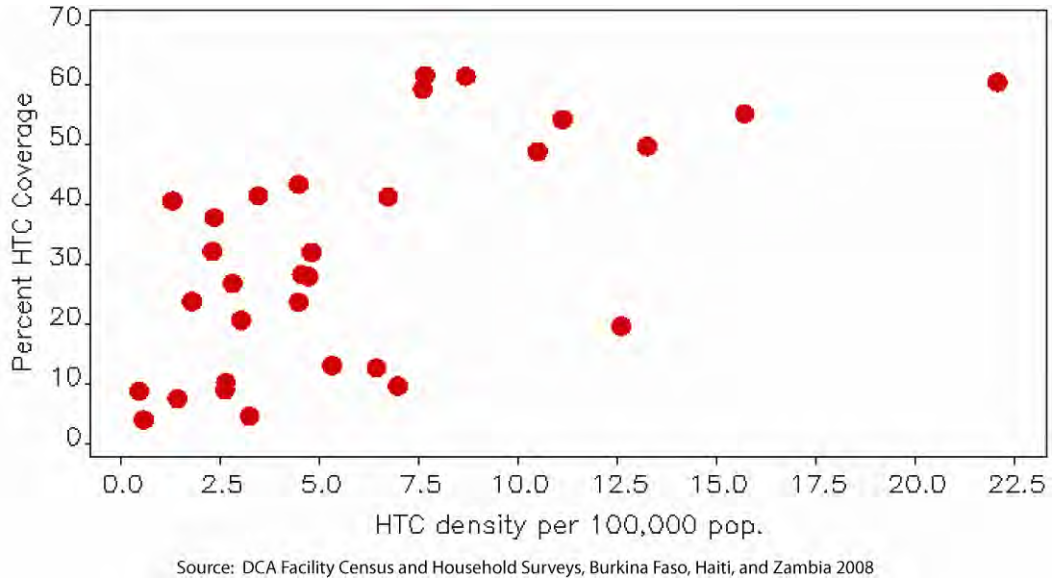
Source: DCA Household Surveys, Burkina Faso, Haiti, and Zambia 2008

LINKING AVAILABILITY AND COVERAGE

The linkage tested between intermediary steps is simply whether districts with a higher density of services (Output), which is assumed to mean better access, also have higher coverage rates (outcome). While controlling for contextual characteristics, the association between availability and coverage variables was tested to determine if higher service density was a significant determinant of service

coverage. The results of testing district-level HTC density per 100,000 population and the proportion of women with HTC are shown below (see Figure 5.16 and Table 5.18), as are results for PMTCT density per 10,000 pregnant women and the proportion of pregnant women tested at ANC during pregnancy (see Figure 5.17 and Table 5.19). In both cases, the density variable remained a significant predictor of coverage levels after controlling for district proportions of urban households, the level women's education, the number of health workers per 10,000 population (as an indicator of overall strength of health services), and the type of facility administration (i.e., public, private, civil society).

Figure 5.16
HTC Services Density and Coverage, DCA Districts in Three Countries, 2008



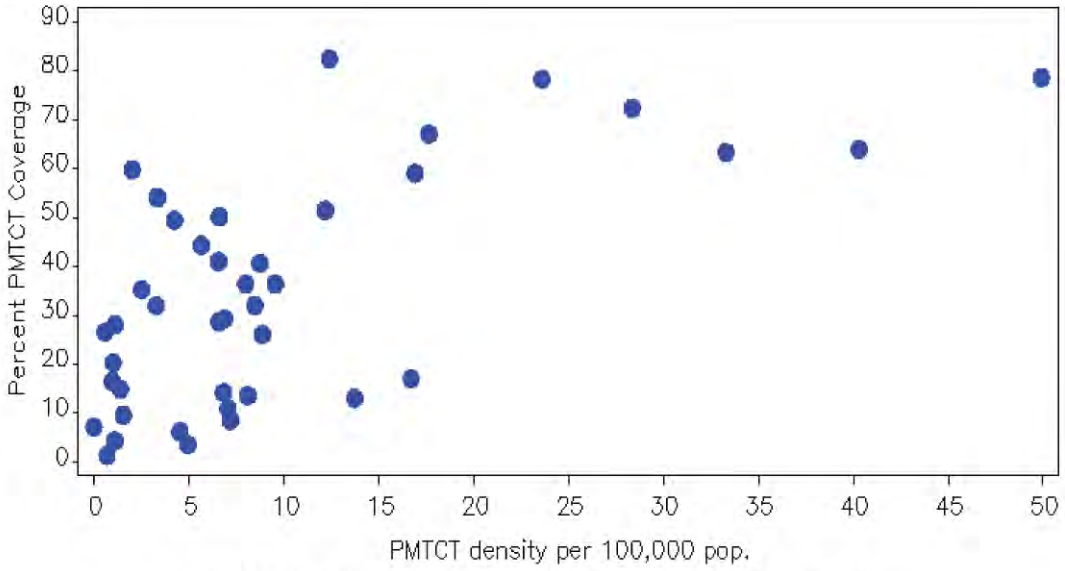
Source: DCA Facility Census and Household Surveys, Burkina Faso, Haiti, and Zambia 2008

Table 5.18: Regression Results for HTC Density and Coverage of Women Ever Tested and Counseled for HIV (adj. R^2=0.94)

	Parameter Estimate	Pr > |t|
Intercept	*-0.069*	*0.687*
HTC density	0.014*	0.000
Burkina Faso	0.165*	0.019
Haiti	-0.094	0.138
Zambia (ref. cat.)	na	na
Urban	0.048	0.181
Primary education	0.647*	<.0001
Secondary or higher education	0.622*	<.0001
Health workers/10,000	-0.011*	0.028
Public	-0.101	0.499
Private	0.020	0.896
Civil society	0.144	0.316

* $p \leq 0.05$

Figure 5.17
PMTCT Services Density and Coverage of Pregnant Women Tested and Counseled During ANC, DCA Districts in Three Countries, 2008



Source: DCA Facility Census and Household Surveys, Burkina Faso, Haiti, and Zambia 2008

Table 5.19: Regression Results for PMTCT Density and Coverage of Pregnant Women Ever Tested and Counseled for HIV (adj. R^2=0.93)

	Parameter Estimate	Pr > |t|
Intercept	*0.193*	*0.428*
PMTCT density	0.007*	0.003
Burkina Faso	0.072	0.475
Haiti	-0.208*	0.026
Zambia (ref. cat.)	na	na
Urban	-0.040	0.428
Primary education	0.512*	0.003
Secondary or higher education	0.751*	0.000
Health workers/10,000	-0.014*	0.044
Public	-0.233	0.278
Private	0.223	0.309
Civil society	0.120	0.548

* $p \leq 0.05$

In summary, this examination of DCA results is an effort to operationalize the stepwise framework for the evaluation using district-level service availability and coverage data. There were limitations that precluded a more robust analysis, including foremost a relatively small set of district observations across three very different countries (n = 31) and the fact that the population may use services outside the district that cannot be taken into account in the analysis. However, the exercise did reveal several insights. First, geographical inequities in service availability are likely to exist between districts within and between countries, as evidenced by the variation in service density (boxplots); inequities also exist, as is widely known already, among populations of different socioeconomic groups—a higher level of women's education, in particular, is associated with higher coverage. Perhaps most interesting is that these empirical findings provide supporting evidence that there is better coverage where services are scaled up. In the absence of impact data at the district level, these associations between the

intermediary Process-Output-Outcome steps were sought as the platform from which plausible statements may be made toward finally achieving a reduction in disease burden. Such a snapshot evaluation of services and associated coverage in subnational areas is also a useful management tool for decisionmakers to identify areas that need attention.

5.8 Impact Mitigation

This section deals with two intervention areas that focus on mitigating the impact of the epidemic: orphans and vulnerable children (OVC) and home-based care and support. It is very challenging to obtain accurate information on the coverage, quality, and impact of such interventions, which may consume a significant share of the funding. The resources are often distributed to a large number of civil society organizations. Monitoring data tend to be based on reporting systems that focus on process indicators, such as numbers of the target populations reached, without much information on the intensity of the intervention. Household surveys can obtain data on a few indicators on orphans (irrespective of the cause of death of the parents), such as school attendance and anthropometric status. In addition, estimates of the numbers of vulnerable children are not readily available, as the definitions tend to vary and pose measurement problems.

The extent to which households have received assistance for terminally or chronically ill people can also be measured in surveys, but the intensity of both the need and the intervention are often not measured. The indicators are also not specific to HIV/AIDS, but refer to any chronic condition.

This section briefly reviews the evidence from Country Impact Evaluation Reports by the evaluation study countries and summarizes the data generated by community surveys in the districts in Burkina Faso and Haiti, and the household surveys in the DCA countries.

Orphans and Vulnerable Children

Caring for OVC is an important part of HIV programs. Information about funding for programs to support OVC, including education, basic health care, community support, and family/home support, is limited. Country NASA reports for DR Congo, Kyrgyzstan, Moldova, Mozambique, and Rwanda show that OVC funding represents 4% to 10% of the total HIV budget. The Global Fund financed OVC activities in several countries. In the seven evaluation countries that are PEPFAR focus countries, the OVC programming funds range between 2% and 8% of the PEPFAR in-country budget.

The use of OVC funds varies between countries. In Burundi, OVC funding in 2006 has been used to set up 45 community projects for OVC, purchase and distribute school materials for 490,000 orphans, provide medical care for 15,000 orphans, and provide psychosocial care for 13,000 orphans. In Lesotho, the program focused on school feeding and orphan take-home rations, but there is no clear registration and monitoring system in place. In Mozambique, it is estimated that about one-fourth of OVC were reached with at least three basic services as identified in the national action plan.

In concentrated epidemic countries, the proportion of children with at least one parent dead ranges from 3% to 9%; in generalized epidemic countries, from 7% to 20%. The latter are likely to have a larger share of orphans due to HIV/AIDS mortality of their parents. In the countries with more than

one DHS survey in recent years, the proportion of children who are orphaned has gone up in Cambodia and down in Burkina Faso, Haiti, and Rwanda. The problem of orphanhood appears to be consistently higher in urban than in rural areas.

The care for orphans, as can be expected, is often the responsibility of relatives and communities. Civil society organizations have been established to support the children themselves and the households they live in. The district Civil Society Organization Survey 2008 in Burkina Faso identified and interviewed 68 community-based organizations in the 13 districts that were part of the DCA. The most common activities of these organizations concerned HIV prevention and education (58%), followed by condom distribution (29%), and OVC programs (28%). It is also noted that smaller numbers were involved in psychosocial care for HIV patients (10%) or provided hospice care for terminally ill patients (8%). In Haiti, one-third of 34 community organizations that were identified as part of the DCA 2008 were engaged in prevention and education, and 25% in condom distribution. Providing support to HIV patients (18%), their families (14%), and OVC (14%) were also common activities. Six percent of the organizations were involved in the provision of antiretroviral treatment, and 10% in the provision of PMTCT.

Household surveys have been used to gauge the coverage of OVC services. Households identified as having an OVC are asked whether they have received any assistance and, if so, what type. The results from four national surveys are presented in Table 5.20. The Burundi MICS 2005 appears to be an outlier, 63% of OVC receiving support, and measurement may have been done differently. The other surveys report that the proportion of households with OVC receiving assistance ranges from 5% in Haiti to 19% in Malawi. There were no differences between boys and girls.

Table 5.20: Percentage of OVC Age 0-17 whose Household Received Free Basic External Support for Caring of the Child (At Least One Support)

Country (source)	OVC 0-17 (%)	OVC (Girls) 0-17 (%)	OVC (Boys) 0-17 (%)
Burundi (MICS 2005)	63.4	-	-
DR Congo (DHS 2007)	9.2	9	9.4
Haiti (DHS 2005)	5.2	5	5.3
Rwanda (DHS 2005)	12.6	13.4	11.8
Malawi (MICS 2006)	18.5	-	-
Zambia (DHS 2007)	15.7	17	14.4

According to the 2008 DCA Household Survey in Haiti, among households receiving OVC care, the service most frequently provided to households with an OVC is school-related assistance, followed by medical support, emotional support, and social and material support.

An alternative method of examining coverage is to look at service provision rates using program data for the numerator and the estimated size of the population in need of services for the denominator. Haiti and Malawi provided this information in Country Impact Evaluation Reports. This estimate is subject to double counting of individuals in the numerator if an individual receives services from more than one provider or if results from each period are added to calculate results for the year. Also, estimates of the population for the denominator may be inaccurate. For instance, Malawi has estimates of the proportion of OVC receiving external support based on routine program reporting and observed a rapidly increasing trend from 14% in 2004 to 20% in 2005 to 38% in 2006 to 53% in 2007. This figure differs considerably from the 2006 MICS (18%).

Haiti has adopted the Community Care Coalition facilitation model for developing self-sustaining care and support to OVC. This model is based on the principle that OVC care is most effective and sustainable when it takes place within the supportive context of the child's own family and community. Financial resources are used to work with existing community structures, including churches and other FBOs, CBOs, government entities, local businesses, schools, and other NGOs, to strengthen and extend the work that communities are already undertaking, recognizing that an effective OVC care response will see communities themselves assuming the responsibility for the well-being of their members. According to national routine program results and the estimated number of OVC, there has been a steady increase in the number of OVC receiving care between 2003 and 2007, from 0.1% in 2004 to 8.4% in 2007.

One indicator of the impact of OVC programming, specifically educational support, is the ratio of school attendance of orphans to nonorphans age 10-14. The results from recent household surveys have been assessed elsewhere and showed modest progress in several countries. The data suggest that orphan schooling rates have improved more than non-orphan schooling rates, thereby closing the gap in countries with multiple data points. Also, the schooling rates are just one aspect, which is showing possible positive changes, some of it before 2004, some of it possibly occurring after. Considerable numbers of children are reached in some countries mostly through CBOs, but from the current data it is difficult to assess what the effects are on their health and well-being.

HOME-BASED CARE AND SUPPORT

Home-based care and support activities may include medical and psychosocial care but also include material and financial support. Countries allocate a variable proportion of the AIDS funding to such activities, some of it by supporting health facilities but mostly through CBOs.

For instance, in Ghana the National AIDS Commission distributed hundreds of small grants to civil society organizations, mostly from the Global Fund and World Bank MAP resources. During 2002-2004, there were 242 projects with civil society organizations. In 2007, funds were disbursed to 302 community-based organizations for prevention work, 87 associations for people living with HIV/AIDS, and an unidentified number of non-government and private organizations.

In the DCA, households with a death in the last two years were asked if, in the past year, they had received any formal assistance for free through a government, private, religious, charity, or community-based organization. Overall, between 5% and 15% of the households reported such a death (see Table 5.21). Most households in the DCA districts did not receive any free assistance or support. However, among all categories of support, the largest percentage of households received assistance in the way of psychological or emotional support. About a third of households in Burkina Faso and Zambia districts and about 15% in Ethiopia and Zambia benefited from emotional support.

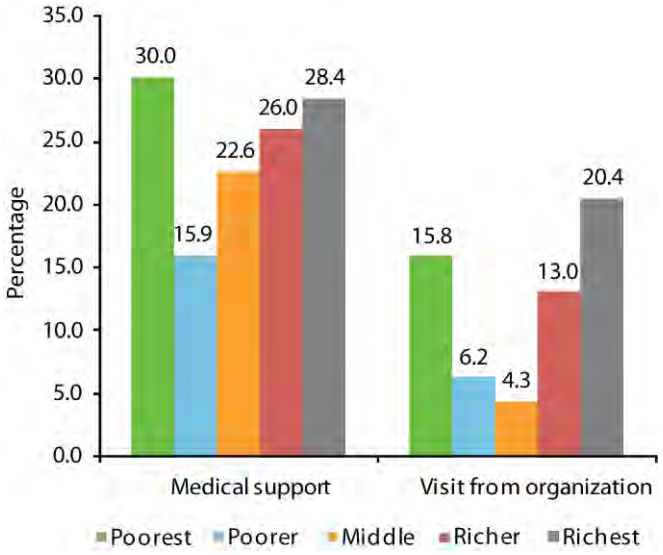
Table 5.21: Among Households with Deaths in Past 24 Months, the Percentage that Received Free Support, by Country, 2008

Support Service	Burkina Faso	Ethiopia (unweighted sample)	Haiti	Zambia
Percentage of household with at least one death in the past 24 months	12.9	6.4	4.9	13.0
Number of households with at least one death in the past 24 months	1,018	531	219	597
Support with medical care, supplies, or medicines	36.5	15.1	1.2	24.4
Emotional or psychological support	34.2	16.8	14.9	31.4
Material support	12.5	11.1	4.8	15.5
Social support	2.8	6.4	1.2	6.9
Support for schooling	32.4	7.3	1.2	9.7
Material, medical, financial help	10.7	13.2	0.5	10.9
Number of households	7,916	8,325	4,451	4,598

The second most common type of support that households received was medical support, including free care, supplies, or medicine. Again, households in Burkina Faso (37%) and Zambia (24%) benefited the most from this type of assistance. Households in Haiti rarely received free medical care. For material and school support, Burkina Faso and Zambia households also report higher levels of assistance. In Burkina Faso, school assistance is especially common. Finally, about one-tenth of households, except for Haiti, had a home visit in the past year from an organization.

The distribution of care and support services does not always reach the households assumed to be in greatest need. In Zambia, the pattern of care and support received includes the poorest households—and also the better-off households. The latter could reflect care received by urban households where such services may be more concentrated and also households that are likely to fall into a higher wealth category (see Figure 5.18). Among households in Haiti, although they report receiving very few care and support services, the households that do receive free medical care and visits from charity organizations are likely to be the better-off households (Haiti DCA 2008).

Figure 5.18
Percentage of Households in Zambia Receiving Free Support, by Wealth Quintile, Zambia, 2008



Source: DCA Household Survey 2008

CONCLUSIONS

Programming to support OVC and home-based care appear to grow in quantity. The quality of these programs and their effectiveness at impacting the lives of children to mitigate the loss of a parent or other vulnerable circumstance is unknown. Better measures to monitor health impact are needed, although it is acknowledged that these are likely to be part of special research studies, given the wide variety of interventions and the difficulties in measuring exposure to and intensity of interventions.

5.9 IMPACT ON HIV TRANSMISSION

The global picture of the epidemic is one of limited changes in the new millennium. Some countries have signs of reductions in HIV incidence in young pregnant women in urban or rural populations, but not many. This section examines HIV trends in the 18 evaluation countries to determine whether there is evidence of recent changes in HIV transmission in these countries.

Changes in new infection rates are the best measure of impact of prevention programs. In the absence of direct measures of incidence beyond local research studies,[23] prevalence trends among young people (where infections are likely to be recent and mortality can be assumed to be negligible) are used. These proxies for incidence include HIV prevalence among pregnant women age 15-24 attending sentinel surveillance clinics[24] and the proportion of HIV-infected women and men age 15-19 from multiple population-based household surveys. HIV sentinel surveillance data from ANC clinics are typically used to track trends in levels of prevalence on a more frequent basis than population-based survey estimates because ANC data are more efficient and cost-effective to collect. However, these two sources of data employ different methodologies, and, therefore, the interpretation of the levels and trends from each need to be interpreted in light of significant methodological differences. In particular, the different sample populations have a bearing on how the results may be inferred to a larger population. The ANC surveillance data, for example, may be calibrated with results from the less-frequent population-based seroprevalence surveys to better represent the general adult population. On the other hand, trends based on the population-based survey estimates, although designed to represent the general adult population for a defined area, should be interpreted taking into account their confidence intervals to determine whether and with how much confidence an increase or decrease is statistically significant.

In addition, a mathematical model that combines HIV prevalence and sexual behavior indicator input data is used to test the hypothesis that changes in patterns of sexual behavior have altered the natural course of the HIV epidemic. This approach goes beyond predicting the course of the epidemic from HIV prevalence data only. It compares observed trends in prevalence data against the behavioral model output to assess whether the evidence for observed changes in sexual behavior had an impact

[23] Direct measurement of incidence is difficult because of the large sample size requirements and loss to follow-up. Using a single sample to estimate incidence or recent infection using detuned ELISA has hitherto been unsuccessful. Statement on the use of the BED-assay for the estimation of HIV-1 incidence for surveillance or epidemic monitoring. Statement following a meeting of the NAIDS Reference Group for Estimates, Modelling and Projections held in Athens, Greece, December 13th 2005. (www.epidem.org/publications.htm).

[24] The 2001 UNGASS Declaration of Commitment set a target of reducing HIV prevalence by 25% of 2000-2001 levels in young people age 15-24 in the most affected countries by 2005.

on the course of the epidemic beyond the natural changes in prevalence that would be expected.[25] Further details on the methodology and assumptions in the mathematical model are presented in Annex 5.3. The number of infections averted due to behavior change is calculated from these models for countries that have evidence of a decline. In addition, the number of new infections averted due to PMTCT and the proportion of all infections due to mother-to-child transmission averted are estimated using a model (Spectrum—LiST).

Southern African Countries

Estimated HIV prevalence among adults is well over 10% in Malawi, Mozambique, and Zambia and over 20% in Lesotho. For countries in the evaluation study, the most recently published rounds of HIV sentinel surveillance among antenatal clinics are those conducted several years ago: Lesotho, 2003; Malawi, 2005 (preliminary data available from 2007); Mozambique, 2004; and Zambia, 2004. Household surveys with HIV testing were conducted in Lesotho (2004), Malawi (2004), and Zambia (2001 and 2007). The surveys show that the epidemics in this region are characterized by adult women-men prevalence ratios of about 1.4 (women prevalence 40% higher) and include high rural HIV prevalence levels. The availability of recent data limits the ability to assess trends since the scaling up.

None of the four countries showed a decline in HIV prevalence among young pregnant women attending sentinel antenatal clinics during the period between the late 1990s and 2003-2004. In Malawi, however, HIV surveillance among young pregnant women age 15-24 in the same 19 antenatal clinics indicated that HIV prevalence declined from 18.3% in 2003 to 14.3% in 2005. This was the first indication of a decline in HIV incidence in a decade. Preliminary data from the most recent round of surveillance in 2007 indicate a further decline to 12.3% among pregnant women age 15-24.

In Zambia, surveillance data are not available beyond 2004, but two DHS surveys with HIV testing in 2001-2002 and 2007-2008 provide insights about the trend (see Table 5.22). Overall, only a modest decrease in prevalence was observed, 15.6% to 14.3% (but not necessarily statistically significant at a 95% confidence level). ART use needs to be taken into account as HIV prevalence rates increasingly include people on ART who would otherwise have died. Among the estimated 677,000 people who

[25] When epidemics mature, prevalence can decline even if individuals do not change their risk behavior. This is due to the epidemic moving to predominately lower-risk groups and through AIDS mortality removing from the population some of the individuals who have contributed most to transmission. These "natural epidemiological dynamics" confound simple statistical tests for trends in prevalence data because a significant decline in prevalence does not necessarily indicate behavior changes reducing infectious spread. In addition, the nonlinear threshold relationship between sexual risk behavior and HIV spread means that the extent to which changes in reports of sexual behavior materially affect the epidemic is unclear. Changes in sexual behavior indicators, though apparently substantial, may not be epidemiologically relevant if, for instance, they are overwhelmed by high degrees of risk of other types, they do not reduce the level of risk below a certain threshold, or they are confined to parts of the population at little risk of acquiring or transmitting infection. Therefore, it is useful to construct a mathematical model that provides a mechanistic description of the link between individual sexual behavior and transmission in the population and that can simulate these natural epidemiological dynamics.

are living with HIV infection in 2007, 151,000 people are on treatment. A preliminary method of adjustment shows that the HIV prevalence rate without ART would be as low as 11.8% in 2007.[26]

Treatment is unlikely to have a large effect on young people in Zambia, as the majority have been infected recently and very few have advanced-stage infections. HIV prevalence among people, especially age 15-19, is the best indicator of recent infection. For women in age groups 15-19 and 20-24, despite apparent declines in prevalence in both age groups between 2001 and 2007, these are not statistically significant declines (see Table 5.22). For example, 95% confidence intervals around prevalence estimates for women age 20-24 range from 12.1%-20.5% in 2001 and overlap with those in 2007 that range from 9.6%-13.9%. On the other hand, women age 20-24 do have significantly higher prevalence than women age 15-19, for both years. This indicates that the cohort of women age 15-19 in 2001 became more infected by 2007, when they are mostly represented in the 20-24 age group.

For men, there are no significant changes in prevalence, in either age group, between 2001 and 2007. Similarly, there are no significant changes in between age groups in either year (also 95% confidence intervals). This indicates a relatively stable prevalence over time in young men.

Table 5.22: HIV Prevalence (%) among Young People, Zambia, DHS 2001 and 2007

	Age	DHS 2001	DHS 2007
Women	15-19	6.6	5.7
	20-24	16.3	11.8
Men	15-19	1.9	3.6
	20-24	4.4	5.1

An incidence estimate for all ages can be obtained from two age-specific prevalence series over time, using assumptions about a mortality pattern.[27] It does, however, take three surveys to be able to confirm a trend in HIV incidence. If one assumes that HIV incidence prior to 2002 was constant, a modest decrease in HIV incidence may have occurred during 2002-2007.

The mathematical models were run for urban and rural populations in all countries, except for Mozambique, where it was run for North, Central, and South regions. Urban and rural Lesotho, rural Malawi, North and Central Mozambique, and urban and rural Zambia fall in the category of stable prevalence and no behavioral change (not taking into account the 2007 data). In South Mozambique, HIV prevalence has grown. Only in urban Malawi the model provides evidence for behavior change affecting the course of the epidemic, particularly around the year 2000, thus predating the scaling up of interventions. As a result, it is estimated that 101,570 infections were averted in Malawi.

[26] Assuming that ART had virtually no impact on HIV prevalence in 2001-2003 and computing an estimate of people who would have died if there had not been any ART, the adjusted estimates show a decline in the prevalence from 15.6% to 11.8%. The adjusted HIV prevalence was computed from HIV treatment numbers for 2006 and 2007 and from assuming that 75% and 25%, respectively, would still be alive by the time of the survey because of treatment and will be represented in the survey sample. Assumptions were made about the distribution of people on treatment by age and sex, as little national data are currently available. Further work is ongoing to refine the methodology.

[27] Hallett, T.B., B. Zaba, J. Todd, B. Lopman, W. Mwita, S. Biraro, S. Gregson, and J.T. Boerma. 2008. Estimating incidence from prevalence in generalized HIV epidemics: Methods and validation. PLoS Medicine 5(4): e80. HIV incidence for Zambia estimates depending on the method ranged from 0.71 to 1.22 and 1.11 to 1.46 per 100 person-years for women and men age 15-49 respectively.

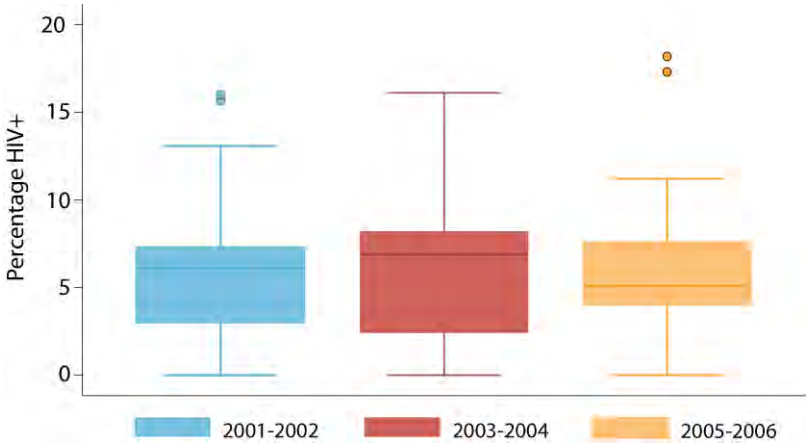
EASTERN AFRICAN COUNTRIES

Adult HIV prevalence in Ethiopia, Burundi, and Rwanda is estimated to be between 2% and 3%. Tanzania has a higher prevalence of about 6%. The most recent published rounds of HIV sentinel surveillance among antenatal clinics refer to 2004-2006. Household surveys with HIV testing were conducted in all countries, although the Burundi survey dates back to 2002. Tanzania conducted national surveys in 2003/04 and 2007/08. The population-based surveys show that the epidemics in this region are characterized by adult women-men prevalence ratios of about 1.5-2.0 (women prevalence 50-100% higher), while rural HIV prevalence levels range from under 1% in Ethiopia to 2-3% in Rwanda and Burundi and nearly 5% in Tanzania.

The most recent published surveillance data for Ethiopia are for 2005. Sentinel surveillance in Addis Ababa shows a decline from 20.7% to 13.5% among pregnant women age 15-24 during 1996-2002 but no further decline since 2002. In Burundi, eight clinics provide annual data and show some decline in the 1990s but little change during 2000-2005. In Rwanda, HIV surveillance rounds were conducted in 1998, 2002, 2003, and 2005, with an expanding number of antenatal clinics (30 by 2005). For 24 sentinel clinics with data for the last three rounds, HIV prevalence declined from 4.6% and 4.5% in 2002 and 2003, respectively, to 3.5% in 2005 among young pregnant women age 15-24. The decline occurred in semi-urban and rural clinics. The 2005 DHS also showed low levels of prevalence among 15-19 years olds: 0.6% among women and 0.4% among men.

Tanzania conducted surveillance rounds in 2001/02, 2003/04, and 2005/06 in 24 clinics in six regions. The median prevalence of the 24 sites was 6.1% in 2001/02, 6.6% in 2003/04, and declined to 5.1% in 2005/06. Figure 5.19 shows the distribution by antenatal clinic surveillance sites in the three rounds.

Figure 5.19
HIV Prevalence among Pregnant Women Age 15-24



Source: Tanzania ANC statistics, 2001-2006, 24 antenatal clinics

Two household surveys with four years in between indicate that HIV prevalence among 15-49 year olds has declined in both sexes, and overall prevalence is down to 5.7% from 7.0% between 2003 and 2007. If ART use is taken into account, as was done for Zambia above, HIV prevalence would even be lower (5.1%).[28] HIV prevalence among 15-19 year olds is the best indicator of recent infection and has declined considerably for both women and men. Also, for ages 20-24, there is a decline for men (see Table 5.23).[29]

HIV incidence in the inter-survey period is estimated at about four per 1,000 person-years, derived from the age-specific prevalence at all ages. If prevalence is assumed to be constant prior to 2003/04, this implies a substantial decline in HIV incidence by more than one-third.[30]

Table 5.23: HIV Prevalence (%) among Young People, Tanzania, THIS 2003/04, and THMIS 2007/08

	Age	THIS 2003/04	THMIS 2007
Women	15-19	2.1	1.3
	20-24	6.0	6.3
Men	15-19	2.1	0.7
	20-24	4.2	1.7

The models to estimate infections averted were run for urban and rural populations in all countries. Evidence for behavior change affecting the course of the epidemic was found for urban and rural Rwanda, resulting in an estimated 210,000 infections averted. Urban changes were concentrated around 1995, rural changes during 2001-2003. Also, in Ethiopia changes occurred for both urban and rural populations, both during 2001-2003, resulting in an estimated 633,950 infections averted. In Tanzania, models were run for urban, semi-urban, and rural populations, which show a modest decline in prevalence in the mid 1990s, but none could be supported by behavioral changes.[31] Burundi did not have sufficient trend data to run the model.

Cambodia, Haiti, and West and Central African Countries

Adult prevalence estimates for 2007 range from just under 1% in Cambodia to 2% in Haiti with the four African countries in between. Most countries have published surveillance reports for 2005 or 2006. All countries conducted a DHS survey with HIV testing during 2003-2006. Women have

[28] Assuming that ART had virtually no impact on HIV prevalence in 2001-2003 and computing an estimate of people who would have died if there had not been any ART, the adjusted estimates show a decline in the prevalence from 15.6% to 11.8%. The adjusted HIV prevalence was computed from HIV treatment numbers for 2006 and 2007 and assuming that 75% and 25%, respectively, would still be alive by the time of the survey because of treatment and will be represented in the survey sample. Assumptions were made about the distribution of people on treatment by age and sex, as little national data are currently available. Further work is ongoing to refine the methodology.

[29] Caution is also needed when interpreting the survey-based trends. Numbers of observations may be small, especially in the earlier surveys, which included less than 500 tested persons in each five-year age group. Sample sizes were doubled in the more recent surveys. Non-response among young people is of the same order of magnitude as that of all ages (about 20-30%), and somewhat more common among more educated urban respondents. The effect of non-response on the HIV prevalence estimate from the survey tends to be small. Furthermore, some figures generated by surveys may suffer from problems such as age misstatement. For instance, the elevated prevalence among men age 15-19 in Tanzania in 2003 (2.1%) was highly unusual given the test results for all other ages and women, as male prevalence rates tend to be very low and always lower than female prevalence in that age group in surveys in Eastern Africa. The HIV prevalence among the same age cohort in the second survey (1.7%) also suggests that the earlier survey was too high.

[30] Hallett, T., et al. Estimation of HIV incidence from household survey based prevalence. Manuscript in preparation.

[31] The 2007/08 survey results have, however, not yet been incorporated.

prevalence almost twice as high as men in Benin, DR Congo, and Ghana. In Cambodia, Burkina Faso, and Haiti, however, there is no difference, suggesting a different transmission pattern. Survey data show that rural HIV prevalence is considerably lower than urban prevalence, with the exception of Ghana, where there is almost no difference. In Cambodia, Benin, and DR Congo, rural HIV prevalence is below 1%.

Trends in HIV prevalence among young pregnant women are the main data source to assess general population trends in all six countries. In Benin, data from seven urban sites during 2001-07 indicate a decline in prevalence during 2001-2007. Most of this decline occurred prior to 2004. No decline was observed in rural sites. Recent trend data are available for only a small number of continuous sites in DR Congo and Burkina Faso, which makes it difficult to ascertain trends. In Ghana, continuous annual surveillance of young pregnant women in 17 sites, mostly urban, shows little change in HIV prevalence among women age 15-24 during the past five years, ranging from 2.5% to 3.5%. In Haiti, the surveillance data indicate a decline in HIV prevalence among young pregnant women during 1999-2003 but not during 2003-2006. Cambodia documented a major decline among pregnant women since 1998, continuing to 2005 and possibly beyond.[32]

There are some data on HIV prevalence trends in urban higher-risk populations. Cambodia has monitored HIV prevalence among FSWs for more than a decade and the surveillance data indicated a continued decline during 2003-2006 from 21.4% to 12.7%. In 2005, surveillance included MSM for the first time in three locations. In Haiti, a survey among FSW showed a prevalence of 5%, but no reliable trend data are available. In Benin, FSWs in urban areas in six provinces (departments) are interviewed and tested every two years. HIV prevalence in 2006 was 25.5%, slightly lower than in 2004 (30.5%). In Ghana, a survey among FSWs ("roamers" and "seaters") in the two major cities found high prevalence, ranging from 24% to 52%. There are no reliable trend data, even though FSW surveys were also conducted in 2004, because of difficulties in comparing the samples over time.

Models were run for urban and rural populations in Benin, Burkina Faso, Ghana, DR Congo, and Haiti. In urban Benin and urban and rural Burkina Faso, HIV prevalence has declined, but there was limited evidence of changes in sexual behavior that could explain the change in HIV transmission. In Burkina Faso, the prevalence changes occurred in the second half of the 1990s. In urban Benin, there was some evidence of reduction in partners, which could partly explain the change in prevalence around 2000. The model estimated 76,620 infections averted. All other countries do not provide convincing evidence of changes in prevalence supported by behavioral trends.

CONCENTRATED EPIDEMICS

All four countries—Kyrgyzstan, Moldova, Peru, and Vietnam—are considered to have adult HIV prevalence rates of 0.5% or lower, based on the most recent UNAIDS/WHO estimates. Assessing trends in concentrated epidemics is difficult, as MARPS surveys are difficult to conduct in the same way over time because of the specific characteristics of the populations (e.g., mobility, marginalization). Also, estimation of the size of the at-risk population itself and bridge populations is

[32] Cambodia Ministry of Health, National Center for HIV/AIDS, Dermatology and STD (NCHADS). 2007: Report of a Consensus Workshop: HIV Estimates and Projections for Cambodia 2006-2012. Surveillance Unit, Phnom Penh, 25-29 June 2007. http://data.unaids.org/pub/Report/2008/cambodia_hiv_estimation_report_2006_en.pdf (accessed 23 March 2009).

critical but difficult. In general, there are very few examples of a decline in HIV transmission among risk populations on a large scale, and none of those are post 2004.

Kyrgyzstan has reported low prevalence among pregnant women, and, overall, the epidemic has remained at very low prevalence levels. In 2004, a study in the two largest cities showed that IDUs had the highest prevalence (6%), followed by prisoners (3%, often including IDUs), FSWs (1%), and STI patients (0.5%).

Moldova's epidemic has grown during 2001-2007, primarily driven by IDUs. Surveillance data in 2007 showed a median HIV prevalence of 17% among IDUs in 11 sites, 3% in FSWs in five locations and 5% in MSM (capital only). Trend data are only available for the capital city, where prevalence among FSWs declined and for MSM went up between 2004 and 2007. About 8,800 (range 6,000-15,000) people are estimated to be infected, corresponding to an adult HIV prevalence of about 0.4%.

In Peru, the focus of the epidemic is urban, where 80% of the population lives. National trends in HIV prevalence since 1996 show that prevalence has been between 0.1% and 0.3% among pregnant women age 15-24, with two-thirds of cases in Lima and with no major differences before and after 2004. Large surveys in 20 cities showed that HIV prevalence among women age 18-29 was 0.04% in 2002 and 0.15% in 2006; corresponding figures among young men were 0.4% and 0.5%, respectively. National HIV prevalence among MSM, the main drivers of the epidemic, in Lima was lower in 2006 than in 2002 (22% and 12%, respectively), but different study approaches may account for some of this difference. Generally, HIV prevalence among FSWs has been below 1% and remained at this level. A survey in 20 cities in 2005 shows 0.7% prevalence, 0.4% among more than 4,000 FSW in 2006.

In Vietnam, the main drivers of the epidemic are IDUs and, to a lesser extent, sex workers and possibly MSM. A risk population survey found the highest HIV prevalence among IDU (29%), followed by FSWs (4%), and a slightly higher prevalence among MSM who were sampled in just two cities (5% and 9%). Vietnam's HIV sentinel surveillance system suggests that HIV prevalence among pregnant women in 40 antenatal clinics has remained at about 0.3% during 2001-2007. HIV prevalence among male military recruits declined to 0.2% in 2006-2007, compared with 0.4% in 2003-2004 and 0.8% in 2001-2002. HIV prevalence among FSWs has remained at about 4-5% during 2001-2007, while prevalence among IDUs declined somewhat from just under 30% in 2003 to 20-25% during 2006-2007.

PMTCT and Infections Averted in Children

Using Spectrum and the country models, one can estimate the number of new infections averted in children by PMTCT. Spectrum estimates child infections by having an estimate of prevalence of pregnant women, transmission probabilities given PMTCT prophylaxis (none, short-course nevirapine, dual drug prophylaxis, or triple drug prophylaxis), and child feeding (exclusive breastfeeding, partial breastfeeding, replacement feeding, and length of breastfeeding). Countries provide data on the number of women's PMTCT interventions and their breastfeeding. For each combination of prophylaxis, feeding type, and length of breastfeeding, there is a probability of transmission of HIV from mother to child. To estimate the number of infections averted in children due to PMTCT, two models were run. One model has coverage of PMTCT for each year since 2000,

and the second has coverage of PMTCT set at zero. The difference in estimated new infections among children between the two models is the estimated number of infections averted due to PMTCT. Table 5.24 shows the estimated number of infections averted due to PMTCT in the 18 countries combined.

Table 5.24: Number of New Infections Averted Due to PMTCT and Percentage of all Child Infections Due to Mother-to-Child Transmission Averted in 18 Evaluation Study Countries

Year	Total New Infections	Number Averted	Percentage of New Infections Averted
2000	149,430	-	0.0
2001	151,652	31	0.0
2002	153,513	169	0.1
2003	154,274	386	0.3
2004	154,488	1,704	1.1
2005	153,394	3,803	2.5
2006	149,607	4,818	3.2
2007	146,841	6,184	4.2

There has been a clear increase in the number of HIV infections averted due to PMTCT programs, with a more rapid increase beginning in 2004. This increase is due primarily to an increase in coverage of PMTCT programs but also to a switch to more effective dual drug prophylaxis in some countries.

While the overall percentage of new child infections that are averted with PMTCT programs is rather small, one must keep in mind that short-course nevirapine prophylaxis only reduces the probability of transmission by about 30% when there is mixed feeding and about 40% when mothers exclusively breastfeed. Therefore, even PMTCT coverage of 100% would only reduce new infections by 30% to 40%. Another important explanatory factor is that the coverage of PMTCT interventions has been very low until recently and has only increased rapidly in the most recent period. Consider, for example, this stepwise analysis: in 14 countries with generalized epidemics, there is a strong correlation between total (external) HIV investments between 2003 and 2006 and the number of PMTCT sites in 2006 ($r = 0.73$). However, the relationship is only moderately strong for HIV investments and the percentage of pregnant women counseled and tested ($r = 0.37$), and virtually no association exists between investments and the percentage of HIV-positive pregnant women receiving ARV prophylaxis. Hence, the effects of increased investments have resulted in more outputs (number of sites) but a lesser effect in increasing national PMTCT coverage. A district-level analysis provides a more sensitive approach to detecting the effects of scaling up services since scale up will vary across subnational areas, especially in the early stages (see Section 5.7, Analysis of DCA Results).

5.10 Mortality

Improving health outcomes and reducing mortality are major goals of the scaling-up response against AIDS. Mortality due to HIV/AIDS may be reduced in the long run by preventing new infections, but it will take years before this will be measurable. Treatment programs, however, can have an almost immediate effect and extend lives. This section first assesses the evidence on the extent to which ART programs affect survival of people living with HIV. Then, the effects on population levels of AIDS mortality are reviewed and modeled, focusing on life-years gained.

ARV Treatment Outcomes

Research studies have provided a general pattern of the characteristics and effects of antiretroviral therapy. A predominant feature is that large proportions of patients initiate treatment with very low CD4 cell counts, leading to high mortality in the first three to six months. This proportion tends to fall as the program matures but is a major factor in mortality.[33] In general, research studies show favorable results in terms of extended survival and improved viral loads, on par with better resourced settings.[34] The challenge, therefore, lies less with the feasibility of treating patients in resource-limited environments and more with programmatic capacity to diagnose, treat, retain, and follow-up patients in the face of rapid expansion.

The quality of data on treatment outcomes is a concern. High levels of loss to follow-up affect the reliability of data on mortality and other outcomes. A review of research studies showed that, on average, ART programs in Africa have retained about 60% of their patients after two years, and loss to follow-up is the main reason for attrition, followed by death.[35] Poor documentation of patient information affects the quality of data generated by the program. In a follow-up study of defaulters in Jimma, Ethiopia, 62% of 355 patients on ART could not be traced because of an incorrect address noted in the treatment register.[36] Those who could be traced at home were found to be more likely to have other risk factors, such as substance abuse, being bedridden, and living far away. This suggests that missing data on patients introduces a potential selection bias, as defaulters are likely to have higher mortality risks than patients who adhere. A similar study in four clinics in Malawi had similar problems with tracing defaulters because of inaccurate addresses in the registers.[37] Among the 253 patients who had not attended the facility for three months or more, 27% could not be traced, mostly because of an incorrect address in the register. Half of those who could be traced had died, and most deaths (58%) occurred within three months of their last visit. Recent research in Zambia suggests that the widespread shortage of health care workers confronted with a rapidly increasing ART patient load is an important factor in low adherence rates. Up-to-date training and deployment of community volunteers improved follow-up rates dramatically in one study.[38] Maintaining consistently high data quality with volunteer programs is, however, a major challenge.

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[33] Mortality in the first three to six months tends to be high among those with very low CD4 cell counts at the start of treatment. For instance, in South Africa mortality at six months fell from 12.7% to 6.6% when the proportion of people starting with CD4 cell counts below 50 cells/ul was reduced from 51% in 2001 to 22% in 2005. Early loss to follow-up appears to become increasingly common when programs are scaling up, which was thought to be associated with reduced ability to trace defaulters. Other factors that affected retention of patients were users fees and advanced immunodeficiency at baseline, most likely associated with premature death. Brinkhof MWG et al. 2008. Analysis of the increasing problem of early loss of patients on antiretroviral treatment programs. Bull WHO 86(7): 559-567. Boulle, A., P. Bock, M. Osler, et al. 2008. Antiretroviral therapy and early mortality in South Africa. Bull WHO 86: 678-687.

[34] Boulle, A., and N. Ford. 2007. Scaling-up antiretroviral therapy in developing countries: What are the benefits and challenges? Sexually Transmitted Infections 83: 503-505.

[35] Rosen, S., P. Fox, and C. Gill. 2007. Patient retention in antiretroviral therapy programs in sub-Saharan Africa: A systematic review. PLoS Med 4: 1-11 doi: 10.1371/journal.pmed.0040001.

[36] Deribe, K., F. Hailekiros, S. Biadgilign, et al. 2008. Defaulters from antiretroviral treatment in Jimma University specialized hospital, Southwest Ethiopia. Trop Med Int Health 13: 328-333.

37 Yu, J.K., S.C. Chen, K.Y. Wang, et al. 2007. True outcome for patients on antiretroviral therapy who are "lost to follow-up" in Malawi. Bull WHO 85: 550-554.

[38] Torpey, K.E., M.E. Kabaso, L.N. Mutale, M.K. Kamanga, A.J. Mwango, J. Simpungwe, C. Suzuki, and Y.D. Mukadi. 2008. Adherence support workers: A way to address human resource constraints in antiretroviral treatment programs in the public health setting in Zambia. PLoS ONE 3(5): e2204.

Evaluation countries were asked to report on nationally reported treatment outcomes of ART patients or special studies that gave an indication of levels of loss to follow-up, deaths, treatment changes, transfers, etc. In addition, an in-depth protocol was introduced as part of the DCA, where a sample of patients was to be selected from ARV clinics in the selected districts, and individual-level retrospective information on these patients was recorded at six-month intervals.

The ART monitoring systems have been developing rapidly using a variety of recording and reporting systems within countries. There has been much focus on the monitoring of the number of users but less so on the outcome of treatment. By 2007, no country had a comprehensive system in place that allows routine cohort analysis of individual records, which is necessary to obtain reliable estimates of survival, other health outcomes, loss to follow-up, and drug regimen use. Some of these data are currently obtained by aggregate reporting by ART clinics on a quarterly or biannual basis. Other countries have conducted special studies in which individual information is collected from a sample of clinics and used for a cohort analysis.

The weaknesses of the current country reporting systems can be deducted from the analysis of reported results. Treatment outcome data presented by countries have to be interpreted cautiously, as there is often no home-based follow-up system in place, and it is often not clear how the survival rates have been computed (e.g., whether loss to follow-up has been included and how). Changes over time may be related to data quality of genuine developments in treatment results. Overall, country data indicate that about 80% of ART patients are still alive and on treatment after 12 months: 5-15% have died, 5-15% are lost to follow-up, a smaller proportion transferred, and a very small proportion reported as having stopped.

- In Zambia, electronic records from a subset of clinics managed by a PEPFAR-supported NGO also showed the ability to produce treatment outcome data from large numbers of individual patient records.[39] A research center (Center for Infectious Disease Research Zambia) maintains the large longitudinal database of individual electronic records. Unfortunately, the data are not publicly accessible for further analysis, and there is no regular reporting system for country program monitoring. The overall reported survival rate in 2007, based on data from 52 sites in four provinces, was 88% for adults after 12 months (with little difference between men and women) and 92% for children. These figures were about the same in 2006.
- In Lesotho, among 8,005 patients who had continuous ART for 12 months in 2007, 2% stopped, 10% died, and 14% were lost to follow-up; 74% were alive and still on treatment.
- The Malawi quarterly reporting system is complete (data are collected by actual visits to all facilities) and provides estimates of treatment outcomes and adherence. In Malawi, of 146,856 patients who ever started on free ART by the end of December 2007, 69% were alive and on ART at the site of registration, 11% had died, 10% were lost to follow-up, 10% had transferred out to another facility (and were presumably alive), and less than 1% had stopped treatment. The general picture since the start of the ART service has remained largely the same except for those who transferred out, which have increased over time. This is expected; as more ART sites are opened, people move to access ART at sites closer to their homes. The Malawi data have also been used to assess survival on treatment among specific occupational groups. Among military

[39] Stringer, J.S.A., et al. 2006. Rapid scale-up of antiretroviral therapy at primary care sites in Zambia. Journal of the American Medical Association 296(7): 296.

personnel, using data from ART clinics in the public and private sector in Malawi, the probability of being alive on ART at 6, 12, and 18 months was 90%, 83%, and 79%, respectively.[40] A similar study among teachers showed that 84% were still alive at 12 months and 73% at 24 months.[41]

- The Rwanda TRAC follow-up study in 71 clinics provides data on treatment retention. Overall, 92% were still on treatment after six months and 87% after one year.[42] The proportion who died was nearly 5% after one year, and most of that number died during the first half-year on treatment. As time progresses, it is likely that loss to follow-up becomes a larger issue, amounting to 5% after one year (see Figure 5.20). The third most common reason for attrition is transferring out, which is likely to become more common as more clinics become available. Analysis for children showed similar treatment outcomes. The Rwanda TRAC study also assessed progress in other health indicators. Values were missing for as much as half of all patients. Body weight increased by three kilograms in the first six months for both sexes but not much in the second half of the first year on treatment (one kilogram for women, none for men). CD4+ cell counts increased by 98 from a baseline of 141 in the first six months, and by 119 in the first 12 months.

Figure 5.20
ART Attrition at Six and 12 Months after Initiation of Treatment, 2004-2005

Source: Rwanda TRAC Study, Cohort 2004-2005

- Haiti conducted a follow-up study of 1,340 patients in nine locations in late 2007. The study reported the ratio of number of events (loss to follow-up, deaths) to the number of people on treatment by the end of the year. In 2007, the ratios were 8% for loss to follow-up and 14% for mortality.
- Ghana's ART data by the end of 2006 indicate that annual mortality rates were only 2.6%, and loss to follow-up was reported to be only 0.9%.[43] These figures are unlikely low compared with all

[40] Banda, A.C., S.D. Makomba, A. Jahn, et al. 2008. Antiretroviral therapy in the Malawi defense force: Access, treatment outcomes and impact on mortality. PLoS ONE 3(19): e1445.
[41] Makombe, S.D., A. Jahn, H. Tweya, et al. 2007 A national survey of teachers on antiretroviral therapy in Malawi: Access, retention in therapy and survival. PLoS ONE 2(7): e620.
[42] Treatment and AIDS Research Centre (TRAC). Report on the evaluation of clinical and immunological outcomes from the national antiretroviral treatment program in Rwanda, 2004-05.
[43] Estimated from the annual data on people on treatment, dying, and lost to follow-up for 2004, 2005, and 2006, assuming that on average people start treatment at two-thirds into each year, resulting in 7,775 person-years on ART with 208 deaths and 69 people lost to follow-up.

other countries. Annual loss to follow-up among ART patients has been below 5% since the beginning of the program.

- In Cambodia, a study of a cohort of 3,422 patients on ART from seven clinics showed that the loss to follow-up was 12.4% after 12 months and 87% were still alive after 12 months (excluding those who were transferred).
- In Peru, a record review with cohort analysis shows good data quality. A detailed analysis of 2,129 patient records was conducted as part of the evaluation study. Data were abstracted for randomly selected patients from patient registers in 19 clinics in five cities that received Global Fund and Ministry of Health financial support. Key findings showed that the national monitoring system provides accurate data on many aspects of the program but that individual record reviews are necessary to obtain new insights and better accuracy:
  - Sixty-nine percent were men with a median age at treatment initiation of 34 years.
  - The intensity of clinical and laboratory procedures tend to diminish as people are longer on treatment: for instance, 98% received a CD4 cell count at the start, 79% at six months, and 65% at 12 months. Similar trends are observed for viral load testing and monitoring body weight.
  - Cohort analysis showed a rapid increase in CD4 cell count and a decrease in viral load, especially during the first six months, with continued improvements to 18 months after initiation.
  - Survival analysis showed that about 90% survived at 12 months but that survival in Lima and the neighboring harbor of Callao was better than in the three provinces (about 93% and 84%, respectively).
- In Vietnam, a review of data from eight ART sites showed that 81% of adults and 93% of children were still alive and on treatment after one year.

POPULATION MORTALITY

There are very limited cause-specific mortality data from the 18 countries. Only Moldova and Kyrgyzstan have a fully or partially functioning vital registration system, and AIDS is a relatively rare cause of mortality in these countries. There are no recent verbal autopsy studies that can provide information on the trend in AIDS mortality in the last few years.

Since HIV/AIDS is associated with more than one-third of all deaths in adults age 15-49 in countries with severe epidemics, levels of young adult mortality obtained from sibling survival modules in household surveys could be used to assess trends in AIDS mortality over time.[44] Malawi had two recent surveys with an adult mortality module (2000 and 2004, and MICS in 2006), but since it concerns retrospective data, the best trend estimate can only be obtained for a period well before 2006.

Demographic surveillance sites generally have complete data on mortality, and many collect data on causes of death through verbal autopsy. In theory, these data could be used to monitor the impact of

[44] Blacker, J. 2004. The impact of AIDS on adult mortality: Evidence from national and regional statistics. AIDS 18(Suppl. 2): S19-S26.

the interventions on AIDS and other mortality. A major challenge is the long period that it takes to generate and publish the data from these research sites. For instance, the demographic surveillance site of Navrongo in the northern part of Ghana has provided cause-of-death statistics for 2003 based on verbal autopsy. HIV/AIDS was the leading cause of death among adults age 15-59, accounting for 29% of deaths for 2004, but no data are available to ascertain recent trends. The accuracy of verbal autopsy as a tool to determine the probable cause of death is also a challenge for the assessment of trends.

Some sites not only collect demographic information but also conduct epidemiological studies with HIV testing in the study population. Data from such studies are more reliable in terms of determining the cause of death.[45] A longitudinal community study in northern Malawi showed that, eight months after a clinic that provided antiretroviral therapy was opened and about one-third of adults from the study population had accessed treatment, overall mortality in adults had decreased by 10% and by 35% among adults near the main road, where mortality before antiretroviral therapy was highest.[46]

Modeling can be used to estimate the number of AIDS deaths based on the AIDS prevalence and various assumptions, including survival time. The number of deaths in 2007 is most affected by the course of the epidemic in the past 15 years or so and more recently by the uptake of treatment. In 2007, UNAIDS and WHO produced estimates for 2001 and 2007. In seven of the 18 countries, the number of deaths due to AIDS was lower in 2007 than in 2001, but in only three the decline was significant in the sense that the uncertainty ranges around the estimates were not overlapping. These were Cambodia (from 14,000 to 6,900), Rwanda (from 22,000 to 7,800), and Zambia (from 78,000 to 56,000).

Modeling the Impact of Scale up of ART

The number of people on ART in low- and middle-income countries has increased rapidly to nearly 3 million by the end of 2007, with significant contributions of the international community led by the multilateral financing through the Global Fund mechanism and by PEPFAR. The number of deaths averted—people who are still alive today because of treatment—can be estimated from a model that has treatment coverage, survival rates on treatment, and mortality without treatment as key inputs. As ART is not a cure and mortality risks among HIV-infected people tend to be higher than for uninfected people of the same age, it is more appropriate to estimate the number of years of life gained.

The number of life-years added due to ART for those on therapy can be estimated using the national epidemic models for the 14 countries with adult prevalence at or above 1%. These models have been developed by national programs working in conjunction with UNAIDS and WHO using the Spectrum AIM module. This software uses adult prevalence, data, and assumptions on variables such as progression from infection (both with and without treatment), effects of HIV on fertility, and the transmission of HIV from mothers to their children to produce estimates of AIDS deaths.

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[45] One such site in Magu district in Tanzania, run by the National Institute for Medical Research, is partly funded by the Global Fund to study the implementation and impact of ART programs in a rural population under continuous surveillance since 1994.

[46] Jahn, A., S. Floyd, A.C. Crampin, et al. 2008. Population-level effect of HIV on adult mortality and early evidence of reversal after introduction of antiretroviral therapy in Malawi. Lancet 371(9624): 1603-1611.

The methods and assumptions in this model have been developed based on the inputs of the UNAIDS Reference Group on Estimates, Modeling and Projections. The methods and assumptions are well documented, and details can be found in a series of special issues in the journal Sexually Transmitted Infections.[47]

Using these models, one can estimate the number of additional adult years of life gained due to the use of ART. We use this measure, instead of deaths averted, as many people on treatment may eventually die of AIDS, so estimates of deaths averted is not appropriate. However, we can calculate the number of years that will be added to life for those on treatment. Table 5.25 shows the estimated numbers of life-years gained for each of the countries.

Table 5.25: Adult Life Years Added Due to ART, by Country

	2001	2002	2003	2004	2005	2006	2007	Total
Benin	21	61	189	527	1,347	2,785	4,363	9,293
Burkina Faso	70	185	513	1,118	2,889	5,493	8,207	18,475
Burundi	210	433	719	1,419	2,172	3,777	5,563	14,293
Cambodia	-	-	596	2,336	6,365	11,661	17,313	38,271
DR Congo	-	130	386	916	2,327	6,106	11,411	21,276
Ethiopia	-	-	724	2,865	7,226	19,131	36,171	66,117
Ghana	-	-	49	542	1,442	3,706	6,313	12,052
Haiti	-	-	359	929	2,086	3,416	4,793	11,583
Lesotho	-	-	-	104	1,078	5,151	8,740	15,073
Malawi	-	-	725	3,380	10,153	26,569	37,557	78,384
Mozambique	-	343	757	2,236	6,327	14,160	31,723	55,546
Rwanda	-	243	1,294	3,196	6,918	13,779	21,345	46,775
Tanzania	-	-	-	797	6,432	19,761	48,462	75,452
Zambia	-	-	296	5,475	15,658	31,742	60,677	113,848
Total	301	1,395	6,607	25,840	72,420	167,237	302,638	576,438

As can be seen in the table above, scale up of ART and resulting life-years gained have increased dramatically from 2001 through 2007. This increase is due to both the number of people newly being placed on ART in these countries as well as the cumulative effects of survival for the people who started earlier on treatment. Overall, ART for adults has resulted in more than 550,000 life-years gained during the period 2001 to 2007 in the 14 countries with generalized epidemics participating in the study.

5.11 Conclusions

Dramatic increases in external HIV funding have occurred during 2003-2006 in the 18 countries, with PEPFAR (28%) and the Global Fund (18%) as the largest single donors, and the balance of external funds from multilateral, bilateral, and international NGOs. There are, however, major differences in external funding levels between countries with similar epidemics that need more attention. External HIV funding presents a significant share of health funding in countries and is larger in countries with higher HIV prevalence and those with lower national health budgets. In six

[47] Ward, H., N. Walker, and P.D. Ghys (eds.). 2004. Methods and tools for HIV/AIDS estimates and projections. Special issue of Sexually Transmitted Infections 80(Suppl. 1).
See Ghys, P., N. Walker, H. Ward, and R. Miller (eds). 2006. Improved methods and tools for HIV/AIDS estimates and projections. Special issue of Sexually Transmitted Infections 82(Suppl. 3).
See Ghys, P.D., N. Walker, W. McFarland, R. Miller, and G.P. Garnett (eds.). 2008. Improved data, methods and tools for the 2007 HIV and AIDS estimates and projections. Special Issue of Sexually Transmitted Infections 84(Suppl. 1): 1-96.

countries, HIV external funding comprised more than one-fifth of the total health funding for 2003-2006, including the three eastern and three of the four southern African countries.

There is consistent evidence that increased funding has resulted in a rapid and significant increase of the number of sites delivering HIV interventions in all evaluation countries since 2003-2004. The district assessment confirmed the scale up of HIV services in health facilities. In general, the readiness of facilities to deliver services—mostly public sector—is fairly adequate in terms of trained staff, guidelines availability, diagnostic tests, and drug availability.

Based on household surveys and clinical reports, HIV service coverage rates also increased rapidly in all countries. HTC services utilization among adults has at least doubled since 2004 in most countries. A similar increase has occurred in HTC of pregnant women for PMTCT. Data on coverage of ARV prophylaxis among HIV-positive pregnant women were considered incomplete in most countries. ART numbers and coverage rates have increased rapidly in almost all countries. The district-level analysis showed the positive relationship between service availability and service coverage (for testing and counseling in the general population and among pregnant women).

The wide array of other interventions aimed at prevention or care and support was assessed through record reviews and community surveys in selected countries. The effects of the large numbers of civil society organizations and multisectoral activities are difficult to gauge, even in terms of intervention quality and coverage. Population trends in risk behaviors could result from a wide array of such interventions. Based on household surveys, there is consistent evidence of modest improvements in a decrease in higher-risk sexual behavior in the countries with two surveys within the last decade, some of that before scaling up.

Interventions for MARPS have been a funding priority in countries with concentrated epidemics and, to a much lesser extent, in countries with generalized epidemics. There are no reliable trend data available for MARPS, and so it is difficult to ascertain national trends in access to services, coverage of interventions, and HIV transmission for these populations. There are, however, reports of successful interventions in several evaluation countries, particularly related to an increase in reported condom use and in safe needle use by MARPS.

For countries reporting treatment outcomes since 2004, most results suggest good follow-up rates in the first year. Survival rates are only available from special follow-up studies, which generally show relatively high early mortality but overall good survival rates. Although most countries reported percentage loss to follow-up and deaths to be less than 8% in the first 12 months, it is possible that this is too optimistic a scenario and does not properly reflect the magnitude of missing data or the omission of early deaths due to delayed initiation of treatment.

There were only a few countries with recent data on HIV prevalence, either from surveillance or from household surveys. Of those countries, Malawi showed a decline since 2003 that continued through 2007. Tanzania surveys presented evidence of a decline in HIV incidence since 2003, supported by surveillance data. Also, Zambia, after taking the large number of people on ART into account, may have experienced a modest decline in HIV incidence during 2002-2007. Mathematical modeling using HIV prevalence and sexual behavior indicator trend data indicated that an additional three countries experienced declines (Ethiopia, Benin, and Rwanda), but mostly prior to scaling up. The

number of infections averted due to mother-to-child transmission is still small because coverage and efficacy of the intervention have been low until recently.

The most dramatic effect of scaling up has been the large number of life-years added through ARV treatment. The evidence of the link between scaling up and prevention success is still fairly limited but can be examined better in the coming years when more data become available and interventions expand their reach.

CHAPTER 5—ANNEXES

ANNEX 5.1: READINESS CRITERIA FOR SPECIFIC HIV SERVICES

Table 5.1.A: Readiness Criteria for HIV Testing and Counseling, Countries with DCA Facility Census, 2008

	Burkina Faso	Cambodia	Haiti	Zambia
Percentage of all health facilities offering HTC	26.3	16.9	41.4	61.2
Trained Staff/Guidelines (%)				
HIV/AIDS counseling and testing	91.8/84.3	62.9/57.6	66.3/46.7	80.0/83.3
HIV/AIDS counseling only	52.1/86.8	60.0/57.6	64.0/439.9	65.2/76.1
HIV/AIDS testing incl. rapid testing	84.2/78.9	40.0/31.3	74.4/50.7	81.5/83.7
Diagnostic Support (%)				
Rapid tests	79.5	45.7	90.8	89.9
ELISA reader/scanner	7.5	28.6	2.3	6.8
Either	79.5	51.4	90.8	89.9
Number of facilities with HTC	146	35	87	207

Source: DCA Facility Census 2008

Table 5.1.B: Readiness Criteria for Antiretroviral Therapy, Countries with DCA Facility Census, 2008

	Burkina Faso	Cambodia	Haiti	Zambia
Percentage of all health facilities offering ART	5.4	6.8	17.1	37.9
Trained Staff/Guidelines (%)				
TB/HIV co-infection	65.5/90.0	42.9/53.8	63.9/55.6	63.8/67.0
Opportunistic infections	79.3/87.5	64.3/61.5	75.0/40.7	77.0/84.8
Drugs (a) (%)				
AZT, ZDV	63.3	100	80.6	78.4
ABC	13.3	33.3	33.3	49.6
EFV (200 or 600)	63.3	100	26.5	81.6
3TC	63.3	100	83.3	69.6
NVP	76.7	100	77.8	87.2
D4T (40 or 30)	66.7	100	91.7	52.8
DDI (b)	26.7	50	72.2	34.7
Diagnostic Support (%)				
CD4 machine	33.3	7.1	52.8	21.3
Number of facilities with ART	30	14	36	128

(a) Several of the main drugs in WHO-recommended first-line treatment combinations
(b) Key drug in WHO-recommended second-line regimens
Note: WHO-recommended drugs are defined in: WHO. 2006 revision. ART for HIV infection in adults and adolescents: Recommendations for a public health approach.
Source: DCA Facility Census 2008

Table 5.1C: Readiness Criteria for PMTCT, Countries with DCA Facility Census, 2008

	Burkina Faso	Cambodia	Haiti	Zambia
Percentage of all health facilities offering PMTCT	17.5	7.7	24.3	47.7
Staff/Guidelines (%)				
PMTCT	91.7/94.4	62.5/46.7	82.4/68.3	89.0/90.9
AZT or NVP	84.0	100.0	94.4	97.9
Number of facilities with PMTCT	97	16	51	158

Source: DCA Facility Census 2008

ANNEX 5.2: COVERAGE INFORMATION FOR SELECTED HIV INDICATORS

Table 5.2.A: Percentage with a Comprehensive Knowledge about AIDS, by Selected Background Characteristics, Countries with DCA Household Survey, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women	9,133	7,457	6,024	na
Education				
No education	7.9	4.6	19.1	
Primary	24.1	13.6	24.3	
Secondary+	55.5	25.6	38.9	
Wealth index				
Lowest	5.3	3.8	18.5	
Second	10.4	5.3	22.1	
Middle	35.6	10.8	22.9	
Fourth	.	17.5	28.1	
Highest	.	21.9	36.1	
Residence				
Urban	28.4	17.7	33.3	
Rural	6.8	6.6	24.0	
Total	15.5	12.5	28.5	

* Unweighted sample of households/women
na = not available
Source: DCA Household Surveys 2008

Table 5.2.B: Percentage who Received Results from Last HIV Test Taken in the Past 12 Months, by Selected Background Characteristics, Countries with DCA Household Survey, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women	9,133	7,457	6,024	4,815
Education				
No education	3.6	7	8.1	21.8
Primary	14.3	15.1	14.3	27.4
Secondary+	25.1	27.5	24.5	32.6
Wealth index				
Lowest	2.3	4.2	6.2	26.7
Second	4.8	7.3	11.1	31.3
Middle	17.8	12.1	12.8	28.1
Fourth	.	22.1	20.0	31.9
Highest	.	23.8	20.1	26.9
Residence				
Urban	14.7	21.1	21.7	28.3
Rural	2.6	7.0	12.1	30.1
Total	7.5	14.4	16.7	29.4

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 5.2.C: Percentage of Women who Gave Birth in the Last Two Years who Were Counseled, who Were Offered and Accepted an HIV Test, and who Received Results, by Selected Background Characteristics, Countries with DCA Household Survey, 2008

	Burkina Faso	Ethiopia	Haiti	Zambi
Number of women who gave birth in the last two years	3,117	1,450	1,678	1,599
Education				
No education	7.3	4.3	10.8	24.9
Primary	21.2	8.8	20.7	30.0
Secondary+	38.3	19.4	35.9	44.6
Wealth index				
Lowest	2.4	1.2	7.7	28.5
Second	7.5	2.6	16.9	33.4
Middle	35.9	5.3	16.7	30.6
Fourth	.	16.7	27.3	35.1
Highest	.	23.9	32.4	49.3
Residence				
Urban	27.4	16.8	28.3	32.3
Rural	3.4	2.0	18.4	36.2
Total	10.5	7.7	22.1	34.6

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 5.2.D: Percentage of Youth 15-24 who Have Been Tested for HIV and Received Results in the Past 12 Months, by Selected Background Characteristics, Countries with DCA Household Survey, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women age 15-24	2,470	1,043	1,641	1,198
Education				
No education	5.3	8.3	5.9	18.3
Primary	15.1	18.0	17.7	35.7
Secondary+	29.2	37.2	30.4	46.4
Wealth index				
Lowest	3.3	3.6	13.4	37.2
Second	5.7	8.4	15.6	41.3
Middle	25.5	19	17.3	34
Fourth	.	26.9	28.5	42.4
Highest	.	37.7	24.2	37.6
Residence				
Urban	20.7	29.4	25.5	34.7
Rural	3.6	8.1	19.3	41.4
Total	10.5	17.8	22.6	38.7

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

ANNEX 5.3: DESCRIPTION OF THE MATHEMATICAL SIMULATION MODEL

Estimating the effects of behavioral change on HIV transmission

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August 2008

Following on previous work (1-3), the present model represents the heterosexual spread of HIV in a sex and sexual activity stratified population. The model is described in the following four sections: (i) Differential equations; (ii) Calculating the force of infection; (iii) Changes in sexual behaviour parameters, and (iv) Model outputs.

(i) Differential equations

The model is defined by a set of ordinary differential equations which are solved numerically using custom-made software developed by the authors. The state variables are given by $X^{s}_{k,l}$: *s* is the infection-status (1= susceptible; 2= acute infection; 3,4,5= latent infection; 6= pre-AIDS; 7= AIDS; 8=pre-AIDS and will receive antiretroviral therapy (ART), 9= on ART), *k* is sex (1= female; 2= male) and *l* is the sexual activity risk group (1= (highest risk), 2 and 3= (lowest risk)). Sexual activity group 1 represents those with high numbers of casual partners; group 2 represents those with long-term casual partners; and, 3 represents those with in stable spousal partnerships. Groups 1 and 2 together are classified as the 'higher risk groups'.

The ordinary differential equations describing changes in the state variable over time are as follows, and the course of HIV infection is illustrated in Figure 1 in the main text.

Latent infection is split into three compartments so that the overall distribution of survival from HIV infection to death in the absence of treatment approximates a gamma distribution, which is indicated by the available data from resource-poor settings (Figure S1).

$$\frac{dX^{1}_{k,l}}{dt} = \frac{(\mu+\alpha)}{2}\phi_{k,l}X^{\bullet}_{\bullet,\bullet} - \lambda_{1,l}X^{1}_{1,l} - \mu X^{1}_{1,l}$$

$$\frac{dX^{2}_{k,l}}{dt} = \lambda_{k,l}X^{1}_{k,l} - (\mu+\sigma_2)X^{2}_{k,l}$$

$$\frac{dX^{s}_{k,l}}{dt} = \sigma_{s-1}X^{s-1}_{k,l} - (\mu+\sigma_s)X^{s}_{k,l} \quad \}\text{s} = 3,4,5$$

$$\frac{dX^{6}_{k,l}}{dt} = (1-a(t))\sigma_5 X^{5}_{k,l} - (\mu+\sigma_6)X^{6}_{k,l}$$

$$\frac{dX^{7}_{k,l}}{dt} = \sigma_6 X^{6}_{k,l} - (\mu+\sigma_7)X^{7}_{k,l}$$

$$\frac{dX^{8}_{k,l}}{dt} = a(t)\sigma_5 X^{5}_{k,l} - (\mu+\sigma_8)X^{8}_{k,l}$$

$$\frac{dX^{9}_{k,l}}{dt} = \sigma_8 X^{8}_{k,l} - (\mu+\sigma_9)X^{9}_{k,l}$$

Here, the rate of individuals ceasing sexual activity is μ (mean duration sexually active $1/\mu$); in the absence of AIDS, the population grows exponentially at a rate α; the fraction of men and women starting sexual activity in each sexual activity group is $\phi_{k,l}$ (such that $\phi_{k,\bullet} = 1$); the force of infection for individuals in each sex and sexual activity group is $\lambda_{k,l}$, which is defined below.

The fraction of individuals progressing to pre-AIDS that will start treatment is given by $a(t)$, and this changes over time in the following way:

$$a(t) = \max[0, \min(a_{\max}, a_{rate}(t - a_{start}))]$$

where, $a_{\max}$ is the maximum level of coverage achieved, a_{start} is the time in the simulation when ART coverage starts to increase and a_{rate} is the increase in coverage.

In the model, it can be assumed that individuals do not change sexual activity group during their lifetime and that the proportion of individuals entering each group is constant over time (this assumption is labelled *'no replacement'*). Over the course of HIV epidemics, some sexual activity groups may suffer greater AIDS-related mortality than others, leading to changes in the overall distribution of risk in the population. The model can counteract that change and allow individuals to move between groups in such a way that the fraction of adult men and women in each risk-group remains constant over time (this assumption is labelled *'with replacement'*). The replacement of individuals in the higher risk groups is simulated in the following way:

for $l = 1,2$:

$$G_{k,l} = \phi_{k,l} X^{\bullet}_{k,\bullet} - X^{\bullet}_{k,l}$$

$$H^{s}_{k,l} = G_{1,l} \frac{X^{s}_{1,l+1}}{X^{\bullet}_{1,l+1}}$$

$$X^{s}_{k,l} \rightarrow X^{s}_{k,l} + H^{s}_{k,l}$$

$$X^{s}_{k,l+1} \rightarrow X^{s}_{k,l+1} + H^{s}_{k,l}$$

This adjustment is made first for $l = 1$ and then for $l = 2$. $G_{k,l}$ Since differential loss will always be grater from group 1 compared to 2 and 3, and group 2 compared to group 3, $G_{k,l}$ is always positive.

(ii) Calculating the force of infection

The force of infection is calculated on the basis of the rate at which individuals change sexual partner, HIV prevalence among their sexual partners, the number of sex acts in each partnerships and the use of condoms.

Individuals in each sex and sexual activity group form partnerships at a set rate: $c_{k,l}$, which is parameterised by a mean rate of partner change for that gender ($\bar{c}_k(t)$) and two parameters that give the relative partner change rate for those in the highest ($\varpi_{k,1}$) and next-highest ($\varpi_{k,2}$) risk groups relative to those in the lowest risk group (so that $\varpi_{k,3} = 1$). The partner change rates for each group are thus calculated as:

$$c_{k,l} = \varpi_{k,l} \frac{\bar{c}_k}{\sum_l \phi_{k,l} \varpi_{k,l}}$$

$W_{k,l}$ is the total number of sexual partnership offered by individuals in that gender and sexual activity group:

$$W_{k,l} = c_{k,l} \sum_s X^{s}_{k,l}$$

Men and women form partnerships so that a fraction, ε, of their partnerships are directed only to those in those of the opposite gender in the corresponding sexual activity group. The rest are distributed randomly among those of the opposite gender, according to the number of partnerships available. For men and women, $\rho_{k,l,l'}$ is the fraction of partnerships that individuals in the k^{th} gender and l^{th} activity-group form with individuals of the opposite gender in the l'^{th} activity group (the prime denotes that the index relates to those of the opposite gender).

$$\rho_{k,l,l'} = \varepsilon \delta_{l,l'} + (1-\varepsilon) \frac{W_{k,l'}}{\sum_{l'} W_{k',l'}}$$

Here, $\delta_{i,j}$ is the Kronecker delta: $\delta_{ij} = \begin{cases} 1, & \text{if } i = j \\ 0, & \text{if } i \neq j \end{cases}$

To ensure that the total number of partnerships formed by men and women are consistent, the following correction is made:

$$D_{a,b} = \frac{W_{2,l} c_{2,l} \rho_{2,l,l'}}{W_{1,l} c_{1,l} \rho_{1,l',l}}$$

$$\rho_{2,l,l'} \rightarrow \rho_{2,l,l'} \left(D_{a,b}\right)^{\theta-1}$$

$$\rho_{1,l',l} \rightarrow \rho_{1,l',l} \left(D_{a,b}\right)^{\theta}$$

In this way, θ determines the extent to which the pattern of partnership formation is determined by the parameters estimated from men's reported sexual behaviour.

In partnerships between individuals in sexual activity groups l and l', the number of sex acts and the level of condom use is determined by whether the partnership is classified as 'regular' or 'casual'. If the partnership is formed among individuals from the two riskiest groups, it is classified as 'casual', otherwise it is classified 'regular'. Let L denote whether a type of partnership is casual or regular, so that:

$$L = \begin{cases} 1, \max(l, l') < 3 \\ 2, otherwise \end{cases}$$

The number of sex acts in casual and regular partnerships is, respectively, n_1 and n_2; the fraction of sex acts in which condom are used in casual and regular partnerships is, respectively, q_1 and q_2

The force of infection is calculated as:

$$\lambda_{k,l} = c_{k,l} \sum_{l'} \left(\rho_{k,l,l'} \left(1 - (1 - p_{k',l'})^{(1-q_L)n_L}\right)\right)$$

Here, $p_{k',l'}$ is the average chance of transmission per sex-act in sexual partnerships formed with individuals of that sex and sexual activity group. It depends on the prevalence and the stage of infection of those in that group in the following way:

$$p_{k',l'} = \frac{\sum_{s=1}^{9} \beta_{k',s} X^{s}_{k',l'}}{X^{\bullet}_{k',l'}}$$

The chance of transmission per sex acts from individuals of sex k in disease state s ($\beta_{k,s}$) is specified with three parameters: the average rate of transmission from individuals with latent infection, averaged across men and women (β); the relative rates of transmission for each stage of disease relative to latent infection (κ_s); and, the relative chance transmission from females versus transmission from males (π_1: $\pi_2 = 1$, by definition). The values for κ_s are estimated using observational data from rural Rakai. However, it has been shown that the

assumed rate of transmission from individuals with pre-AIDS and AIDS has a large influence of the size of declines in HIV prevalence (4). Since the there remains uncertainty in the extent to which the rate of transmission increases as symptoms develop and because this may be associated with decreases in coital frequency or the rate of forming new partnerships, an additional parameter is introduced, h, which allows the relative rate of transmission from pre-AIDS and AIDS individuals to be adjusted independently of rate of the transmission at other stages.

$$\beta_{k,s} = \pi_k \kappa_s \left(\beta \frac{2}{1+\pi_k} \right) \quad s = 1,2,3,4,5,9$$

$$\beta_{k,s} = h\pi_k \kappa_s \left(\beta \frac{2}{1+\pi_k} \right) \quad s = 6,7,8$$

(iii) Changes in sexual behaviour parameters

Three sexual behaviour parameters are allowed to change in a piece-wise linear fashion; the mean rate of partner change for men, the mean rate of partner change for women, and the fraction of sex acts in which condoms are used in casual partnerships. These parameters all change at the same time, and this is parameterised by: (i) the time at which the changes in behaviour start, ζ; and, (ii) the time it takes for the behavioural parameter to reach its new value, F. The eventual relative change in the mean rate of partner change for women and men are denoted, respectively: Δ_1 and Δ_2. The relative change in condom use in casual partnerships is denoted: Δ_3. Thus:

Time (t)	Mean partner change rate: women and men	Condom use in casual partnerships
$t < \zeta_1$	$\bar{c}_k(t) = \bar{c}^*_k$	$q_2(t) = q^*_2$
$\zeta_1 \le t < (\zeta_1 + F)$	$\bar{c}_k(t) = \bar{c} * k\left(1 + \frac{(t-\zeta_1)}{F}(\Delta_k - 1)\right)$	$q_2(t) = q^*_2\left(1 + \frac{(t-\zeta_1)}{F}(\Delta_3 - 1)\right)$
$t \ge (\zeta_1 + F)$	$\bar{c}_k(t) = \Delta_k \bar{c}^*_k$	$q_2(t) = \Delta_3 q^*_2$

Where a * indicates the initial value for that parameter.

(iv) Model outputs

The key output from the model for comparison to data is the prevalence time-series. This is calculated by defining the calendar year when the simulation is assumed to start (T_0) and recording prevalence, in the way shown below, at the mid-point of each subsequent year.

$$p(t+T_0) = \frac{\sum_{s=2}^{9} X^s_{\bullet,\bullet}}{X^{\bullet}_{\bullet,\bullet}}$$

However, although the model outputs simulated prevalence in the general population, it must be compared with data collected in ante-natal clinics (ANC). It has been shown that there are usually differences between prevalence measured in the general population and at the ANC (5), so the model output is *calibrated* to represent ANC prevalence.

$$\rho(t) = \Phi\left(\Phi^{-1}(p\ (t)) + d\right)$$

Where Φ is the cumulative distribution function of the standard normal distribution and d is the 'calibration constant' parameter that is held constant within one simulation but can be varied between simulations (see next section).

Numbers of new infections in the period 1995-2008 are also calculated. The number of new infections in the simulation model is rescaled so that the denominator population matches the estimated population size and projected growth of the country of interest to provide consistency between derived estimates and those from other sources. Preliminary investigations showed that the size and the growth rate of the simulated population do not substantially affect prevalence or incidence rates. The population size in year 1995 is Pop_{1995}, and the growth rate (assumed constant) in the period 1995-2008 is ν. The number of new infections is then calculated as:

$$I(t+T_0) = \frac{\left(Pop_{1995}\right)\exp\left(v*(t+T_0-1995)\right)}{X^{\bullet}_{\bullet,\bullet}} \sum_{l}\sum_{k} \lambda_{k,l}(t) X^{1}_{k,l}(t)$$

The Bayesian Melding procedure (6) combines information on model parameters (inputs) and prevalence (output). For this simulation model there are two sources of prior information: information on the model parameters, including aspects of HIV transmission and sexual behaviour, and information on HIV prevalence. The information on prevalence is distinguished from the actual data on prevalence because it can be based on expert opinion or indirectly on data that is not perfectly comparable.

Following the procedure and notation proposed by Alkema *et al.* (7), we denote the model described above as M , the model input parameters as $\boldsymbol{\theta}$ (including all the parameters listed in Table 1) and the model output (which is a time-series of calibrated simulated HIV prevalence rates) as $\boldsymbol{\rho}$. That is, $\boldsymbol{\rho} = M(\boldsymbol{\theta})$. We denote the direct priors (information of HIV prevalence rates) as $p(\boldsymbol{\rho})$. We allow this information to be in the form of intervals for HIV prevalence at certain times. In this way, the direct prior can only either support or refute a particular simulated epidemic. This is represented formally by:

$$p(\boldsymbol{\rho}) \propto \prod_{t \in \Gamma} I_{V_t}(\rho_t)$$

Where Γ is the set of years for which there is prior knowledge, V_t is the specified interval for prevalence in year t, and $I_A(x)$ is the indicator function (equals 1 if $x \in A$ (x is included in A), or 0 otherwise).

For each input model parameter, available information is summarised in the prior marginal distribution. The prior density for each set of parameters is denoted $p(\theta)$. This translates to an induced prior on model outputs, which is denoted $p^*(\boldsymbol{\rho})$.

The two sources of prior information are combined to give a pooled prior $\tilde{p}(\boldsymbol{\rho})$:

$$\tilde{p}(\boldsymbol{\rho}) \propto p^*(\rho) \prod_{t \in \Gamma} I_{V_t}(\rho_t)$$

Next, we denote the data on HIV prevalence as $\mathbf{W}$. The fundamental relationship between the prior information, the data and the updated posterior information can be expressed as:

$$p(\boldsymbol{\rho}|\mathbf{W}) \propto \tilde{p}(\boldsymbol{\rho})\, p(\mathbf{W}|\boldsymbol{\rho})$$

Since the model is not invertible, it is not possible to derive an analytic solution with which to calculate the posterior distributions. A standard Monte Carlo technique is used to approximate this instead; the Sample-Importance-Resample algorithm (8). This consists of the following steps:

1. Generate a set of parameters by randomly sampling from the prior distributions of each parameter: $\boldsymbol{\theta}^{(i)}$
2. Evaluate the model using this set of parameters: $\boldsymbol{\rho}^{(i)} = M\left(\boldsymbol{\theta}^{(i)}\right)$
3. Form the sampling weight for the run as the product of the likelihood and the direct prior: $\omega_i = p\left(\mathbf{W}\middle|\boldsymbol{\rho}^{(i)}\right) \prod_{t \in \Gamma} I_{V_t}(\rho_t^{(i)})$
4. Repeats steps 1-3, *N* times.

5. Re-sample from the discrete distributions of epidemic simulations *Q* times, with probability proportional to the sampling weights, to approximate the posterior distribution for the inputs.

In this process, the number of samples, *N*, must be large so that combinations of parameters are selected from all regions of the multi-dimensional parameter space. In experimental analyses, a value for *N* was found by examining how changes in model fits and conclusions changed with increasing values of *N*. With *N*=750,000, it was found that further sampling did not lead to either a substantial change in the distribution of likelihood of the candidate runs, or the overall conclusions being materially affected. The results presented use $N=4x10^6$ and *Q=8,000*. The likelihood of the simulated epidemic given the data from ante-natal clinics, $p(\mathbf{W}|\boldsymbol{\rho})$, is estimated using a random-effects model, which controls for sites consistently measuring higher or lower levels of prevalence than average (7).

To test the hypothesis that changes in sexual behaviour have contributed to altering the natural course of the epidemic, two models are compared: one which does not allow behaviour change (M_0), with one that does (M_1). One model comparison is the Likelihood Ratio Test, which is based on comparing the fit to data of the best-fitting parameter values for each model (θ^*):

$$R = \frac{p(W|\theta^*, M_0)}{p(W|\theta^*, M_1)}$$

The statistic $-2\ln R$ is compared to the Chi-squared distribution with four degrees of freedom for an approximate p-value.

Another test is based on the Bayes factor, K, which measures the relative agreement to the data of the two models averaged across the prior distributions for the input parameters:

$$K = \frac{\int p(\boldsymbol{\theta})p(\mathbf{W}|\boldsymbol{\theta}, M_1)d\boldsymbol{\theta}}{\int p(\boldsymbol{\theta})p(\mathbf{W}|\boldsymbol{\theta}, M_0)d\boldsymbol{\theta}}$$

Bayes Factor values greater than one indicate that model M_1 is superior, with the data providing support for behaviour change affecting the natural course of the epidemic. Jeffreys (9) and Raftery (10) have proposed similar qualitative scales for the interpretation of Bayes Factors on the log-scale, which we follow here:

- $0 \le 2\ln(K) < 2$: Little or no support for model M_1;
- $2 \le 2\ln(K) < 5$: Some support for model M_1;
- $5 \le 2\ln(K) < 10$: Strong support for model M_1.
- $2\ln(K) \ge 10$: Very strong support for model M_1.

If it is decided that the data do support the hypothesis that changes in sexual behaviour have altered the course of the epidemic (i.e. M_1 superior to M_0), then the number of infections averted is calculated by running the model again for each set of parameters in the posterior distribution of inputs, and comparing it with another run in which the same parameter values are used, except that the parameters specifying any behaviour change

are set to null values ($\Delta_1 = \Delta_2 = \Delta_3 = 1$). Since estimates of infections averted can be confounded by reductions in HIV incidence and AIDS deaths leading to faster population growth and greater numbers of HIV infections, these two companion simulations are run using the same population growth rate. Numbers of infections averted in urban and rural areas of the country are summed to give national estimates. If the model comparison tests do not indicate that behaviour change has altered the natural course of the epidemic, then the estimated number of infections averted by behaviour change is zero.

The model can be extended to incorporate two periods of behaviour, which we denote the earlier and later points for behaviour change. As above, we let M_1 denote the model that incorporates behaviour change at the earlier period (but not the later period), we let M_2 denote the model that incorporates behaviour change at the later period (but not the earlier period), and we let M_3 denote the model that incorporates behaviour change at both the earlier and the later period. If there is evidence for behaviour change occurring early in the epidemic (M_1 versus M_0), then the model comparison, M_3 versus M_1, is used to assess the evidence for further behaviour change later in the epidemic. If there is no evidence for behaviour change early in the epidemic, the model comparison, M_2 versus M_0, is used to assess the evidence for changes in behaviour occurring at the later period only.

Sources for Parameter values

The model analysis procedure requires that distributions of possible values for the parameters are specified, reflecting prior knowledge about that aspect of sexual behaviour or HIV transmission. Other parameters are held at the same value for all simulations; these include those about which more information is available, those which have been shown not to materially affect the course of epidemic or the extent of HIV prevalence declines (11, 12), and demographic parameters used to scale model output for consistency with other published data. The sources for both sets of parameters are described in detail below.

Prior Distribution for Parameters That Vary Between Simulations

The parameters that are varied between simulations are listed in Table S1.

The prior for the calibration constant for urban and rural areas of each country was based on a comparison of estimates of prevalence in the ANC surveillance system and estimates of prevalence in household surveys (5, 13). The prior for the calibration constant was normally distributed, with mean equal to the difference between the two measures of prevalence after probit transformation. As described by Alkema *et al.* 2008, the standard deviation of the prior was calculated on the basis of the sample size of the household survey and the design effect (in the case of cluster sample surveys). If a survey was not available (Mozambique), then the average of the means and standard deviations from the other countries was used instead (separately for urban and rural areas). If the design effect for the survey was not reported (Burundi and DR Congo), then the average of the design effects in other surveys was used instead. If two surveys are available (Mali and Niger), the average value of prevalence between the surveys and the combined sample size is used (13).

Sexual behaviour surveys were included in the parameterisation for the analysis in each country if it was recognised as an excellent quality nationally-represented study that used the same form of questions on

sexual behaviour in several rounds, and from which the indicators for condom use and multiple partners could be calculated. The "condom use" indicator used was the based as the UNGASS 17 indicator: "Percentage of women and men aged 15-49 who had more than one partner in the past 12 months reporting the use of a condom during their last sexual intercourse". (UNGASS indicators are used to monitor progress towards the declarations set out in the United Nations General Assembly Special Session on HIV/AIDS (14)). Since the model includes only one term for condom use in casual partnerships (which is constrained to be the same for men and women), the indicator we use is the arithmetic mean of the reports among men and women. The "multiple partners" indicator used was the same as the UNGASS 16 indicator: "Percentage of women and men aged 15-49 who have had sexual intercourse with more than one partner in the last 12 months". The prior for the value of the parameter for the fraction of sex acts in casual partnerships that use condoms was a triangular distribution that ranged between 0 and 0.5, with mode equal to the reported level of condom use in that population in the earliest survey used. The priors for changes in sexual behaviour were based on comparisons between the earliest survey used and the most recent. The prior for the timing of behaviour change was a uniform distribution between the dates of the two surveys. The prior for the change in condom use was a triangular distribution between 0.5 and 1.5, with mode equal to the relative value for reported condom use (as defined above) between the two surveys. The prior for the change in rate of partner change was a triangular distribution between 0.5 and 1.5, with mode equal to the relative value for multiple partners (as defined above) between the two surveys, separately for men and women. If only one survey is used, the prior for the timing of behaviour change was uniform between 1995 and 20005, and the mode for changes in condom use and multiple partnerships was 1.0.

The scale-up of ART in the model is represented as a linear increase (at rate a_{rate}) in the fraction of individuals that develop a new for treatment that will (after a delay) access treatment. WHO, UNAIDS, UNICEF have published the coverage of ART in the countries included in the study, where coverage is defined as the fraction of individuals in need of treatment that are currently receiving treatment (15) (and shown in Table S2). Since the relationship between the scale-up rate used in the model and the WHO measure of coverage does not depend on incidence, it was possible to fit a simplified version of the model to find the appropriate value for a_{rate} to generate the observed levels of ART coverage. The prior distribution for a_{rate} was a triangular distribution with mode set to correspond to the WHO 'estimate' of ART coverage in the country, and the limits sets by the 'lower' and 'higher' reported values.

Duration of latent infection is estimated through fitting an Erlang distribution to observed rates of net HIV-associated mortality in resource-poor setting (21) (Figure S1), subject to the constraint of durations of pre-AIDS and AIDS (discussed below). The location of priors for the rate of transmission during latent infection reflects observational data from rural Uganda (18), but gives greater support to higher values than indicated in that study. This is done in recognition of two factors: first, the observational data likely underestimate the transmission probability per sex act due to inaccurate reporting of number of sex acts and through the selection bias of only including sero-discordant couples; second, it is known that sexually transmitted disease can increase the chance of HIV acquisition and transmission (19), but since they are not explicitly included in the model, higher value for the transmission probability of HIV can implicitly capture their basic effect.

It was not possible to directly evaluate many of the other parameters in Table S1 directly from national surveys, since relevant questions on sexual behaviour were not asked or because the parameter relates to a higher-order property of the sexual network, which cannot be measured from standard cross-sectional surveys.

For the parameters relating to individuals sexual behaviour, we use prior distributions that are sufficiently broad as to capture the range of credible values. The detailed sexual behaviour data collected from a rural Zimbabwean population (16, 17) was used to determine suitable ranges for these distributions for countries with epidemics of similar magnitude to Zimbabwe. The population data was divided by sex, age (<20; 20-29; 30-39; 40-49), type of location (estate, subsistence farming area, roadside trading venue or small town) and religious affiliation (Traditional, Anglican, Roman Catholic or Other/None). Sub-groups in which the number of respondents was less than 10 were ignored. The limits of the prior distributions were then set as the 1st and 99th percentiles across these 128 strata. For countries with lower prevalence, alternative ranges for prior distribution that generated small epidemics were found through examining the behaviour of other similar models (3, 4) and extensive experimentation. Priors for parameters relating to the higher order properties of the sexual partner network (balancing the demand for partnerships of men and women, mixing between the sexual risk-groups and replacement of high-risk groups) are uniform distributions over the entire range of feasible values.

Values of Parameters That Do Not Vary Between Simulations

Relative rates of transmission in the different stages and the time spent with acute infection are based on observational data from rural Uganda (18). Durations of pre-AIDS and AIDS are based on a meta-analysis of survival rates in resource-poor settings (20). In the model, individuals entering the pre-AIDS state are assumed to have a CD4 cell count that has decreased below 200 and are developing symptoms of immune-suppression. A meta-analysis (20) indicates that survival of infected individuals from the time when their CD4 cell-count is equal to 200 is approximately three-times as long as for patients with a CD4 count less than 200. Studies in resource-poor settings show that median survival for patients with CD4 counts below 200 is approx 1 year; therefore, we assume that the same relationship holds for resource-poor settings and estimate median survival for those with CD4 cell counts equal to 200 as 3 years. This three year period includes time spent in pre-AIDS and AIDS states. The same meta-analysis also indicates that mean survival time from developing AIDS to death is approximately 1 year; we therefore assume that average time spent with pre-AIDS conditions is 2 years. The duration with pre-AIDS for those individuals that will receive ART is based on another modelling study focussed on the delivery of treatment relative to disease progression in Africa (22). Survival on ART is based on extrapolating observed first-year mortality rates for individuals in resource-poor setting starting treatment (23, 24).

The size of the adult population and the rate of growth over the projection period (separately for urban and rural areas) are obtained from the UN Department of Economic and Social Affairs - Population Division (25).

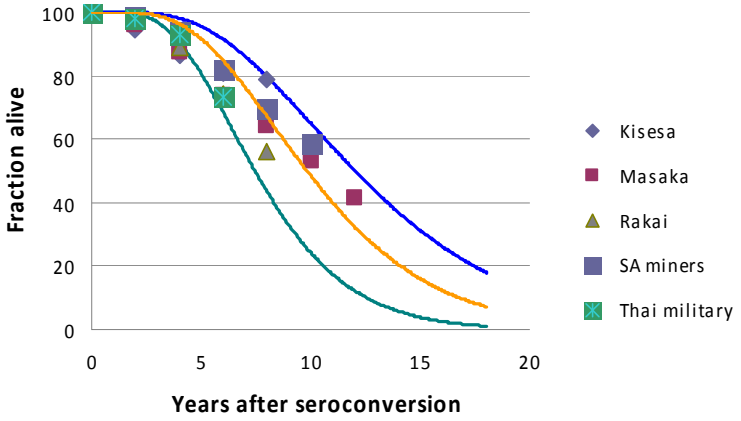

Figure S1: Net survival distribution with HIV. The yellow line show the best fit of the gamma distribution to the observational data, reported by Marston et al.(21). The green and blue lines, respectively, show the limits of the prior distribution for mean survival with HIV infection, in the absence of ART.

		Prior Distribution	
Model Parameter	**Symbol**	*Epidemics peak prevalence >5%*	*Epidemics peak prevalence <5%*
Year epidemic starts (with prevalence at 0.1%)	T_0	Uniform(1980,1990)	
Extent of mixing between high-risk groups.	ε	Uniform(0.2,0.8)	Uniform(0.5,1.0)
Replacement (0 for no replacement; 1 for replacement.)	R	Bernoulli(0.5)	
Extent to which male determine the pattern of sexual partnership formation.	θ	Uniform(0.2,0.8)	
Mean partner change rate: men	$\bar{c}_2$	Uniform(0.2,4.0)	Uniform(0.2,2.5)
Mean partner change rate: women	$\bar{c}_1$	Uniform(0.2,4.0)	Uniform(0.2,2.5)
Fraction of men in high risk groups (groups I and III).	$1-\phi_{2,3} = \phi_{2,1}+\phi_{2,2}$	Uniform(0.05,0.50)	Uniform(0.005,0.25)
Fraction of men with casual partners that have large numbers of partners (group I as a fraction of groups I and II).	$\phi_{2,1}/(1-\phi_{2,3})$	Uniform(0.20,0.80)	Uniform(0.10,0.50)
Fraction of women in high risk groups (groups I and III).	$1-\phi_{1,3} = \phi_{1,1}+\phi_{1,2}$	Uniform(0.05,0.50)	Uniform(0.005,0.25)
Fraction of women with casual partners that have large numbers of partners (group I as a fraction of groups I and II).	$\phi_{1,1}/(1-\phi_{1,3})$	Uniform(0.20,0.80)	Uniform(0.10,0.50)
Relative rates of partner change: group II versus group III: men.	$\varpi_{2,2}$	Uniform(2,50)	
Relative rates of partner change: group I versus group III: men.	$\varpi_{2,1}$	Uniform(10,100)	
Relative rates of partner change: group II versus group III: women.	$\varpi_{1,2}$	Uniform(2,50)	
Relative rates of partner change: group I versus group III: women.	$\varpi_{1,1}$	Uniform(10,100)	
Fraction of sex acts in casual partnerships protected by condom.	q_1	Triangular(0.0,0.50,*cond*) **See Table S2**	

Number of sex acts in casual partnerships per year.	n_1	Uniform(10,80)
Number of sex acts in regular partnerships per year.	n_2	Uniform(50,300)
Chance of HIV transmission per sex act from individuals with latent infection (average value for men and women).	β	Triangular(0.0007,0.0020,0.0010)
Relative coital frequency for those with symptoms of immune suppression versus others.	h	Uniform(0,0.5)
Survival time from infection to death (years).	—	Uniform(8.5,12.5)
Rate of scale-up of access to ART	a_{rate}	**See Table S2**
Calibration between antenatal clinic and general population. (Difference in prevalence, on probit scale).	d	Normal(μ_d , σ_d) **See Table S2**
Year behaviour change starts	ξ	Uniform(T_1,T_2) **See Table S2**
Years until new value for behavioural parameters reached	F	Uniform(1,5)
Relative change in condom use in casual partnerships (1=stays the same)	Δ_1	Triangular(0.5,1.5, Δ_3) **See Table S2**
Relative change in mean partner change rate: women	Δ_2	Triangular(0.5,1.5, Δ_1) **See Table S2**
Relative change in mean partner change rate: men	Δ_3	Triangular(0.5,1.5, Δ_2) **See Table S2**

Table S1: ***Prior Distribution for Parameters That Vary Between Simulations***

	Calibration constant				Prior limts on prevlanece			Sexual behaviour indicators						ART coveragae, 2006		
	Urban, d: mean	Urban, d: st-dev	Rural, d: mean	Rural, d: st-dev	Average prevalence, 1985-1989	Prior limit, 1987: low bound	Prior limit, 1987: high bound	Lower limit on T0 prior	Upper limit on T0 prior	Original condom use ("cond")	Relative change in condom use (Δ3)	Relative change: womens' multiple prts (Δ2)	Relative change: mens' multiple prts (Δ1)	Low estimate	High estimate	Best estimate
Benin	-0.045	0.036	-0.108	0.040	0.0%	0.0%	2.5%	1996	2006	0.21	0.96	0.36	1.51	0.25	0.62	0.38
Burkina Faso	-0.037	0.047	-0.082	0.038	2.1%	0.0%	2.5%	1999	2003	0.45	0.96	0.64	1.13	0.29	0.58	0.39
Burundi	-0.131	0.044	0.000	0.037	16.8%	1.0%	99.0%	-†						0.19	0.52	0.26
Cote d'Ivoire	-0.109	0.028	-0.054	0.030	3.0%	1.0%	99.0%	2005		0.18	1.00	1.00	1.00	0.19	0.47	0.28
DRCongo	-0.420	0.039	-0.647	0.049	4.3%	1.0%	99.0%	2001	2007	0.14	1.56	0.79	1.00	0.06	0.2	0.11
Ethiopia	-0.336	0.038	-0.382	0.041	4.6%	1.0%	99.0%	2000	2005	0.16	0.55	0.10	0.37	0.18	0.62	0.4
Ghana	-0.183	0.035	-0.215	0.028	3.5%	1.0%	99.0%	2003	2006	0.36	1.00	1.09	0.85	0.62	0.21	0.16
Haiti	-0.360	0.032	-0.058	0.035	8.7%	1.0%	99.0%	2000	2005	0.26	1.08	1.30	0.95	0.26	0.67	0.39
Lesotho	-0.091	0.031	-0.079	0.018	-	0.0%	99.0%	2004		0.30	1.00	1.00	1.00	0.27	0.36	0.31
Malawi	-0.004	0.045	-0.075	0.020	18.5%	1.0%	99.0%	2000	2004	0.15	1.23	1.00	0.62	0.27	0.89	0.43
Mali	-0.274	0.037	-0.280	0.030	1.4%	0.0%	2.5%	2006†		0.27	1.00	1.00	1.00	0.26	0.56	0.37
Mozambique *	-0.136	0.032			0.7%	0.0%	2.5%	2001	2003	0.02	7.77	0.98	1.17	0.1	0.2	0.14
Niger	-0.142	0.041	-0.318	0.034	0.3%	0.0%	2.5%	2006†		0.34	1.00	1.00	1.00	0.03	0.12	0.06
Rwanda	0.109	0.030	-0.087	0.025	22.1%	1.0%	99.0%	2000	2005	0.29	0.37	0.00	1.25	0.57	1	0.72
Tanzania	-0.016	0.028	-0.018	0.021	7.3%	1.0%	99.0%	1996	2004	0.13	1.84	0.66	1.04	0.15	0.23	0.18
Zambia	-0.101	0.028	-0.097	0.027	9.0%	1.0%	99.0%	1996	2002	0.24	0.99	0.60	0.78	0.29	0.45	0.35
Zimbabwe	-0.106	0.017	-0.045	0.017	5.0%	1.0%	99.0%	1999	2005	0.55	1.00	0.20	0.76	0.11	0.22	0.15

Table S2*: Priors for country-specific analyses.*

Source for the calibration data: Gouws et al. (5).

Source for behaviour data: Demographic and Health Surveys for the relevant years, with the following exceptions:

Cote d'Ivoire, 2005: AIDS Indicator Survey; Mozambique 2001: National Surveys of Reproductive Health and Sexual Behaviour To 15-24 year-olds, National Institute of Statistics, CDC, Macro International; DR Congo, 2001: Multiple Indicator Cluster Survey.

Source for ART coverage: WHO, UNAIDS, UNICEF, 2007 (15).

* For Mozambique, the prevalence data were separated by geographic region, not urban or rural. The calibration constants used were based on prevalence measured in the whole country. Trends in multiple partnerships were based on 15-24 year-olds only.

† If fewer than two surveys were used, then the prior for T0 was 1995-2005, and $\Delta 1=\Delta 2=\Delta 3=1$.

Parameter		**Value**	**Reference**
Ratio of HIV transmission male-to-female versus female-to-male	π_1	2.00	(26, 27)
Relative chance of HIV transmission (versus with latent infection): acute infection	κ_1	2.4	(18)
Relative chance of HIV transmission (versus with latent infection): pre-AIDS	$\kappa_6 = \kappa_8$	3.29	(18)
Relative chance of HIV transmission (versus with latent infection): AIDS	κ_7	6.14	(18)
Relative chance of HIV transmission (versus with latent infection): on treatment	κ_9	0.14	(18)
Mean time with acute infection	$1/\sigma_2$	5 months	(18)
Mean time with pre-AIDS, and will not receive treatment	$1/\sigma_6$	2 years	(20)
Mean time with pre-AIDS, and will receive treatment	$1/\sigma_8$	2 months	(22)
Mean time with AIDS	$1/\sigma_7$	1 year	(20)
Mean time on treatment	$1/\sigma_9$	10 years	(24)
Year when ART first becomes available,	a_{start}	2003	(28)
Maximum fraction of individuals that will have access to ART at full scale-up	$a_{\max}$	0.8	–

Table S3: ***Model parameters that have fixed values.***

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ANNEX 5.4: COUNTRY SUMMARIES

These country summaries are largely based on Country Impact Evaluation Reports. However, some information presented here, and in the Country Impact Evaluation Reports, is not always consistent with information used in Chapter 5 because sources may differ.

Benin

Epidemic	Adult prevalence in the general population has been stable around 2% since 2002, with a slight decrease in rural areas by 2007. Prevalence rates among women are twice as high as among men.
Funding	About half of external funding in 2003-2006 comes from the Global Fund and PEPFAR (28% and 24%, respectively); the per capita amount remains fairly steady at US$1.5-2.0. The spectrum of external donors mainly comprises these two, WB-MAP, SIDA, and UN agencies. Domestic funds support an important part of some activities (e.g., the government contributes 20-30% of HTC expenses). Except for HTC, the Global Fund shoulders the most expenses for HIV interventions, namely PMTCT and ART, and are appreciated as *coup d'accélérateur* in the HIV domain.
Access and coverage of health service interventions	HTC coverage doubled from 2006 to 2007, but despite being free and anonymous, less than half of people tested receive results, purportedly due to "sociological" reasons. Statistics from NGOs and others are not collected. PMTCT services are mostly in urban areas except for two regions where UNICEF supports rural sites. Although many sites were established in 2002, many were not functional due to lack of provisions until 2008. In 2006, 75% of pregnant women were screened, but coverage fell to just 50% due to stockouts in about 20% of sites in 2007. Coverage of HIV-positive pregnant women on ARV is high. ART has seen rapid expansion and coverage to about 48%, although services are mostly limited to urban areas. No ART data exist prior to 2006.
Impact on transmission	HIV surveillance has shown some recent urban declines but not in rural areas. Some decline in FSW. Stable among women in general population, but declines in HIV-positive pregnant women and those utilizing HTC—perhaps due to the expansion of services that draw on a pool of clients with lower risk.
Impact on mortality	No information.
Equity	The quality of PMTCT services varies according to the partner supporting the service. There needs to be overarching quality control from the central level. Most services are concentrated in urban areas and would need to expand in rural areas to increase overall coverage rates. ART coverage of children under 15 years is inferior to adult coverage.
Monitoring and evaluation	HIV surveillance sites have expanded from seven urban sites in 1990 to 50 urban and rural sites since 2005. The country considers that, although interventions are being carried out, the present system to collect routine data and to track HIV indicators is insufficient. Likewise, financial tracking information is insufficient (no NASA has been conducted). The country has come out with strong recommendations to overhaul the HIS; although the role that a national system should play is clear, it needs assistance in mapping a detailed strategy.

Burkina Faso

Epidemic	Adult prevalence in the general population is estimated at 1-2% in 2007. Women have higher infection rates, as do people in urban areas and from wealthier households.
Funding	Aside from DR Congo, Burkina Faso has received the smallest amount of per capita funding in 2003-2006, steady at about US$1. The Global Fund has contributed about 15% of external funding in that period, and 85% came from other donors (PEPFAR, 0%).
Access and coverage of health service interventions	Civil society plays an important role in the expansion of HTC services since initiation in 1999, including annual campaigns organized by *Programme d'Appui au monde communautaire* (PAMAC). Several HTC sites also have mobile outreach strategies. A disproportionate number of sites are in urban areas. Women are more likely to use the services. PMTCT has increased since initiation in 2003, although most sites are in rural areas. About 40-45% of pregnant women have been tested and counseled since 2004. The proportion of HIV-positive pregnant women receiving prophylaxis is 80-90% since 2004. All ART sites are located in urban areas, and so are the majority of people needing treatment. A survival study of ART patients for this evaluation shows 90% of the treatment cohort still on treatment after 12 months.
Risk behaviors	The proportion of young people having sex with more than one partner has decreased in 2003 relative to 1999, no significant change detected for the adult population.
Impact on transmission	Modeled prevalence shows some possible urban and rural decline prior to 2004, but no evidence that behavior is a significant determinant. Overall, HSS trends also show a declining trend starting prior to scale up, although not in all sites. Despite scale up in services, notably since 2003, there is no evidence that financing has decreased incidence and prevalence.
Impact on mortality	No information available, except from the survival study of persons on ART. Probability of death in the first six months of treatment was the greatest, by 12 months about 60% of patients had died.
Equity	The main obstacle is providing services to the people in need in rural areas, although most of disease burden is in urban areas.
Monitoring and evaluation	Surveillance of pregnant women has been on-going since 1997. There is not a unified system for a systematic and transparent flow of HIV-related data from facilities up to the central level. Rather, there are separate reporting streams for each service, and it happens outside the official central health statistics office *Direction des Etudes et de la Planification au MOH* (DEP). No data on basic M&E indicators were available at the central level for this effort. The HTC statistics are reported to two separate entities depending on whether they are private or public. Unlike HTC and PMTCT, ART data are communicated directly from the service point to the MOH, without intermediary aggregation at the district and regional levels. For ART and HTC, monthly reports are submitted to ensure renewed stocks of drugs or supplies. Often, however, only the required pharmacy section of ART is reported in order to renew stocks, the clinical and biological sections are not completed.

Burundi

Epidemic	UNAIDS/WHO estimated that HIV prevalence in 2007 was about 2% for the population age 15-49; prevalence among young people age 15-24 was estimated at 1.3% for females and 0.4% for males.
Funding	Total funding for HIV increased from just over US$1.7 million in 2002 to nearly US$16 million in 2007. The Global Fund and the World Bank were the major contributors in 2007 with nearly US$8 million and over US$6 million, respectively. The government contributed just over US$1.6 million. In 2005, total funding was at a similar level, but in 2006 it decreased to US$11.5 million.
Access and coverage of health service interventions	In 2007, the Global Fund and the World Bank contributed about US$1 million to the conduct of HTC services. The number of sites providing HTC services increased from five in 2000 to 187 in 2007, and sites are well distributed across the different regions of the country. The number of people using HTC increased from 318 in 2000 to 147,575 in 2007. Overall, 1.8% of the population has been tested. Twenty percent of people tested in 2007 tested positive. PMTCT services received significant financing only from 2005, and the total amount available for this activity was just over US$366,000 in 2007, with about 90% coming from the Global Fund. This was a big decrease from 2006 when the World Bank alone made over US$900,000 available, and no funding was available from the Global Fund. The number of PMTCT sites increased from nine in 2004 to 38 in 2007. In 2007, 23.6% of pregnant women accepted to be tested for HIV vs. just over 17% in 2004. The number of women in the PMTCT program increased from 138 in 2004 to 1,222 in 2007. Funding for ARV increased rapidly from less than US$500,000 in 2003 to US$5.5 million in 2007. ART sites increased from 19 in 2004 to 46 in 2007. By 2007, there were nearly 10,000 people on ARV treatment.
Prevention activity and risk behaviors	Little or nothing is known about recent risk behaviors in Burundi, as there have not been appropriate surveys to address this issue.
Impact on transmission	It is estimated that HIV prevalence has declined from 3.5% in 2001 to 2% in 2007. The percentage testing positive during HTC has remained fairly steady at around 20% during 2005-2007, down from more than 23% in 2004. Seropositivity by province does not show a clear pattern, as there are large variations from year to year in the percentage positive in each province, with the possible exception of Mwaro province, which showed more than 75% positive in 2004-2006 but 0% in 2007. There clearly are data problems related to the proportions positive by province.
Impact on mortality	UNAIDS/WHO estimate that the number of AIDS deaths decreased from 14,000 in 2001 to 11,000 in 2007.
Equity	The number of women and men accessing HTC services is about equal with slightly more men than women in 2007. There are also no large differences by age with the number of people tested who were under 25 about equal to those over 25.
Monitoring and evaluation	Burundi has not benefited from recent HIV/AIDS-related surveys, and most of the information necessary for M&E comes from the HMIS. This HMIS is clearly valuable but also shows weaknesses, particularly where figures by province are concerned. There are many gaps and unexplainable differences, which in turn can cast doubt on some of the figures mentioned above. However, it is clear that HIV prevalence in Burundi is relatively low and that useful systems are in place to track services and results, particularly after a thorough review.

Cambodia

Epidemic	The epidemic was initially concentrated among brothel-based sex workers; now it is present at a low level in the general population (prevalence under 1% in 2007). There is not a significant difference in prevalence between men and women; rural prevalence is lower than urban prevalence.
Funding	After Haiti, Cambodia has received the highest amount of funding per capita, about US$2.5 in 2006. The Global Fund proportion is small compared with PEPFAR, 13% versus 54%, respectively, from 2003 to 2006.
Access and coverage of health service interventions	HTC was first made available in 1995, and there has been a large increase in the number of sites and clients, especially since 2000. Although there is relatively low coverage of HTC in the general population, there is high coverage among sex workers. The PMTCT program saw a large expansion of sites from 2006 to 2007, as well as large increase in number of pregnant women tested and counseled. However, the number of HIV-positive pregnant women receiving prophylaxis is still low in 2007. There is very good geographical distribution of ART sites, decentralized in 20 of 24 provinces. There is very good ART coverage: an estimated two-thirds of HIV-positive people in need of treatment receive ART services (2007).
Prevention activity and risk behavior	The 100% condom distribution program provides free condoms and free STD diagnosis and treatment to brothel-based sex workers and their clients; high-risk sex among FSW has declined.
Impact on transmission	Results from different data sources and methodologies give a mixed picture. Overall, it appears that behavioral surveillance data indicate a decline in prevalence among sex workers and MSM from 2003 to 2006. A BED incidence test on blood samples showed that HIV incidence in all risk groups peaked in 1999 and declined afterwards, except for women attending ANC. EPP modeling, however, shows a decline in HIV prevalence among pregnant women since peaking in 1998-1999.
Impact on mortality	The UNAIDS modeled decline in the number of deaths due to AIDS from 2001 to 2007 is significant. In 2007, the percentage of patients on ART who died was about 1% of adult patients; this is an improvement over previous years.
Equity	No significant issues regarding equity.
Monitoring and evaluation	Surveillance of risk populations is ongoing over the past decade, although results generated from surveillance studies are not widely available. For routine data collection since 2005, data collection for most HIV services is through the National Center for AIDS, Dermatology and STD (NCHADS) via provincial data management, PMTCT data collection is still through the MOH. NCHADS disseminates their data via the Internet. Private clinics offering HIV services represent a significant share of HIV service providers but are unregulated and data are not integrated into routine M&E.

The Democratic Republic of the Congo

Epidemic	The prevalence in the general population is 1-3%, depending on the source, in 2007. This varies from 2% to 8% according to the province; and above 10% for FSW and those victims of abuse during civil unrest.
Funding	DR Congo has received the lowest level of HIV funding in 2003-2006, amounting to less than US$1 annually per capita. About half of their external funding comes from the Global Fund (27%) and PEPFAR (30%).
Access and coverage of health service interventions	The number of HTC sites has tripled from 2004 to 2007, mostly in urban areas. About 10% of youth have been tested and counseled. PMTCT, likewise, has shown a large increase in the number of sites since 2004 and also in the coverage of pregnant women tested and counseled. In 2005-2006, about 70% of HIV-positive pregnant women received ARV. There has been uneven establishment of ART sites between provinces and almost all ART sites are in urban areas.
Risk behaviors	There is no information on trends or baseline indicators from DHS 2003.
Impact on transmission	Prevalence among HTC clients has been about 11% in 2005 to 2007. Among pregnant women, prevalence is stable at about 2%; however, these surveillance data show stable prevalence in urban areas but increasing prevalence in rural areas that converged in 2006. Modeling also shows that the prevalence has stabilized. There is no evidence as yet that increasing HIV funding has reduced the burden of HIV.
Impact on mortality	No information available on mortality although guidelines for monitoring patients and patient outcomes have been developed and disseminated. Further training or reinforcement of application is needed.
Equity	The biggest discrepancy is uneven scale up between provinces and lack of services in rural areas. This ostensible inequity will persist, however, as infrastructure remains weak and the epidemic remains low and stable.
Monitoring and evaluation	There has been surveillance of pregnant women for the past 10 years for 24 sites in 2005. Routine data on the three services is collected by the MOH since 2004, but they are not considered complete or accurate, as there is no audit system in place to validate contents of the reports.

Ethiopia

Epidemic	HIV prevalence is less than 2% nationally with less than 1% in rural populations and greater than 5% in urban populations. Women are twice as likely (2%) to be infected as men (1%).
Funding	There was a considerable increase in HIV funding but still relatively low at less than US$2 per capita by 2006. In 2006, funding from PEPFAR was more than four times as much as that from the Global Fund.
Access and coverage of health service interventions	HTC sites (first introduced in late 1990s) have increased throughout the country and the number of tests performed in 2007/08 was almost 3 million, which has resulted in approximately 14% of adult women receiving recent HIV test results. PMTCT was introduced in 2000, and the number of sites has increased from four to 558 (over 500 introduced in the last four years). Eight percent of all pregnant women (35% of pregnant women attending ANC) are being tested, and 67% of identified HIV-positive pregnant women receive ARV prophylaxis. Over 300 ART sites have been added to the first three opened in 2004. These sites serve about half of the population in need of ARV.
Risk behaviors	Levels of high-risk sexual behavior among women in the general population are relatively low. While a higher proportion of women in 2008 compared with 2005 are engaging in higher-risk sexual activity, more women are delaying their sexual debut.
Impact on transmission	The decline among young pregnant women occurred prior to scaling up and was concentrated in Addis Ababa; no changes documented since 2002/03.
Impact on mortality	There are good treatment data with retention rates of 87% after one year and 5% mortality.
Equity	Female prevalence is considerably higher than that of men, but access to HIV services shows no bias. HIV testing (for general purposes or for PMTCT) is more common in wealthier, urban, more educated women, and there are notable regional differences.
Monitoring and evaluation	No information was provided about the HIV information systems in the Ethiopia Impact Evaluation Report.

Ghana

Epidemic	The prevalence in the general population is estimated at 2% (2007), with a high female-male ratio. HIV is mostly spread through heterosexual transmission and some mother-to-child transmission. There is little or no difference in rural and urban prevalence levels.
Funding	Ghana has received about US$1-2 per capita in 2003-2006, a similar amount to that of Burkina Faso (and slightly more than DR Congo). In 2003-2006 About 15% of external funding was from the Global Fund, 20% from PEPFAR, and the remainder from other donors. The country contends that in 2006 the Global Fund is the most important source of funding for the National AIDS Control Program (NACP).
Access and coverage of health service interventions	HTC has increased rapidly since 2004. It has the highest density of sites among countries in this group, and sites have been established in every region. However, although the number of HTC clients has increased remarkably, coverage among adults has remained low. PMTCT availability has also increased rapidly since 2004 with a density of sites comparable with other countries in the group. However, the percentage of HIV-positive pregnant women receiving ARV is still low. Like the other services, the ART program started to roll out in 2004 but had its most important growth in 2005-2006, when the government subsidized treatment. All regions have ART services available but coverage is still low.
Prevention activity and risk behaviors	Government has "championed" numerous condom campaign programs but reported condom use is still low. Prevention, education, and BCC have been major activities undertaken by civil society. While awareness of HIV is high, it has not translated into widespread behavioral change.
Impact on transmission	HHS data show the median prevalence rates over the past decade have oscillated between 2.5% and 3.5% (and 2% in the general population). There may be early signs of a potential decline after 2006, but this may well be confounded by shifts in the population structure or non-comparable sample of pregnant women. High-risk populations are not identified as one of the main transmission routes, but recent small-scale studies have been done on FSW and their clients, MSM, truck drivers, miners, and prisoners. Findings are not conclusive, however, because the size of the risk pool is unknown.
Impact on mortality	Males are more likely to die than females on treatment, in part due to accessing treatment later than females.
Equity	Women are more likely to access services; nevertheless, a larger proportion discontinues treatment due to adverse clinical events. No difference between women and men in loss to follow-up rates; more boys are on treatment than girls. In terms of distribution of services, Ghana has scaled up in all regions, but still services to rural populations need to be increased.
Monitoring and evaluation	Regular HSS of pregnant women since 1992, with 40 urban and rural sites as of 2005. There is an infrastructure of district and regional focal persons to collect and aggregate data, but it is not convincing that this is sufficiently effective to eliminate reporting gaps. ART routine reporting is more complete than HTC and PMTCT because the NACP has employed two Global Fund data entry people in regional hospitals to oversee electronic data capture of ART patients.

Haiti

Epidemic	Adult prevalence in the general population is just over 2% (2007) with no significant male/female or urban/rural differences.
Funding	Haiti received about US$8 per capita in HIV funding in 2006. Resources for HIV have increased more than fivefold from less than US$20 million in 2003 to almost US$100 million in 2007. This is the equivalent of about US$8 per capita in 2006. Nearly 100% of that funding is external with PEPFAR providing three times as much as the Global Fund.
Access and coverage of health service interventions	Availability of clinical services for HIV counseling and testing, PMTCT, and ART has increased substantially since 2004. However, the proportion of surveyed ANC sites that offer counseling and testing services is only 44%. Coverage of HIV clinical services has increased over time, so that, currently, 17% of the adult population has received the results of a recent HIV test; 22% of all pregnant women (42% of pregnant women attending ANC) are being tested, and 22% of the estimated number of HIV-positive pregnant women receive ARV prophylaxis; and an estimated 41% of HIV-positive people who need ARV are receiving them.
Prevention activities and risk behaviors	Data from population surveys (DHS and DCA/Woman's Survey) show that risky sexual behaviors are not improving among women (early sexual debut and higher-risk sex) or men (early sexual debut).
Impact on transmission	The HIV surveillance data showed some decline in prevalence in the 1990s but do not show a recent decline. The model indicates a decline in urban and rural prevalence but not due to behavior.
Impact on mortality	The modeled number of AIDS deaths decreased in the early 2000s but has since ceased to decline.
Equity	HTC, PMTCT, and ART sites are located primarily in urban areas. In terms of HIV testing among the general population and pregnant women, inequities between the urban and rural, poor and wealthy, and lower- and higher-educated persisted from 2005 to 2008.
Monitoring and evaluation	PEPFAR has invested in an HIV-specific monitoring system for tracking service statistics for HTC, PMTCT, and ART. The system contains an almost complete data set (information from some Global Fund sites is missing). The monitoring system does not include information on nonclinical services, such as social support for OVC or home-based care, non-health-sector services (such as those provided in the education sector or private sector), or financial information. This information would make the system more comprehensive. The current system should also be integrated into the national HMIS. Several national population-based studies have been conducted and provide information on risk behaviors and service coverage. More information is needed about the quality of services provided and cause-specific mortality.

Kyrgyzstan

Epidemic	The epidemic shows a low steady prevalence among pregnant women and among high-risk groups. It is mostly IDU-driven, followed by infections among prisoners and, to a lesser extent, among FSW and MSM.
Funding	Kyrgyzstan received a sharp increase in per capita funding, from US$0 in 2003 to about US$1.5 per capita in 2006. Fifty-four percent of funding over this period is from the Global Fund, and 13% from PEPFAR, mainly for care and treatment and prevention interventions among key populations. Other external funding comes from the World Bank Regional AIDS Control Project, Central Asia AIDS Control Project, Soros, DFID, and others, dedicated mainly to harm reduction efforts. UN agency contributions are largely targeted at youth.
Access and coverage of health service interventions	HTC started under state auspices in 1989 and has since grown due to external funding. Depending on the source, about 7-10% of people have been tested and counseled. Voluntary testing and counseling during pregnancy is often refused, and so coverage rates for counseling and testing among pregnant women are low. There is no information on the number of PMTCT sites. Estimated ART coverage is low despite the density of ART treatment sites being high. Since 2005, HIV diagnosis, monitoring and ART (highly active antiretroviral therapy and opportunistic infection) and ARV drugs are supplied solely by the Global Fund. Stigma is a major obstacle to universal care, treatment, and support.
Risk behaviors	Intravenous drug use poses the biggest threat, and drug injections have risen since independence. People feel they are at low risk of contracting the disease and hence a low awareness is fostered.
Impact on transmission	Official country reporting (UNGASS 2007) of prevalence in 2005 and 2006, respectively, is 8% and 7.4% for IDU, 1.1% and 1.4% for FSW, 0% and 1.0% for MSM, and 0.4% and 3.5% for prisoners. Only the latter shows a significant increase.
Impact on mortality	Few cases are registered; in 2007, among 57 PLWA on ART, 11 died.
Equity	Much stigma and discrimination is attached to the disease, especially since HIV is associated with drug use, sex with non-regular partners, and prisoners.
Monitoring and evaluation	Sentinel surveillance since 2003-2004 has been funded by WHO. National monitoring of STI since 2002 is a proxy indicator. There has been annual surveillance of key high-risk groups. DHS (1997), MICS (2005-2006).

Lesotho

Epidemic	Extremely high level of HIV prevalence throughout the country, 24-27% national prevalence in 2004; the epidemic is believed to have reached stable proportions. Prevalence rates vary substantially between districts, are highest in urban areas, highest among women, and highest among those 20-34 years.
Funding	A NASA was conducted in 2008. Moderate increase in funding, but still only US$5 per capita HIV external funding and very low average funding per PLWA. The Global Fund is the main external funder (44% during 2003-2006).
Access and coverage	Overall, access to HIV services is insufficient due to lack of human resources and weak health infrastructure, especially in remote areas. The Millennium Development Account investments to build or renovate health centers are expected to improve this. HTC started in 2004, launching the Know Your Status campaign for full coverage by 2007. There is good distribution of services in districts but lack of access in remote areas. Training of mobile outreach has helped improve coverage. PMTCT program was launched in 2003, but there was inconsistent support to expand access. There is much to be done to ensure services available within two hours of walking distance. The private sites are not regulated and appear and disappear without informing the central level. There is scaling up of more efficient ARV treatment to pregnant women but limited access so far. ART started in the private sector in 2001 and expanded into the public sector with the Global Fund and other donor support in 2003. Coverage in 2007 is only 45%, but the process of decentralization should improve coverage. Funding for ART declined in part due to a decrease in Global Fund Round 2 funding, but the priority of at least one-third of HIV funding for treatment was maintained. ART services are available in all districts but unevenly; there are too many patients in some ART sites and in others uptake is slow, and remote areas are still underserved. Obstacles to better coverage are numerous, including lack of human resources, infrastructure, procurement of equipment, and a weak data collection system that doesn't permit adequate patient follow-up.
Prevention and risk behaviors	The KYS campaign has helped to reduce stigma. Awareness levels are good, but there is no evidence yet that prevention interventions have translated into behavioral changes, although higher education does appear to be associated with lower prevalence. The Global Fund and others are supporting youth prevention programs; workplaces are informing and empowering employees. There have been reports of condom shortages recently, but a national strategy is being mounted to oversee logistics. There is no evidence of OVC discrimination in terms of schooling opportunity; a registration system of OVCs is underway.
Impact on transmission	Modeling has indicated slight declines due to the natural maturing of the epidemic, but there is no evidence that behavioral change is a contributing factor. The effect of ART treatment is expected to slightly increase prevalence due to longer survival, but there is no evidence of this as scale up has been recent.
Impact on mortality	The average survival rate after 12 months of treatment, in 2007, was 74%. Adequate patient follow-up would improve these rates.
Equity	There is no evidence of major male-female inequalities in access, but there is higher use of HIV services among women. Services are distributed, but unevenly, across all districts, but remote areas remain undeserved.
Monitoring and evaluation	There are weak systems in place and big concerns about data quality. Vertical programs are to be integrated into HMIS. ART data collection is not sufficient for patient follow-up, but community-based systems are to be strengthened by the National Identity Document project.

Malawi

Epidemic	Malawi is one of the countries hardest hit by HIV/AIDS with the 2004 DHS survey estimating HIV prevalence among 15-49 year olds at 11.8%, compared with 1% in 1986. 2007 sentinel surveillance figures put the rate at 12%.
Funding	External funding for HIV increased more than fourfold since 2003 to US$72 million in 2006 according to WHO. The Global Fund contributed about one-third of this amount.
Access and coverage of health service interventions	The number of sites providing HTC services increased from 14 in 2001 to 600 in 2007, and sites are well distributed across the different regions of the country. The number of people using HTC increased from 40,805 in 2001 to 886,331 in 2007. Overall, 7.3% of the population 15-49 has been tested in the period from July 2006 to June 2007. Nineteen percent of these people tested positive. PMTCT services started in 2002 with seven sites. This grew to 60 sites in 2006. Funding for PMTCT services increased only slightly between 2004 and 2006. The number of pregnant women tested rose enormously from only about 5,000 to nearly 138,000 in 2006. Funding for ARV increased 35-fold from 2002 to 2005/2006 to nearly US$15 million. All funding for ART is contributed by external funding agencies. The number of sites providing ART rose from four in 2002 to 419 in 2008 and the number of people on ART rose from about 11,000 in 2004 to over 140,000 in 2007.
Prevention activity and risk behaviors	Risk behaviors seem to have changed little in Malawi between 2004 and 2006. However, there is increased knowledge of HIV and increased use of condom with nonregular sexual partners. However, little has changed in age at first sex and the frequency of sex with a nonmarital partner.
Impact on transmission	It is estimated that HIV prevalence has declined from close to 23% in 1999 to 11.8% in 2003. The percentage testing positive during HTC was around 19% during 2006-2007. There are large differences by district, but, even in the district with the lowest percentage positive, this reaches over 8%. Positivity among pregnant women was just under 12% in 2006-2007.
Impact on mortality	The MOH estimated in 2007 that the number of deaths due to HIV/AIDS has declined by about 15% from 70,121 in 2003 to 60,932 in 2007 and that the number of orphans averted has about doubled since 2003 to nearly 113,000.
Equity	The number of women on ART is about double the number of men, even though the HIV prevalence rate for women is not much greater (13.3%) than that for men (10.2%).
Monitoring and evaluation	Malawi has had already four DHS surveys and also MICS surveys. Thus, there is ample information about the HIV problem at the population level, particularly as the 2004 DHS included HIV testing. The national HMIS has its expected shortcomings and there is a clear lack of quality control and completeness of reporting as stated in the country report.

Moldova

Epidemic	HIV is mostly concentrated in IDUs with a fair amount in FSW and MSM. Since 2005, more new cases are via sexual transmission than by injecting drug use, women more likely than men to contract the virus. Most recent data show new reported cases among pregnant women, hitherto undetected.
Funding	HIV funding per capita in 2003-2004 was just US$0.25 and increased to about US$1.0 in 2005-2006. The Global Fund represents 30% of cumulative funding, and PEPFAR just 2%. Other funding sources include World Bank and Soros Foundation, the umbrella organization for NGOs supporting harm reduction activities. Moldova conducted a National HIV/AIDS Spending and Financing exercise; detailed findings are available through the National Center for Health Management.
Access	Confirmation HIV tests are only done in the capital. There were three treatment and PMTCT sites in 2007, but the country is small, places are accessible, and prevalence is low. HTC sites are being piloted in 2007 and will be rolled out in the coming year. Of note, between 2004 and 2007, there was an average of 152-205 days between requesting and receiving Global Fund disbursement, a situation that threatened continuous ARV drug supplies.
Coverage of health service interventions	On the left bank, there has been excellent coverage of pregnant women who are tested twice during pregnancy. One-hundred percent of blood is screened. Moldova is an example of best practices in the quality of harm reduction services; 90% of these services are coordinated and delivered via NGOs.
Risk behaviors	Particular vigilance is needed—and is being exercised—of the IDU group so that the disease is not spread to the general population. Sex work is prominent in the country and could be a vehicle to spreading HIV in the general population. Likewise, highly mobile populations such as returning emigrants are more likely to contribute toward spreading the disease.
Impact on transmission	Behavioral surveillance data show increased national prevalence due to IDUs but show early evidence of sexually transmitted cases in the general population. Studies indicate a decline among FSW and an increase among MSM.
Impact on mortality	Among 203 patients registered in 2007, 11 died. The rate of defaulting has dropped to very low levels since 2004. Moldova is one of the few countries with a good, vital registration system. They had planned to validate HIV/AIDS deaths reported in their vital registration with those reported by the National AIDS Center, but this activity did not materialize.
Equity	The left bank is a frozen conflict zone and has been slow to scale up services, yet IDU use is higher on the left bank and prevalence among pregnant women and among blood donations was higher in 2007.
Monitoring and evaluation	In 2007, a new HIV electronic system for case registration and follow-up was developed in Moldova, and it started to cover HIV/AIDS cases data in detail from 1987. There has been annual health systems strengthening of pregnant women and STI patients since 1990. There has been BSS among MARPS, including IDU, FSW, and MSM, in 2001, 2003/04, and 2007 but not necessarily comparable samples and of varying quality. Population-based surveys in 2006 and 2008. (DHS 2005)

Mozambique

Epidemic	Based on ANC surveillance, the national HIV prevalence is about 16%, with the highest levels in the south and lowest levels in the north. There is no national seroprevalence data for information on sex/age/residence strata.
Funding	There was a significant increase in external funding, from less than US$1 per capita in 2003 to about US$4 per capita in 2006. The share of Global Fund contributions is 5%, and PEPFAR contributions are 30%; the remaining contributions are from a long list of bilateral, multilateral, and international NGOs. The proportion of HIV funding allocated to prevention interventions and human resources have decreased relative to increases in care and treatment and other areas.
Access and coverage of health service interventions	HTC was initially jumpstarted by a Global Fund grant; by 2006, the government showed a sense of ownership and has contributed more than 50%. There is still a lower density of HTC than in other countries in the region, and coverage levels are among the lowest—although the number of clients has been increasing steadily since 2004. PMTCT was implemented in 2002 and trends show that services have grown rapidly, especially since 2006. ART was introduced in the private sector in 2002, and the public sector followed suit in 2003. In 2006, there was a major increase in the number of PLWA initiating treatment, in part due to a significant expansion of sites in rural areas—although the northern area is still underserved. ART coverage is still low compared with other countries in the group, apparently associated with difficulties in managing more remote sites. The government recognizes the low ART coverage rates, but it also recognizes that human resources in the face of such rapid scale up become overworked and potentially unsustainable if not managed.
Prevention activity and risk behaviors	There are limited data on behavioral indicators from the Mozambique DHS in 1997 and 2003. Awareness is still low in certain pockets, especially among women. No robust evidence on behavioral changes.
Impact on transmission	Overall, the HIV prevalence rate is slightly increasing or stable from 2001 to 2006 and then mostly stabilizes. In the regions, however, there are slight declines in the center and north, and only in the southern region are there signs of a steady increase in prevalence. The recent Mozambique Triangulation Project in 2008 offers plausible explanations behind the subnational trends.
Impact on mortality	There is no empirical or routinely reported data; a modeling exercise has simulated mortality trends with and without AIDS.
Equity	There is no evidence of major male-female inequalities in access, but there is higher use of HIV services among women; rural access is still relatively poor, especially in the north.
Monitoring and evaluation	HSS of pregnant women has been carried out regularly since 1998. There has been no national seroprevalence survey yet in Mozambique, which is a big gap in understanding levels and patterns in the general population. There is a unified reporting system envisioned, but in practice it is weak and fragmented. There is a monthly reporting system for several HIV services, but it is not well-coordinated, forms are not standardized, and underreporting results from noncompliance by staff due to miscomprehension of forms or work overload. Lack of "horizontal" data analysis at facility, district, and provincial levels.

Peru

Epidemic	The epidemic is mostly contained in urban areas and spread through sexual transmission, mostly MSM driven. Men are more affected by the epidemic than women, in a ratio of 3:1.
Funding	Peru has received the least funding in the group, less than US$0.25 per capita; 12% of external funding is from the Global Fund and 2% from PEPFAR. From 2005 to 2007, 40-50% of funding went to treatment, 20-30% to prevention, and 20% to research. Spending on prevention in 1999-2000 was about 45%; the country, with Global Fund Round 6 support, aims to reinvigorate prevention efforts for vulnerable populations.
Access and coverage of health service interventions	There have been notable efforts to increase HTC, especially among pregnant women; increases among high risk groups and the general population are variable between regions. Density of HTC services has remained constant, but there are current efforts to expand, with the Global Fund support, in order to reach more at-risk populations. The Global Fund has also supported increased HTC among prisoners. Despite some overreporting, there has been an important increase in PMTCT services in ANC clinics; however, coverage varies between regions due to availability of supplies and whether ANC is free. Prior to 2004, ART was paid for by patients; in 2004, the Global Fund implemented free treatment, and these costs have since been (mostly) assumed and sustained by the government. Numbers on ART peaked in 2005 and have since remained constant. ART coverage is about 50%, there is a need to screen more MARPs (above).
Prevention efforts and Risk behaviors	MOH and civil society have increased prevention efforts at youth MSM, pregnant women, and other vulnerable populations, but there is little or no change detected in indicators of behavior change (e.g., HTC visits among FSW or MSW). Condom distribution has increased but still does not meet the estimated need. Other behavioral indicators show mixed results: improvement among youth using a condom with nonregular partners, but an increase in the number of sexual partners among women and men reported in the last 12 months. The Global Fund has supported teacher training and curriculum support for life skills and sexuality. There have been other national efforts to support HIV/AIDS programs in the workplace; there is nascent but increasing attention, mainly by NGOs, towards orphans and vulnerable children. Amazonian cities have the highest rates of risky sexual behavior.
Impact on transmission	Prevalence among high0risk populations, mainly MSM, shows increasing prevalence through the 1980-90s followed by a plateau and decline since the mid 2000s. Note that prevalence trends are largely inconclusive; the sample inclusion criteria often differ. The epidemic is stable but low among pregnant women. The Amazonia region is believed to be one of the most affected regions and also lacking the most in services. Overall, after Global Fund support, it is possible to see a reduction in the number of HIV cases as well as AIDS cases reported since 2006. (The latter is due to a blip in AIDS cases reported following expansion of free ART in 2004.)
Impact on mortality	A national death notification system is in place; prior to 2004, 80% of reported HIV cases died after two years of being diagnosed. Mortality due to AIDS has decreased since ART became freely available in 2004. In 2006, on average 93% of people on ART were alive at 12 months, which varies from 80% to 98% according to CD4 count at treatment initiation. The number of annually reported AIDS deaths was constant from 2000 until 2004 and then dropped off as ART became freely available.
Equity	With Global Fund support, there has been a concerted effort to scale up HIV services in rural facilities, so coverage has improved in rural areas. Services are, however, still limited in Amazonian regions mainly because fewer facilities are established. Levels of mortality in the Amazon regions are estimated to be higher due to slower rollout of services in this region. ART treatment outcomes are significantly better in Lima than in provinces.
Monitoring and evaluation	There has been HIV surveillance among pregnant women in hospitals since the mid 1990s, and it includes health centers since 2002. The PREVEN surveillance project also regularly monitors high-risk groups since 2002 via population-based surveys. The MOH and NGO IMPACTA oversee sentinel surveillance of MSM since 1996. A series of DHS surveys area available since 1996, with a continuous DHS in place since 2004. ART data for loss to follow-up are incomplete but show fewer than 5%.

Rwanda

Epidemic	There is about 3% prevalence with higher prevalence among females and higher prevalence in urban populations. 2005 seroprevalence survey findings are consistent with ANC surveillance. There is high HIV/TB co-infection.
Funding	There has been a considerable increase in funding to about US$8 per capita; HIV external funding is about half of the country's health funding. About half of external funds from 2003 to 2006 are from PEPFAR, 17% from the Global Fund, and the remainder from others, including several international NGOs.
Access and coverage of health service interventions	There has been a large increase in HTC availability since Global Fund Round 1 support started in 2003. HTC services are equitably distributed in provinces in rural and urban areas and utilized by both sexes, but they need to focus on youth-friendly services. A substantial increase in PMTCT availability has resulted in very high testing and counseling coverage of pregnant women at ANC equally over the country. New ARV prophylaxis protocol has been introduced; success in ARV administration varies between sites and reasons have been identified. This is recognized as a serious issue to address because it is a significant determinant of infant mortality in the first two years. The introduction of rapid tests spurred higher coverage, so has training non-nurses as counselors and implementing Kenya's model of mobile HTC. Rwanda has the highest density of ART sites of all countries in the group. ART is free since 2004 and heavily subsidized by numerous external donors.
Risk behaviors	Levels of sexual risk behavior in the general population are relatively low; there are no changes in risk behaviors between 2000 and 2005. Rwanda cites an ongoing need to intensify prevention efforts and integrate the prevention and treatment scale up, with particular attention to vulnerable groups such as youth.
Impact on transmission	There has been a slight decline among young pregnant women during 2003-2005; there is low incidence among young people according to 2005 survey.
Impact on mortality	There is good treatment data with 87% retention rates after one year, and less than 5% died after one year. There is no data on pre-ART patients (i.e., deaths prior to initiating treatment).
Equity	There are no major geographical or sex inequalities in accessing services. The quality of PMTCT services in terms of trust, confidence, and compassion is notably higher in FBOs. ART for HIV-positive children is lacking due to low screening rates, and pediatric treatment doses are not available.
Monitoring and evaluation	The electronic reporting system, TRACnet, collects monthly aggregate information since 2003 on ART patients from almost all ART sites and links with central drug purchasing agency; the database may be queried online. HTC and PMTCT reporting since 2002-2003 is managed by MOH and based on monthly paper reports. The Global Fund collects information separately on Fund-supported PMTCT sites, and the parallel reporting does not yield consistent data, as revealed in this validation exercise. Rwanda strongly needs to eliminate duplicate reporting systems, streamline tools, and improve data use at all levels.

Tanzania

Epidemic	Adult prevalence in the general population is about 6%, with almost 5% in rural populations and 9% in urban populations. Women are more likely to be infected (6.6%) than men (4.6%).
Funding	In Tanzania, 2003-2006, per capita HIV funding increased steadily from about US$1 to US$3. During this period, 8% of HIV funding came from the Global Fund while about one-third came from PEPFAR.
Access and coverage of health service interventions	HTC sites were first introduced in late 1995. A national campaign was conducted in 2007, which tested almost 3.5 million people. PMTCT was introduced in 2000 and the number of sites has increased from five to 1,311 (over 500 introduced in the last two years). In 2007, 76% of pregnant women attending PMTCT sites were tested, and 25% of identified HIV-positive pregnant women took NVP prophylaxis; an additional 1% were started on ARVs. The number of ART sites has increased from 21 in 2004 when they were first introduced to 91 in 2006. These sites serve about 60% of the population in need of ARV.
Prevention activities and risk behaviors	Long-term sexual risk behavior in the general population showed positive changes in 2003/04 among both men and women.
Impact on transmission	There has been some decline in prevalence among young pregnant women during 2003-2005 and possibly lower incidence during 2003-2007.
Impact on mortality	There is poor data on treatment outcomes.
Equity	There is no evidence of major male-female inequalities in access, but there is evidence of higher ART use among women.
Monitoring and evaluation	Reporting has been problematic with many partners in service provision and many reporting requirements, and there has been weak health facility information system. Note: There are many inconsistencies in the report, probably due to bad routine reporting quality.

Vietnam

Epidemic	The epidemic is concentrated mainly among IDUs and, to a lesser extent, among FSW and MSM. People in younger age groups are contracting HIV, and heterosexual transmission is becoming more likely.
Funding	Vietnam has received a slow but steady increase in funding since 2003, reaching about US$0.50 per capita in 2006. Half of external funding is from PEPFAR and 9% from the Global Fund. Other sources of external funding include DFID, the Asian Development Bank, and the World Bank.
Access and coverage of health service interventions	Vietnam has the lowest coverage in the group in terms of ART treatment, pregnant women tested and counseled, and people using HTC. While HTC utilization is increasing, it is not being accessed by those most in need (i.e., key populations at risk). PMTCT has evolved but is hampered by various administrative and economic barriers. Significant progress has been made in treating PLWA with ART, and this has been considered effective. The harm reduction program has been strongly supported by partners, but interventions among some key groups are still limited, notably among mobile populations and MSM.
Risk behaviors	Information, Communication and Education efforts have raised awareness of HIV in the general population, including among youth, but a lower increase in knowledge is detected among MARPS. Efforts have brought about some reduction in stigma, but Vietnam seeks alternative BCC models to make their efforts more effective. DFID and World Bank support condom distribution programs. Sex workers report higher levels of condom use during last sex, but other data show inconsistent condom use. More targeted interventions are, thus, needed for FSW. There is no trend information for MSM or IDU on condom use. DFID and the World Bank also support needle/syringe provision; overall distribution has increased but still remains variable between districts.
Impact on transmission	There have been steady and low rates of infection among pregnant women and steady and moderate rates among FSW. There has been some decline among IDU and also subtle decline among military.
Impact on mortality	In 2007, it was shown that 81% of adults and 93% of children on ART were still alive 12 months after initiating treatment.
Equity	Males account for 85% of total reported HIV cases, but males are also more likely to be IDU.
Monitoring and evaluation	There has been HSS annually or biennially since the early to mid 1990s, including high-risk groups; data are stored in a central databank. There have been three BSS surveys between 2000 and 2006 and one AIS survey in 2005. Since 2006, the M&E department is striving to define standards for data collection and to implement a single (routine) reporting form for donors, but triangulation with multiple internal and external sources is still crucial.

Zambia

Epidemic	There is a high level of HIV prevalence at around 15%, and urban prevalence is twice as high as rural, with women about 40% higher than men.
Funding	Zambia receives the most funding of the evaluation countries, exceeding US$10 per capita in 2005-2006, which is about a quarter of the country health budget. The Global Fund share is 16%, and PEPFAR accounts for 60% of external funding, during 2003-2006.
Access and coverage of health service interventions	There have been major increases in access to ART, PMTCT, and HTC. PMTCT and HTC site densities are greater than other countries, while ART is not. Coverage is about half for ART and PMTCT, and just 2% of adults received testing and counseling in 2007. ART access increased substantially when government-sponsored ART treatment with international support started in 2003.
Prevention activity and risk behaviors	The extensive monitoring system shows modest reductions in high-risk sexual behavior among men and women, especially in recent years. There are proportionally more orphans in school than non-orphans.
Impact on transmission	There have been slight declines measured in the general population, as well as among ANC surveillance and PMTCT clients. There has been modest decline in HIV prevalence during 2001-07 according to national surveys but no convincing changes among young people
Impact on mortality	Evidence from PEPFAR-supported clinics shows 90% treatment retention after one year with high survival. ART has slightly reduced mortality among people on treatment. There has been an indication that death rates declined in the recent past, but this does not necessarily imply that it is due to increased ART coverage.
Equity	There is no evidence of major male-female inequalities in access, but there is higher use among women of HTC; rural access is improving (e.g., for PMTCT). Women are more likely than men to survive 12 months after initiating ART.
Monitoring and evaluation	There is an extensive survey-based system to monitor risk behaviors and now HIV prevalence; there is a need for national reporting system (electronic) for interventions to improve data quality and completeness.

6 TUBERCULOSIS: SITUATION, TRENDS, RESULTS

6.1 INTRODUCTION

The World Health Organization (WHO) estimates that in the year 2006 there were 9.2 million new cases of tuberculosis (TB) and 1.5 million deaths from TB, plus 0.2 million TB deaths among persons co-infected with HIV.[1] The number of estimated new cases per year worldwide has been increasing due mainly to population growth, but the global incidence per 100,000 population has declined annually since 2003. TB prevalence in 2006 was estimated to be 14.4 million persons. Estimated global prevalence has declined since 1990, reflecting a range of factors, including declining incidence rates and improved case detection and cure, but also reduced survival in some regions relating to HIV co-infection.

The predominance of the TB burden, measured on a per capita basis, occurs in Africa. In 2006, the estimated incidence rate in Africa (363 per 100,000) was almost three times as high as the estimated global incidence rate (139 per 100,000); a similar ratio also applies to the estimate of HIV prevalence among TB cases in Africa compared with the global estimate (22% versus 7.7%). Estimated TB mortality in Africa is more than three times the estimated global rate. The heaviest burdened region has also struggled with low rates of case detection and treatment success. WHO's estimated case detection ratios are lowest in Africa (46% versus the global average of 61% in 2006), and successful treatment outcomes are also among the lowest (76% versus the global average of 85% in 2005).

In terms of TB burden across countries, WHO has identified 22 high-burden countries (HBCs) that account for 80% of all estimated TB cases. India and China occupy first and second place, respectively, and the remaining countries are dispersed across every other region of the world. Six countries participating in this evaluation study are among the HBCs: Cambodia, the Democratic Republic of the Congo (DR Congo), Ethiopia, Mozambique, Tanzania, and Vietnam.

Table 6.1 characterizes the countries in this study in terms of a variety of different attributes relevant to TB epidemiology and control. Four countries have smear-positive notification rates exceeding 100 per 100,000 population: Lesotho, Cambodia, Zambia, and DR Congo. At the other extreme, the three West African countries (Benin, Burkina Faso, and Ghana) and Kyrgyzstan have notification rates below 40. The 18 countries participating in this study should not be regarded as being representative of worldwide TB epidemics, as many of the countries have well-established TB programs, which impose limits on opportunities for further advances.

[1] WHO. 2008. Global tuberculosis control: Surveillance, planning, financing. WHO Report 2008. Geneva: WHO. Available at http://www.who.int/tb/publications/global_report/2008/pdf/ fullreport.pdf.

Table 6.1: Characteristics Related to TB in 18 Evaluation Study Countries

Country	TB Notification Rate, All Cases (per 100,000), 2006	New Smear-positive Cases Notified (000s), 2006	TB Notification Rate, Smear-Positive Cases (per 100,000), 2006	Treatment Success Rate For New Smear-positive Patients (%), 2005	HIV Prevalence (%), 2007
Benin	41	2.9	34	87	1.2
Burkina Faso	27	2.7	19	71	1.6
Burundi	75	3.1	38	79	2.0
Cambodia*	244	19.3	136	85	0.8
DR Congo*	158	63.5	105	78	1.2-1.5
Ethiopia*	151	36.7	45	73	2.1
Ghana	54	7.8	34	73	1.9
Haiti	148	7.5	79	73	2.2
Kyrgyzstan	117	1.8	35	79	0.1
Lesotho	605	4.0	202	83	23.2
Malawi	185	8.2	60	82	11.9
Moldova	168	18.3	87	84	<0.1
Mozambique*	124	19.3	70	81	12.5
Peru	130	1.7	44	91	0.5
Rwanda	86	4.2	45	85	2.8
Tanzania*	150	24.7	63	62	6.2
Vietnam*	113	56.4	65	93	0.5
Zambia	409	14.0	120	92	15.2
Global	82	2,532.0	38	85	

*Indicates one of the 22 HBCs
Source: Global TB Database

GLOBAL TB CONTROL TARGETS AND STRATEGIES

Since the mid 1990s, global TB control has emphasized scale up of Directly Observed Treatment/Therapy, Short-course (DOTS) programs to promote early diagnosis of active TB and to attain high rates of successful treatment. Progress in global TB control is tracked in reference to several impact and outcome targets, elaborated within the framework of the Millennium Development Goals, the Stop TB Partnership targets, and the World Health Assembly (WHA) targets.

Box 6.1 Targets for TB Control

MILLENNIUM DEVELOPMENT GOAL 6 (Target 6.C):
By 2015, halt and reverse the incidence of TB.

STOP TB PARTNERSHIP TARGETS:
By 2005, detect at least 70% of people with sputum smear-positive TB (i.e., under the DOTS strategy), and successfully treat at least 85% (established at the WHA in 1991).
By 2015, the global burden of TB (per capita prevalence and death rates) will be reduced by 50% relative to 1990 levels (resolution at G8 meeting in 2000).
By 2050, the global incidence of active TB will be less than one case per 1 million population per year (TB elimination).

The Stop TB Strategy aimed at meeting these targets is set forth in the Global Plan to Stop TB 2006-2015,[2] which comprises six components:

- DOTS expansion to improve diagnosis and treatment outcomes
- Addressing TB/HIV, multidrug resistance tuberculosis (MDR-TB), and other challenges
- Health systems strengthening: diagnosis and treatment integrated in general health services, human resource development, and staffing needs

[2] Raviglione, M.C., and M.W. Uplekar. 2006. WHO's new Stop TB Strategy. Lancet 367(9514): 952-955.

- Engaging all health care providers in detection, referral, treatment, and reporting
- Empowering patients and communities: advocacy, communication, and social mobilization activities
- Enabling and promoting research.

6.2 Evaluation Approach for TB

Evaluation of progress against TB in this study is based on the same stepwise approach used in other components of the evaluation study. The implementation and potential impact of DOTS over the past decade is examined through several key indicators: financial inputs, programmatic outputs, and estimated impact indicators on disease burden. The indicators are hypothesized to relate to each other in a stepwise fashion; specifically, investment contributions (including national and international, financial, and in-kind contributions) are expected to produce improvements in the availability, quality, and coverage of diagnostic and treatment interventions. Improvements in diagnosis and treatment should in turn be translated into reduced TB incidence, prevalence, and mortality. In seeking to operationalize this evaluation strategy, a number of challenges persist due to limitations in the types and quality of data that are available. In particular, measurement of epidemiologic impact is difficult because direct measures of TB incidence, prevalence, and mortality are uncommon, especially in resource-poor settings. In view of these challenges, the goals of this study include both (1) assessment of what conclusions may be drawn about the hypothesized relationships between inputs, outputs, and impact based on the current state of evidence, and (2) critical analysis of important gaps in information and recommendations for improving the basis for future evaluation of the impact of scaling up TB control.

Data Sources

National record review. This study compiled secondary data in 18 participating countries to examine trends and patterns in TB case notification and treatment through review of national records and through analysis of other information available in existing surveys and studies. The national record review focused on compiling subnational data for major TB control indicators available in quarterly reports at the central level (the National Tuberculosis Program office).

The information compiled was mainly for standard variables related to case notifications and treatment outcomes.[3] While national-level information is available in standard yearly reports from WHO, the subnational detail offers opportunities for additional analyses of data quality and variation in case reporting and treatment outcome within countries.

Standard data abstraction spreadsheets in Microsoft Excel were provided to countries to facilitate data compilation in a uniform format. These data sheets were cleaned and analyzed during the Secondary Data Quality and Analysis workshop in Glion (April 1-4, 2008). A detailed report outline and automated templates to calculate trends were proposed to address the major study questions.

In addition to compiling routine program data, other sources of data, including surveys and studies, were also requested (for example, any available national surveys on TB prevalence or TB infection prevalence).

District Comprehensive Assessment. In addition to the national record review, selected Primary Data Analysis Countries (PDACs) collected information relevant to TB using household and individual surveys and facility censuses as part of the District Comprehensive Assessment (DCA). These new primary data were used to assess the availability of key diagnostic and treatment services in facilities.

SUMMARY OF KEY INDICATORS

Following the stepwise framework to examining the impact of scale up on TB outcomes, the focus was on the following indicators for each of the steps in the framework:

1. ***Funding:*** Country Impact Evaluation Reports, donor records, and National Health Accounts data were used to characterize overall levels of funding for TB and the composition of this funding in terms of domestic, Global Fund, and other contributions.

2. ***Availability and access:*** The main indicator of availability of services is the DOTS population coverage estimate, which was summarized briefly. Data on the numbers of diagnostic and treatment facilities over time are also considered where available. There will be no analyses of access to services due to lack of data availability.

3. ***Quality:*** The chief indicator of service quality is the reported outcomes of DOTS treatment. Quality was also assessed in selected countries using results from the DCA Facility Census on the presence of trained personnel, availability of drugs, and availability of diagnostic tests.

4. ***Coverage:*** Utilization combines with availability, access, and quality to yield the overall coverage of services, but data on coverage of TB services remain weak. There will be later

[3] Case notification variables included type of TB case (new or previously treated, pulmonary, or extrapulmonary), age and sex of new sputum smear-positive cases, TB suspect information (sputum and cultures examined/results), and HIV testing/results. Information compiled on treatment outcome variables included the number of patients registered in quarter ending last month, all possible treatment outcomes for sputum smear-positive patients and other types of TB patients (cure, treatment completed, died, treatment failure, default, and transfer out), and co-trimoxazole preventive therapy and antiretroviral therapy treatments provided to HIV-positive patients.

comments (see Section 6.7) on limitations in the main indicator of coverage used in global TB monitoring—the estimated case detection rate. Based on these limitations, the indicator is not emphasized here because no direct measurements of the denominator of the ratio (incidence) are available in any of the countries considered in this evaluation study.

5. ***Health impact:*** Direct data on incidence or mortality are uncommon. The focus is mainly on case notifications as a proxy measure for incidence and on discussing the limitations in this measure. Recognizing that case notifications reflect the product of incidence and case detection, a means of adjusting notification data empirically was considered to improve their likely correlation with true incidence. The availability of information on other indicators, such as prevalence of active TB or prevalence of infection, was also reviewed. Finally, simple models were considered to undertake limited estimation of plausible bounds around mortality impact based on available data.

6.3 Data Quality

A first assessment of data quality was based on aggregating the quarterly subnational data compiled for this evaluation study and comparing these aggregate figures with the national figures in the WHO Global TB Database. Results of this initial assessment varied, with Benin, Burkina Faso, Haiti, and Tanzania showing good correspondence to the national database records, but a number of countries showed discrepancies due in large part to missing data for certain districts and years. Overall, many of the details on age- and sex-specific data that were included in the standard templates were not available through the national record review. No country produced data on MDR-TB and HIV testing in the record review that adequately matched national reports. However, for the key indicators examined here (new smear-positive case notifications and treatment outcomes for new smear-positive patients), a number of countries were able to reconcile many of the preliminary differences with the Global TB Database totals by acquiring additional information and performing a careful re-review of the national records.

A comparison of the final data from the national record review against the data in the Global TB Database appears below. By the time the national record review was completed, most countries produced datasets of sufficient quality to allow some province-level analysis of trends in these indicators. District-level analyses would be feasible in some countries based on the data collated during the national record review, but the focus of the subnational analyses will be on province-level data for several reasons: (1) the data at levels below province are subject to greater random variation; (2) not all countries provided district-level detail; and (3) reorganization of administrative areas in some countries makes tracking of continuous district-level series over the last 10 years impossible.

In some countries, while aggregated subnational data from the national record review may have corresponded closely to the overall figures in the Global TB Database, inspection of the subnational data revealed incomplete reporting in some geographic areas and years. In other words, the national notifications data can reflect incomplete geographic coverage of case reporting even in areas covered by a DOTS program. As a first adjustment, the quarterly data on notifications by TB basic management units (BMUs)—usually, but not always, corresponding to districts—were augmented by imputing missing quarterly totals using the average value across observed quarters during the same calendar year. In some countries, reporting appeared only in the fourth quarter of some years, consistently across subnational units. To be conservative in the adjustments, it was assumed that

these figures reflected the yearly totals, so there was no imputation of any further cases for the other three quarters. Aggregating up from quarterly to yearly data after this step, it was observed that a number of BMUs continued to have missing values where data were not available for any quarters during a given year. As the composition and definition of BMUs has shifted over time in some countries, the most conservative approach was taken here to identifying missing data; that is, the only values labeled as "missing" were those that are both preceded by and followed by recorded values in other quarters. Table 6.2 summarizes, for all countries in the study for the period 1998 to 2007, the degree of missingness in yearly notifications, even after extrapolating to missing quarters in a given year. Two countries (Ethiopia and Kyrgyzstan) did not complete the standard national record review. Five countries (Burundi, Ghana, Lesotho, Moldova, and Peru) reported information only at the province level. Benin, Cambodia, Haiti, and Malawi provided data that produced complete yearly time series for all BMUs in the national record review. At the other extreme, in DR Congo only around one in three BMUs had complete yearly reporting over the 10-year period.

Table 6.2: Summary Information on Missingness in BMU-level Information Collected through the National Record Review, by Country

Country	Number of BMUs*	Number of BMU with Incomplete Time Series	Median Number of Years of Missing Data (1998-2007), among BMUs with Incomplete Time Series
Benin	51	0	n/a
Burkina Faso	83	29	1
Burundi	Information provided at province level		
Cambodia	181	0	n/a
DR Congo	523	354	2
Ethiopia	National record review not available		
Ghana	Information provided at province level		
Haiti	10	0	n/a
Kyrgyzstan	National record review not available		
Lesotho	Information provided at province level		
Malawi	33	0	n/a
Moldova	Information provided at province level		
Mozambique	171	10	4
Peru	Information provided at province level		
Rwanda†	69	1	1
Tanzania	168	5	2
Vietnam	Information provided at province level		
Zambia	72	3	1

* Reported number includes the total number of unique BMUs represented in the database. In some cases, such as Cambodia, the reorganization of reporting units may mean that the total number of BMUs listed here does not correspond to the number of BMUs reporting in any given year, but rather the universe of BMUs reporting during at least some part of the 10-year period under study.
† Districts in Rwanda were reorganized in 2006, so results reported separately for 1998-2005 (top row) and 2006-2007 (bottom row).
Source: National Record Review for Country Impact Evaluation Reports

In those countries with incomplete time series in any BMUs (defined conservatively as noted above), each province's case notifications were adjusted to account for nonreporting BMUs in those

provinces in two steps. The first step was to fill in missing quarterly data for a given BMU based on extrapolating from observed quarters in the same year. The second step, for those BMUs still missing data at the annual level, used the following simple approach. First, in all of the years in which the BMU did report, the average relative deviation of that BMU's notifications from other consistently reporting BMUs in the same province was estimated. Then, missing yearly data for the BMU were predicted by applying the same relative adjustment based on the observed notifications in the consistently reporting BMUs in that year.

Table 6.3 shows comparisons of national case notification figures from the Global TB Database with the figures from the national record review, before and after adjusting for missing BMU reports where relevant. Results are reported for the 16 countries that completed the national record review in this study. Of these countries, 10 reported BMU-level information. Four of these 10 countries (Benin, Cambodia, Haiti, and Malawi) reported complete time series for all BMUs. For the remaining six countries, the case notifications were adjusted as described above and reported on in the table.

Table 6.3: Comparison between National Case Notifications (New Smear-positives Only) in the Global TB Database, National Record Review in this Evaluation Study, and Adjusted Figures from the National Record Review to Account for Missingness Where Relevant, 1998-2007, by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Benin										
Database	1,988	2,192	2,286		2,415	2,438	2,582	2,739	2,943	
Record review	1,991	2,192	2,277	2,294	2,424	2,446	2,582	2,739	2,943	2,762
Burkina Faso										
Database	1,331	1,411	1,560	1,522	1,544	1,703	1,926	2,294	2,659	
Record review	1,292	1,408	1,545	1,522	1,544	1,703	1,924	2,294	2,659	2,604
Adjusted	1,292	1,498	1,545	1,661	1,548	1,707	1,924	2,297	2,665	2,613
Burundi										
Database								3,262	3,119	
Record review								7,058	6,191	4,852
Adjusted								7,058	6,191	6,469
Cambodia										
Database	13,865	15,744	14,822	14,361	17,258	18,923	18,978	21,001	19,294	
Record review	13,865	15,744	14,822	14,361	17,258	18,923	18,978	21,001	19,294	19,421
DR Congo										
Database	33,442	34,923	36,123	42,054	44,518	53,578	62,192	65,040	63,488	
Record review	28,269	34,485	35,316	28,656	41,008	46,045		26,323	69,941	
Adjusted	41,590	42,188	50,626	42,426	43,079	53,070		36,119	69,941	
Ghana										
Database	7,757	6,877	7,316	7,712	7,732	7,714	7,259	7,505	7,786	
Record review	7,757	6,877	7,316	7,712	7,732	7,714	7,259	7,584	7,778	
Haiti										
Database	6,442	6,828	5,887	5,607	6,188	7,015	7,044	7,340	7,461	
Record review	5,841	5,638	5,696	5,597	5,998	7,032	7,044	7,357	7,499	7,412
Lesotho										
Database	2,476	2,729	3,041		3,167	3,652	4,272	4,280	4,024	
Record review	2,835	2,730	2,982	2,869	3,103	3,478	3,889	3,692	3,603	3,736
Malawi										
Database	8,765	8,132	8,260	8,309	7,703	7,716	8,566	8,443	8,166	8,765
Record review	8,616	8,130	8,260	8,307	7,443	7,716	8,536	8,443	8,170	8,616
Moldova										
Database						1,214	1,536	1,696	1,679	
Record review						1,259	1,544	1,796	1,590	1,585
Mozambique										
Database		12,825	13,257	13,967	15,236	16,138	17,058	17,877	18,275	
Record review		12,838	13,287	13,990	15,221	15,931	17,042	17,791	18,196	18,187
Adjusted		12,847	13,449	14,160	15,221	17,087	18,088	19,065	19,265	18,225
Peru										
Database			22,580	21,685	20,533	18,504	18,289	18,490	19,251	
Record review			19,891	19,163	18,222	16,848	16,686	16,195	14,834	13,897
Rwanda										
Database	4,417	4,298	3,681	3,252	3,956	4,627	4,179	4,166	4,220	
Record review	4,417	4,297	3,681	2,586	3,956	3,710	4,179	4,159	4,220	3,855
Adjusted	4,417	4,297	3,694	3,448	3,956	3,710	4,179	4,159	4,220	3,855
Tanzania										
Database	23,726	24,125	24,049	24,685	24,136	24,899	25,823	25,264	24,724	
Record review	23,773	24,074	24,081	24,640	24,136	24,835	25,824	25,264	24,724	17,979
Adjusted	24,128	24,227	24,275	25,684	25,906	25,319	26,029	25,460	25,887	24,238
Vietnam										
Database		53,805	53,169	54,238	56,698	55,937	58,394	55,492	56,437	
Record review			53,169	54,238	56,698	55,937	58,394	55,492	56,476	
Zambia										
Database					16,351	18,934	17,247	14,857	14,025	
Record review						10,166	11,756	12,543	13,208	13,471
Adjusted						17,662	17,984	13,249	13,208	13,471

Sources: Global TB Database and National Record Review for Country Impact Evaluation Reports

The comparison of data collected in the national record review to data in the WHO Global TB Database shows that 10 countries have deviations of less than 3% every year since 1998 (except where noted): Benin, Burkina Faso (since 1999), Cambodia, Ghana, Haiti (since 2003), Malawi (except 2002), Mozambique, Rwanda (except in 2001 and 2003), Tanzania, and Vietnam.

Adjustments due to incomplete BMU-level reporting were made in six countries. In Burkina Faso, Mozambique, and Tanzania, adjustments for missingness were below 10%. Rwanda required adjustments for missing BMU information in two years, one of which was a large adjustment (33% in 2001). Data from Burundi were limited and showed large discrepancies between sources. Data from DR Congo were also largely discrepant between the global database and national record review, and adjustments needed for missingness were substantial. Lesotho showed discrepancies in the range of 5% to 15% in most years and did not provide data below province level. Moldova had discrepancies between 1% and 6% across four years of reporting. Peru showed discrepancies between 10% and 16% over most years of comparison. Finally, Zambia had large discrepancies with the WHO Global TB Database (declining from 86% in 2003 to 6% in 2006) and required adjustments for missingness that have ranged from 74% in 2004 to 6% in 2005 and no missingness in 2006 and 2007.

Treatment outcomes for new smear-positive cases in the Global TB Database were also compared with those obtained in the national record review (see Table 6.4). Both the number evaluated and the reported outcomes were compared. Table 6.4 highlights substantial discrepancies in gray. Two countries (Ethiopia and Kyrgyzstan) did not complete the national record review. Two countries (Burundi and DR Congo) produced datasets that were very incomplete. Four countries (Benin, Cambodia, Tanzania, and Vietnam) had results in the national record review that provided a very close or identical match to the WHO Global TB Database (within 10% of the total number evaluated and within 2 percentage points of the treatment success probability in all years—shaded in gray, Table 6.4), and three other countries (Burkina Faso, Mozambique, and Peru) had results that matched well in nearly all years. In some cases, the national record review showed treatment success that was higher than that reported by WHO, but these discrepancies typically appeared where the number evaluated was lower in the national record review, indicating the potential for upward bias in the presence of missing data. One possible hypothesis is that poor data quality is correlated with poor program outcomes, so that BMUs with data missing in the national record review were also those with lower treatment success results on average.

Table 6.4: Comparison between Treatment Outcomes for New Smear-positive Cases in Global TB Database (WHO) vs. National Record Review (NRR), by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Benin									
WHO: Number	1,950	2,192		2,298	2,420	2,455	2,582	2,766	
WHO: Tx Success (%)	77	77		79	80	81	83	87	
NRR: Number	1,966	2,161	1,726	2,293	2,420	2,569	2,582	2,766	2,942
NRR: Tx Success (%)	77	78	80	79	80	83	83	87	86
Burkina Faso									
WHO: Number	1,331	1,392	1,574	1,537	1,518	1,718	1,939	2,290	
WHO: Tx Success (%)	59	61	60	65	64	66	67	71	
NRR: Number	1,230	1,394	1,545	1,551	1,518	1,720	1,939	2,149	2,659
NRR: Tx Success (%)	61	59	60	64	64	66	67	76	73
Burundi*									
WHO: Number	2,733	3,465		3,465	3,138	3,624	3,087	3,424	
WHO: Tx Success (%)	74	80		80	79	79	83	79	
NRR: Number								3,539	2,413
NRR: Tx Success (%)								78	84
Cambodia*									
WHO: Number	13,290	15,744	14,775	14,277	17,396	18,923	18,978	21,001	
WHO: Tx Success (%)	95	93	91	92	92	94	91	93	
NRR: Number					17,396	19,098	18,807	20,919	19,298
NRR: Tx Success (%)					92	93	92	93	93
DR Congo									
WHO: Number	33,442	34,923	36,123	40,884	45,013	53,711	62,192	65,066	
WHO: Tx Success (%)	70	69	78	77	78	83	85	85	
NRR: Number	14,017	31,753	27,720	10,934					
NRR: Tx Success (%)	76	75	76	70					
Ethiopia									
WHO: Number	14,836	15,980	29,662	32,391	36,541	39,698	41,430	39,430	
WHO: Tx Success (%)	74	76	80	76	76	70	79	78	
NRR: Number									
NRR: Tx Success (%)									
Ghana									
WHO: Number	6,061	5,605	7,042	7,712	7,732	7,714	7,259	7,584	
WHO: Tx Success (%)	59	55	50	56	60	66	72	73	
NRR: Number	6,419	6,162	5,653	6,599	6,908	7,372	7,245	7,532	
NRR: Tx Success (%)	61	62	65	65	68	70	72	73	
Haiti*									
WHO: Number	1,476	2,933	2,687	3,545	4,681	5,346	5,470	6,625	
WHO: Tx Success (%)	79	70	73	75	78	78	80	81	
NRR: Number	5,752	5,552	5,217	5,850	6,427	6,473	7,264	6,803	2,903
NRR: Tx Success (%)	71	74	77	78	75	78	81	82	70
Kyrgyzstan									
WHO: Number	830	1,272	1,233	1,,458	1,476	1,634	1,716	1,897	
WHO: Tx Success (%)	82	83	82	81	82	84	85	85	
NRR: Number									
NRR: Tx Success (%)									
Lesotho									
WHO: Number		2,831		2,977	2,301	3,652	4,272	5,542	
WHO: Tx Success (%)		69		71	52	70	69	73	
NRR: Number	2,525	2,062	2,537	2,973		2,998	3,195	3,434	2,459
NRR: Tx Success (%)	77	76	80	82		80	85	82	79
Malawi									
WHO: Number	8,824	8,185	8,296	8,274	7,703	7,716	8,566	8,443	
WHO: Tx Success (%)	69	71	73	70	72	73	71	73	
NRR: Number				8,269	7,701		8,021	2,338	
NRR: Tx Success (%)				70	72		76	77	

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Moldova*									
WHO: Number		6		200	556	1,025	1,530	1,690	
WHO: Tx Success (%)			83	66	61	65	62	62	
NRR: Number						954	1,346	1,988	2,071
NRR: Tx Success (%)						48	43	53	54
Mozambique*									
WHO: Number		11,791	13,296	14,001	15,236	16,140	17,058	17,877	
WHO: Tx Success (%)		71	75	78	78	76	77	79	
NRR: Number	9,864	11,737	13,299	14,020	15,317	16,101	1,535	21,661	4,513
NRR: Tx Success (%)	68	72	75	78	78	76	73	77	84
Peru									
WHO: Number	26,137	23,681	22,230	13,524	16,142	15,770	15,807	14,793	
WHO: Tx Success (%)	92	93	90	90	92	89	90	91	
NRR: Number			19,282	18,638	17,771	16,392	15,344	15,228	14,489
NRR: Tx Success (%)			93	92	92	89	90	89	89
Rwanda*									
WHO: Number	5,156	4,652	3,776		3,975	4,627	4,284	4,175	
WHO: Tx Success (%)	72	67	61		58	67	77	83	
NRR: Number	2,705	4,804	3,913	1,906	3,637	4,455	4,179	4,141	3,882
NRR: Tx Success (%)	74	77	80	67	64	70	78	84	89
Tanzania									
WHO: Number	23,726	23,994	23,923	24,235	24,136	24,899	25,823	25,264	
WHO: Tx Success (%)	76	78	78	81	80	81	81	82	
NRR: Number	23,067	23,882	23,892	24,454	24,037	24,896	25,522	24,956	15,823
NRR: Tx Success (%)	78	78	78	81	80	81	81	82	84
Vietnam									
WHO: Number	52,799	53,227	53,169	54,238	56,590	55,842	58,370	55,492	
WHO: Tx Success (%)	93	92	92	93	92	92	93	92	
NRR: Number		53,267	53,138	54,178	56,149	55,840	58,370	55,484	
NRR: Tx Success (%)		92	92	93	92	92	93	92	
Zambia*									
WHO: Number				8,847	11,694	18,934	17,247	14,857	
WHO: Tx Success (%)				75	83	75	83	84	
NRR: Number					13,118	20,272	10,161	15,178	13,148
NRR: Tx Success (%)					86	88	89	84	84

* Recording of years was shifted forward by one year in national record review (e.g., 2006 cohort coded as 2007) in the starred countries. This deviation has been corrected in this table. Number = number registered in WHO database or number evaluated in NRR Tx Success = proportion of patients evaluated with outcomes of cure or treatment complete. Gray shading for numbers indicates discrepancies of 10% or more between WHO database and NRR. Gray shading for treatment success indicates discrepancies of more than 2 percentage points between WHO database and NRR.
Sources: Global TB Database and National Record Review for Country Impact Evaluation Reports.

To add further to the assessment of the completeness and accuracy of reporting, additional data quality checks were undertaken on subnational datasets collected through the national record review based on criteria defined by Dye et al.[4] For example, changes over time in notifications were examined under the expectation that year-on-year changes of more than 10% were unlikely to reflect true epidemiological trends. Likewise, measures such as the male-female ratio and the ratio of smear-positive to all notified cases were examined both in terms of differences across geographic areas and over time and in reference to expected values based on existing knowledge of TB epidemiology and program experience. Detailed results of these checks are presented in individual Country Impact Evaluation Reports, and Annex 6.2 to this chapter provides graphs of subnational trends on various relevant indicators.

[4] Dye, C., S. Ottmani, L. Laasri, and N. Bencheikh. 2007. The decline of tuberculosis epidemics under chemotherapy: A case study in Morocco. International Journal of Tuberculosis and Lung Disease 11(11):1225-1231.

In Table 6.5, summary indicators relating to the three data quality criteria described above are presented. First, in province-level time series in each country, the year-on-year changes in smear-positive notifications are examined. The analysis is confined to those province-years that had at least 100 notifications in order to avoid over-penalizing small samples. Table 6.5 shows the number of province-years available for this analysis in each country, the average year-on-year changes in these data subsets, across all province-years, and the fraction of all province-years that showed less than a 10% relative change from the previous year. Five countries (Benin, Moldova, Mozambique, Peru, and Vietnam) had average changes that were less than 10%, and nine countries (Benin, Cambodia, Ghana, Malawi, Moldova, Mozambique, Peru, Tanzania, and Vietnam) had more than half of all province-years showing less than a 10% change from the previous year. DR Congo and Zambia showed the largest oscillations overall.

A second indicator of data quality is the consistency of reporting by sex across geographic units and over time. Again confining analyses to province-years with at least 100 total smear-positive notifications, Table 6.5 shows the intraquartile range (i.e., the span from the 25th to the 75th percentiles) in the male-female smear-positive notifications across province-years. Seven out of the 14 countries with available data had ranges that varied by less than 30% from top to bottom: Burkina Faso, Burundi, Ghana, Haiti, Malawi, Rwanda, and Zambia. Based on historical TB epidemiology, the male-female ratio is expected to be greater than one; seven countries had male-female ratios above one in all province-years of analysis: Burkina Faso, Burundi, Ghana, Lesotho, Rwanda, Tanzania, and Vietnam. It is noted as a caveat that the male-female ratio may be an imperfect quality metric since this ratio may in part reflect differences in access by gender, which may vary between countries.

The third indicator of data quality relates to the fraction of all notified cases that are new smear-positives. In Table 6.5, both the consistency in this fraction across provinces and years and whether the fractions appear around the expected value of 0.45 is considered. Six countries had intraquartile ranges with a span of less than 30%: Benin, Burkina Faso, DR Congo, Ghana, Peru, and Rwanda. Four countries (Burundi, Lesotho, Malawi, and Tanzania) had more than half of all province-years of analysis fall within a range of +/- 10 percentage points of the expected value of 0.45.

Based on the three sets of indicators described here and summarized in Table 6.5, a summary data quality score was generated using the following criteria: (a) whether the average relative yearly change in notifications was in the lower half of the observations across countries (which produced an identical dichotomization across countries as either the proportion of province-years that reflected changes of less than 10% or the proportion less than 20%); (b) whether the intraquartile range of male-female ratios across province-years had a span of less than 30% of the lower bound; (c) whether the intraquartile range of smear-positive to all cases across province-years had a span of less than 30% of the lower bound; and (d) whether the fraction of province-years falling within the expected range of 35% to 55% smear-positive cases among all cases was in the upper half of the observations across countries. This set of criteria yielded a summary score that could range from 0 to 4; the first column in Table 6.5 reports the scores by country. Overall, the top scores were attained by Ghana, Malawi, and Rwanda, while the lowest scores were assigned to DR Congo, Haiti, Lesotho, Moldova, Mozambique, and Vietnam.

A number of caveats in the interpretation of this score should be noted. First, three countries (Peru, Mozambique, and Vietnam) were not scored on all indicators because they did not report data by sex or did not provide data on notifications of types of cases. Also, note that measures of yearly changes should be interpreted with some caution, as part of the variation across countries relates to differences in the number of provinces (in general, the smaller the number of units, the larger the size of the units and the smaller the random error), differences in case notification levels, and other factors unrelated to data quality. Nevertheless, these metrics do offer examples of simple summary indicators of data quality that may be computed easily from routinely collected data, and provide some means for assessing the quality of notifications data.

The WHO Global Task Force on TB Impact Measurement has proposed a certification process for case notifications that relies on some of the same types of indicators presented here in the assessment of data quality. The findings in the present study point to some of the challenges in collecting and analyzing routine program data, and there remain further conceptual and methodological challenges relating to the definition of clear and valid criteria on which to base the certification process. This data quality analysis has relied largely on arbitrary benchmarks within several of the categories of data assessment proposed by the Global Task Force. Moving forward, it will be important to reflect carefully on the precise definitions of the criteria that will comprise the certification process; it will also be important to find ways to undertake rigorous validation of the certification criteria to the extent possible.

Table 6.5: Data Quality Metrics

Country	Overall Data Quality Score	Year-on-year Changes in Smear-positive Notifications, across Province-years			Male-to-female Ratios across Province-years		Ratios of Smear-positive to All Cases across Province-years		
		Number of Province-years Examined	Average Relative Change	Proportion of Relative Changes <10% (%)	N	Intra-Quartile Range	N	Intra-Quartile Range	Proportion of Ratios Falling between (0.35-0.55) (%)
Benin	++	48	0.08	69	54	1.5-2.0	54	0.76-0.87	0
Burkina Faso	++	52	0.15	44	59	1.8-2.2	62	0.66-0.81	11
Burundi	++	23	0.17	26	20	1.6-1.9	31	0.40-0.67	65
Cambodia	++	162	0.12	54	139	1.0-1.4	139	0.54-0.75	25
DR Congo	+	65	0.90	32	65	1.0-1.4	77	0.58-0.72	18
Ethiopia				National record review not available					
Ghana	+++	84	0.11	57	89	1.7-2.2	89	0.55-0.68	20
Haiti	+	79	0.15	49	60	0.9-1.1	60	0.50-0.71	23
Kyrgyzstan				National record review not available					
Lesotho	+	81	0.16	42	73	1.5-2.2	82	0.31-0.46	51
Malawi	+++	168	0.13	52	195	0.9-1.1	195	0.31-0.41	52
Moldova	+	5	0.07	80	37	2.3-4.3	42	0.24-0.34	24
Mozambique	+	80	0.09	65					
Peru	++	136	0.09	67			155	0.56-0.66	21
Rwanda	+++	45	0.18	40	20	1.5-1.8	39	0.53-0.67	33
Tanzania	++	189	0.11	61	155	1.4-1.9	155	0.37-0.53	66
Vietnam	+	339	0.09	73	382	2.1-2.9	332	0.55-1.00	21
Zambia	++	39	0.36	28	50	1.1-1.3	50	0.25-0.34	24

Source: National Record Review for Country Impact Evaluation Reports

6.4 TB FUNDING

Chapter 4 reviews patterns and trends in funding for tuberculosis. The primary source of information on TB funding is the series of annual Global Tuberculosis Control Reports, which compile country reports made to WHO. The main highlights are briefly summarized here.

Globally, funding for TB has increased steadily since 2003, up to US$3.3 billion in 2008 among 86 countries reporting to WHO. In the 22 HBCs, TB funding increased nearly threefold between 2003 and 2007, from US$0.77 billion to US$2.2 billion in 2007. The Global Fund is the predominant source of funding in the HBCs; it provides more than 25% of the national TB program budget in 11 of the 22 HBCs.[5]

Table 6.6 shows total disbursements for TB from major donors on TB to the evaluation study countries from 2003 to 2006. Disbursement levels varied from year to year in most countries. Levels of disbursement were consistently high in Ethiopia, Peru, and Zambia, exceeding US$3 million in every year. In eight countries, levels were below US$2 million in every year (Benin, Burkina Faso, Burundi, Kyrgyzstan, Lesotho, Malawi, Tanzania, and Vietnam).

Table 6.6: Major Donors Disbursements (Constant 2006 US$ Million) for Tuberculosis, 2003-2006, by Country

Country	2003	2004	2005	2006
Benin	0.3	1.3	1.5	0.3
Burkina Faso	0	2.0	1.3	2.4
Burundi	0.3	0.5	1.4	0.7
Cambodia	3.1	2.9	3.6	4.3
DR Congo	3.4	6.2	2.5	6.8
Ethiopia	11.8	6.1	7.6	5.6
Ghana	1.4	1.2	2.0	8.6
Haiti	3.1	6.7	2.1	4.5
Kyrgyzstan	0.6	1.0	1.1	1.0
Lesotho	0.2	0.8	0.7	0.2
Malawi	1.3	1.3	1.2	1.4
Moldova	2.1	3.2	0.3	0.3
Mozambique	0.3	1.8	0.6	6.9
Peru	3.7	6.2	13.7	5.6
Rwanda	0	4.0	2.0	1.1
Tanzania	0	0	0.4	0.4
Vietnam	0	0.5	1.9	0.3
Zambia	3.3	11.0	15.8	4.0

Source: Global Fund, World Bank, USAID

In the 18 countries in this study, per capita TB disbursements from major donors in 2006 was at or below Int$1 for all countries except Mozambique (Int$1.7). Six countries had per capita TB disbursements ranging from Int$0.50 to $1.00: Burkina Faso, Cambodia, Ghana, Haiti, Kyrgyzstan, and Zambia. Per notified case, estimates ranged from Int$10 in Vietnam to more than Int$1,000 in Burkina Faso, Ghana, and Mozambique. Six countries had disbursements between Int$300 and Int$1,000 per notified case: Burundi, Cambodia, Kyrgyzstan, Peru, and Rwanda.

[5] World Health Organization (WHO). 2008. Global tuberculosis control: Surveillance, planning, financing. WHO Report 2008. Geneva: WHO. Available at http://www.who.int/tb/publications/global_report/2008/pdf/fullreport.pdf.

Table 6.7 reports on cumulative Global Fund disbursements for tuberculosis between 2003 and 2006, showing very large differences between countries.

Table 6.7: Cumulative Global Fund Disbursements for TB (Nominal US$ Million), 2003-2006, by Country

Country	2003	2004	2005	2006
Benin	0.2	1.4	2.8	3.1
Burkina Faso	-	1.9	3.2	5.6
Burundi	-	-	0.6	1.4
Cambodia	0.6	1.1	2.4	4.7
DR Congo	1.6	5.8	6.9	12.3
Ethiopia	6.5	6.5	11.0	15.3
Ghana	1.5	1.9	3.2	11.3
Haiti	-	3.3	3.3	6.9
Kyrgyzstan	0.1	0.6	1.2	1.5
Lesotho	0.2	0.9	1.7	1.7
Mozambique	-	1.3	1.3	7.2
Peru	2.6	7.5	19.6	24.6
Rwanda*	-	3.1	4.8	5.9
Tanzania*	-	-	-	-
Vietnam	-	0.4	2.2	2.5
Zambia	1.5	7.6	17.8	20.8

* Excludes disbursements for HIV/TB combined grants, which add cumulative totals of US$9.1 million in Moldova, US$14.6 million in Rwanda, and US$20.4 million in Tanzania
Source: http://www.theglobalfund.org (Accessed on February 2, 2009)

6.5 Availability of Services

DOTS Population Coverage

DOTS programs are designed to promote early diagnosis of active TB and to increase the proportion of successful treatment outcomes in order to reduce the burden of TB on a large geographic scale. As of 2006, 184 of 212 countries were implementing DOTS. One indicator of the availability of DOTS that is routinely tracked and reported is the DOTS population coverage, which indicates the proportion of a country's population that live in districts or provinces that have adopted DOTS. Based on WHO estimates, populations in Southeast Asia, West Pacific, and Eastern Mediterranean regions are fully or almost fully covered; Africa and the Americas are covered 90% and 92%, respectively.

In the evaluation study countries, populations in half of them (nine) were fully covered by 2000, populations in 14 were covered by 2003, and only Haiti's population was not 100% covered in 2006 (91%).

Availability of Facilities for Diagnosis or Treatment of TB

Some but not all Country Impact Evaluation Reports produced for this evaluation study provide information on time trends in the numbers of facilities providing TB services. Table 6.8 reports the density of facilities over time where these data were reported. Thirteen countries provided at least two data points on facility density. Six countries (Benin, Burkina Faso, Ghana, Malawi, Vietnam, and Zambia) had modest declines in density over the period 2003-2007. In all of these except Malawi and Vietnam, the absolute number of facilities rose slightly but at a slower rate than population growth. Peru showed a modest increase in facility density, while Cambodia, DR Congo,

Haiti, Lesotho, and Tanzania all showed increases of between 10% and 15%, and Burundi showed a nearly 50% increase. Cambodia's continued increase between 2003 and 2007 followed a nearly sixfold increase over the previous five-year period.

Table 6.8: Trends in the Density of TB Services (Numbers of Facilities* Providing TB Services per 100,000 Population) 1998–2007 and Ratio of Change before and after 2003, by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Ratio, 03 to 98**	Ratio, 07† to 03
Benin	0.68	0.66	0.64	0.62	0.60	0.59	0.61	0.60	0.57	0.55	0.87	0.94
Burkina Faso	0.58	0.63	0.62	0.60	0.58	0.57	0.56	0.55	0.56	0.55	0.97	0.97
Burundi			1.27	1.39	1.39	1.34	1.30	1.25	1.69	1.97	1.05	1.47
Cambodia	1.07	1.16	1.71	3.26	4.25	6.32	7.24	7.28	7.16	7.03	5.91	1.11
DR Congo						1.83	1.74	1.82	2.55	2.05		1.12
Ghana						7.15	7.21	7.10	6.95	6.90		0.96
Haiti	1.76	1.89	2.12	2.15	2.26	2.48	2.46	2.52	2.69	2.87	1.40	1.16
Lesotho	10.26	10.08	10.02	9.89	9.89	9.74	10.89	10.80	11.03	11.11	0.95	1.14
Malawi	5.42	5.30	5.15	4.98	4.89	4.75	4.60	4.46	4.32	4.18	0.88	0.88
Peru			0.07	0.07	0.07	0.07	0.07	0.07	0.07		1.00	1.02
Rwanda										4.58		
Tanzania							5.46			6.24		1.14
Vietnam			13.30	13.20	13.10	13.70	13.60	13.40	13.20	12.90	1.03	0.94

* Facilities defined as any facilities providing diagnostic or treatment services for TB, except in Burundi, which reports only on facilities providing diagnostic services
** Or earliest observed
† Or latest observed
Source: Country Impact Evaluation Reports

For PDACs, the DCA Facility Census was undertaken in selected districts and may be used to examine the availability and basic quality of TB services in health care facilities in these districts. Specific types of services offered are detailed in Table 6.9. The majority of surveyed facilities reporting to offer any TB service offered at least one type of diagnostic service (sputum smear, culture, X-ray, MDR-TB) or treatment-related service. DOTS, or services related to treatment such as Directly Observed Treatment outreach services and follow-up of TB patients, were the most frequently offered TB-related service.

Table 6.9: Among Surveyed Health Facilities that Report to Offer any TB Services, the Percentage that Offer Specific TB Services, by Country, 2008

	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Number of districts	13	7	11	9	9	23	9
Number of facilities that report to offer any TB services	335	140	156	173	106	284	239
Offer at least one of the TB services below	83	95	99	60	95	96	93
Diagnosis of TB through sputum smear microscopy	7	67	85	54	31	71	46
Diagnosis of TB through culture	1	16	4	6	3	40	15
Diagnosis of TB including X-ray	4	13	24	24	12	32	28
Diagnosis of MDR-TB using culture or rapid test	1	6	7	6	4	19	11
DOTS	64	76	90	41	52	67	72
Directly Observed Treatment outreach services	70	66	19	40	63	48	53
Follow-up of TB patients	80	79	90	47	92	74	77

Source: DCA Facility Census or DCA Facility Survey 2008

There was considerable variation in which types of diagnostic services were available across countries. Diagnosis of TB through sputum smear microscopy was offered in only 7% of the health care facilities offering TB services in Burkina Faso, whereas in Ethiopia 85% of the facilities offered this service. In general, few health care facilities offered culture for diagnosis of TB. Culture was most widely offered in Peru (40%). In Burkina Faso, less than 1% of the visited health care facilities offering TB services offered diagnosis through culture. Diagnosis of TB, including X-ray, was most widely offered in Ethiopia (24%), Haiti (24%), Peru (32%), and Zambia (28%). Diagnosis of MDR-TB using culture or rapid tests was most widely available in Peru and least widely available in Burkina Faso. When differences between public and private facilities were analyzed, it was found that private facilities were more likely than public facilities to offer smear microscopy and culture in Burkina Faso, Malawi, Peru, and Zambia; private facilities were more likely to offer diagnosis of MDR-TB in all countries except Ethiopia (which only had one private facility visited in this study).

About seven out of 10 health facilities were reported to provide DOTS in Burkina Faso, Cambodia, Peru, and Zambia. Treatment-related services were least frequently available in Haiti (41%). Almost all hospitals and health centers in Ethiopia provided TB treatment. In Burkina Faso, Cambodia, Haiti, and Malawi, public facilities were about twice as likely as private facilities to offer DOTS—almost three times as likely in Peru. By contrast, only 45% of public facilities in Malawi offered DOTS, compared with 70% of private facilities.

GLOBAL FUND FINANCING FOR TB/HIV AND MDR-TB INTERVENTIONS

While the design of the present study did not allow for collecting new data on TB/HIV co-infection or MDR-TB, the Global Fund portfolio across the 18 countries in the study was examined in order to summarize the specific interventions and activities relating to TB/HIV and MDR-TB that are currently supported by the Global Fund. Table 6.10 shows the results of this review as a checklist of specific components included in grants through Round 6.

Table 6.10: TB/HIV and MDR-TB Activities Supported by Global Fund Grants (Cells Report on Rounds in which Specific Activities Were Included), by Country

Country	Collaborative TB/HIV Activities	HIV Testing in TB Patients	TB testing in HIV Patients	Co-trimoxazole Prophylaxis in TB/HIV	ART Treatment for TB/HIV Patients	MDR Drug Procurement and Treatment
Benin	2,5	2		5,6	2,6	6
Burkina Faso	6	4			4	
Cambodia		5			5	
DR Congo	5					5
Ethiopia	1	4				1
Ghana	5	5	5		5	
Haiti	5			5		
Kyrgyzstan	6					2,6
Lesotho	5,6	6		6		
Moldova	6					6
Peru			5			5
Rwanda	6	1	1	1		4,6
Tanzania	3					
Vietnam	6		1			6
Zambia			1	1	1	1

ART=antiretroviral therapy
Source: http://www.theglobalfund.org; grants through Round 6

6.6 SERVICE QUALITY

TREATMENT OUTCOMES

The primary indicator of quality of services in a TB program is the categorization of treatment outcomes for yearly cohorts of patients. Globally, about 2.4 million smear-positive patients notified in 2005 started treatment. Overall treatment success (cured or completed treatment) of those patients was 84.5%, almost reaching the target set by the World Health Assembly in 1991 of 85% successfully treated.

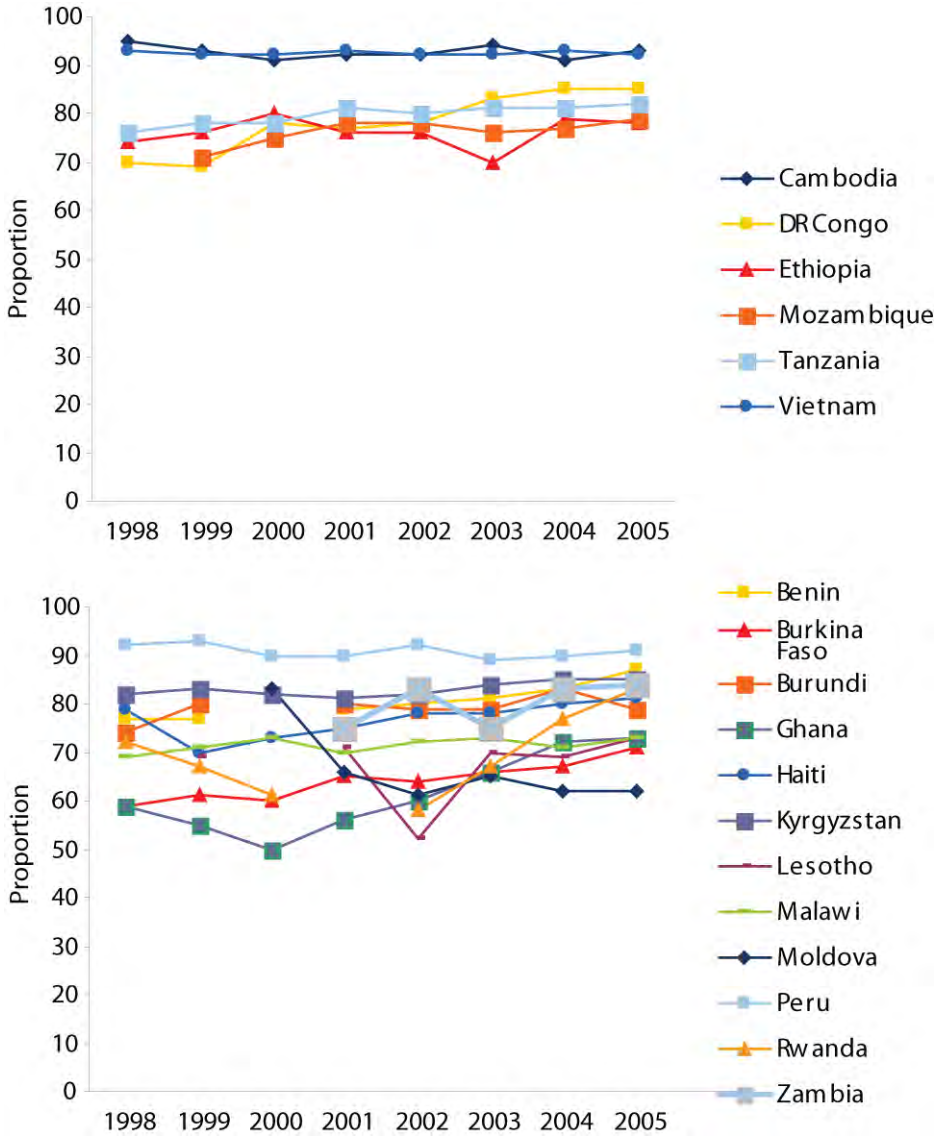
In this evaluation study, information at the district level on treatment outcomes was collected as part of the national record review. As noted above, data quality was assessed by comparing the aggregated national-level results on treatment outcomes among new smear-positive patients from the national record review with the results reported in the WHO Global TB Database (see Table 6.4). In Haiti, Ghana, and Rwanda, the national record review yielded higher estimates of treatment success than the WHO database in earlier years but matched well in the last two to three years; the national record review in Malawi deviates upward from the WHO database in the most recent years; the Lesotho and Zambia national record reviews consistently overstate; and the Moldova national record review consistently understates treatment success compared with WHO figures.

A number of observations about levels and recent trends in successful treatment are consistent across both the WHO Global TB Database and the national record review, although in some cases discrepancies between the two sources leave some ambiguity about recent trends. In terms of clear and consistent findings, Benin and Burkina Faso show 10% or greater improvements since 2000 based on either data source. Several countries (Cambodia, Peru, and Vietnam) have held steady with already high rates (above the 85% target), while others (Tanzania and Mozambique) maintained somewhat lower levels over this period.

In terms of discrepant findings, the countries showing the most improvement in treatment success according to the WHO figures included Ghana and Rwanda, but in contrast to the gains of more than 30% in the WHO database, the national record review points to a more modest slope of increase. In Zambia, where WHO figures point to a 10% improvement over the last five years, the national record review suggests little change. On the other hand, Malawi shows a flat trend in the WHO database and a rising trend in the record review. Lesotho shows a flat trend at a moderate level of treatment success in the WHO figures but a higher level in the national record review. Although figures in Moldova are widely discrepant, both data sources point to poor outcomes.

Among countries omitted from the national record review or providing insufficient data to assess recent trends, DR Congo and Kyrgyzstan show modest improvements in the WHO database; Burundi and Ethiopia have relatively stable patterns below the 85% target, and Kyrgyzstan has risen to attain the target in recent years.

Figure 6.1
Trends in Treatment Success Proportions among High-Burden Countries (Upper Panel) and Other Countries (Lower Panel) Participating in the Evaluation Study, 1998-2005



Source: WHO Global TB Database

Figure 6.1 summarizes the trends in treatment success from the WHO database in high-burden and other countries in this study. Treatment success ranged widely across both high-burden and other countries, although the levels among the six HBCs were all generally above 70%, whereas six of the 12 non-HBCs (Burkina Faso, Ghana, Lesotho, Malawi, Moldova, and Rwanda) had levels below 70% in at least one year.

The national record review undertaken in this study builds on the routine national-level reporting reflected in the WHO Global TB Database by examining subnational information. As noted above, the focus of this evaluation study is on the first subnational level, usually provinces or regions (the shorthand "province" is used to refer to this level, recognizing that the naming of the first subnational administrative level varies across countries). The annex figures present treatment outcomes at the province level for each of the countries that provided subnational information in

the national record review. To evaluate whether the trends in successful treatment have differed significantly across provinces, the intraquartile ranges across provinces in treatment success probabilities were computed in each country. Table 6.11 shows the span across the intraquartile range in each country. In countries having four or more data points starting in 2001, linear regression models were fit to these values from 2001 through 2006 (or an available subset of this period), and the significant results are reported in the last column of Table 6.11. Four countries showed discernible progress in reducing geographic disparities in treatment outcomes: Benin, Cambodia, Moldova, and Rwanda. The other 10 countries for which the regression models were fit showed no significant trends in the subnational variation around treatment outcomes. In some countries, wide gaps remain across different areas; for example, Ghana and Lesotho both maintain approximately 20 percentage point differences between provinces with the best and worst outcomes, and these gaps have not appeared to diminish over the last decade, even as treatment has improved on average in Ghana.

Table 6.11: Trends in Subnational Variation in Treatment Success Probabilities: Span of Interquartile Range in Treatment Success Proportion across Provinces, 1998–2006, and Slope of Linear Regression from 2001 (or First Available Year Thereafter) through 2006 (or Last Available Year), by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	Slope
Burkina Faso	10.2	15.7	7.2	9.2	10.0	3.0	6.1	5.2	9.2	NS
Burundi								8.0	9.0	-
Cambodia					8.3	8.0	8.1	7.0	5.5	-0.7**
DR Congo	5.9	9.3	12.2	12.5						-
Ghana	5.5	10.1	11.0	5.9	8.5	11.5	12.7	9.8		NS
Haiti	10.3	2.1	6.0	6.2	12.4	7.4	2.8	2.9	21.9*	NS
Lesotho	14.0	10.8	7.6		21.2	18.1	5.0	11.0	15.2	NS
Malawi				7.7	5.9		4.0	4.7		NS
Moldova						28.7	26.3	16.4	12.4	-5.9**
Mozambique	8.1	9.3	10.7	5.8	7.4	7.5	1.7*	8.8	3.7*	NS
Peru			2.3	3.3	3.6	6.7	4.8	3.5	2.8	NS
Rwanda	5.6	2.4	0.6	10.5	2.6	5.6	3.5	3.2	1.2	-1.3†
Tanzania	11.2	11.4	6.4	6.2	4.2	4.2	4.9	6.8	4.2	NS
Vietnam			4.0	3.5	3.4	3.0	3.4	3.0	4.2	NS
Zambia					6.7	2.1	3.8	4.9	3.1	NS

NS=not significant
* Data points excluded from regression based on very incomplete reporting (i.e., overall sample size <50% of sample sizes in surrounding years).
** Significant at p<0.05
† Significant at p<0.10
Source: National Record Review for Country Impact Evaluation Reports

QUALITY OF DIAGNOSTIC SERVICES

From the DCA Facility Census in PDACs, the availability of diagnostic equipment and materials is considered as another indicator of the quality of services. Among those health care facilities that reported to offer TB sputum tests, the proportion that had materials available for the test in Cambodia was only 54%. Rates were higher in the other countries, at 75% or above except in Peru (see Table 6.12). Public facilities were more than twice as likely to have observed materials available compared with private facilities in Burkina Faso. On the other hand, public facilities in Malawi were less likely than private facilities to have observed materials (71% compared with 92%). The DCA Facility Census also assessed capacity to perform the tests onsite and deliver prompt results. In all

countries, only around half or fewer facilities that report to offer TB diagnosis could perform the test onsite and have the result available the same day. In Burkina Faso, Ethiopia, Haiti, Malawi, Peru, and Zambia, approximately 70-80% of facilities can perform the TB sputum test onsite. The data show that some health care facilities that have TB sputum test materials and equipment nevertheless do not perform the test onsite. While there have been suggestions for indicators of smear microscopy quality based on data available in TB laboratory registers,[6] the examination of individual laboratory registers was beyond the scope of the national record review conducted in this evaluation study.

Culture tests for TB were only available in a relatively small number of facilities. Of the health care facilities offering culture, only 9% had the materials available in Cambodia. In Haiti and Zambia, 55% and 38%, respectively, had materials available. In Burkina Faso, 40% of the health care facilities that offer culture tests had to refer them elsewhere; in Cambodia this proportion was 38%, in Haiti 9%, and in Zambia 12%.

Table 6.12: Among Surveyed Facilities that Report to Offer Diagnosis of Tuberculosis through Sputum Smear Microscopy, the Percentage that Have Available TB Sputum Test (AFB or Ziehl Nielsen Test with Stain), by Country, 2008

	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Number of facilities that offer diagnosis of TB through sputum smear microscopy	24	94	133	94	33	203	111
Percentage with TB sputum test equipment and materials (observed)	75	54	91	85	79	64	77
Available onsite, results today	50	40	53	35	27	36	50
Available onsite, results not today	29	5	34	43	39	42	23
Available offsite, results within two days	4	16	9	14	30	15	15
Not available	17	38	3	9	3	4	13

Source: DCA Facility Census or DCA Facility Survey 2008

AVAILABILITY OF TUBERCULOSIS DRUGS

Findings from the DCA Facility Census on the availability of anti-tuberculosis drugs in facilities offering DOTS were also examined (see Table 6.13). Drug availability was much lower in Burkina Faso compared with the other countries. However, it is worth noting that in all countries except Ethiopia there were some health care facilities that offer DOTS but do not have any of the main drugs used for standardized treatment available.

[6] Van Deun, A., M. Zwahlen, V. Bola, R. Lebeke, E. Bahati, P. Lubamba, and H.L. Rieder. 2007. Validation of candidate smear microscopy quality indicators, extracted from tuberculosis laboratory registers. International Journal of Tuberculosis and Lung Disease 11(3): 300-305.

Table 6.13: Among Surveyed Health Facilities that Report to Offer TB Treatment (DOTS), the Percentage Having Available at Least One Type of TB Treatment Drug, by Country, 2008

Availability of Drugs	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Number of facilities that offer TB treatment (DOTS)	216	107	141	71	55	191	172
Ethambutol	32	93	99	99	95	86	92
Isoniazid	33	87	99	97	95	87	94
Rifampicin	31	91	99	90	91	87	90
Pyrazinamide	28	91	96	92	91	83	88
Streptomycin injectable	10	24	72	38	20	46	51
No TB drug	54	7	0	1	5	4	6
All four TB drugs (excluding streptomycin)	27	84	96	85	91	82	86
All five TB drugs	9	22	72	34	20	45	50

Source: DCA Facility Census or DCA Facility Survey 2008

When considering the differences between public and private facilities, it was found that private facilities were more likely than public facilities to have all five drugs available in Burkina Faso, Cambodia (though numbers of public facilities offering treatment were small), and Zambia but less likely in Haiti, Malawi, and Peru.

In terms of specific formulations, fixed-dose combinations were most widely available in Ethiopia, Haiti, Malawi, and Zambia (see Annex Table 6.1). Four-drug fixed-dose combinations were most widely available in Ethiopia (86%), Malawi (91%), and Zambia (73%). Expired drugs were mainly found in Burkina Faso and Ethiopia.

AVAILABILITY OF CO-TRIMOXAZOLE

As an indicator of readiness to manage TB/HIV co-infected patients, the availability of co-trimoxazole in the DCA Facility Census was also examined. Table 6.14 reports the health care facilities with co-trimoxazole available, as either a proportion of all facilities offering TB treatment or as a proportion of all facilities offering any HIV services. Wide availability of co-trimoxazole was found in all countries.

Table 6.14: Among Surveyed Health Facilities that Report to Offer TB Treatment (DOTS) or HIV Services, the Percentage Having Co-trimoxazole Available, by Country, 2008

Availability of Drugs	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Number of facilities that offer TB treatment (DOTS)	216	107	141	71	55	191	172
Percentage with co-trimoxazole	99	93	95	96	89	96	96
Number of facilities that offer HIV services	331	87	149	114	105	294	268
Percentage with co-trimoxazole	87	95	96	83	91	85	92

Source: DCA Facility Census or DCA Facility Survey 2008

AVAILABILITY OF TRAINED STAFF AND GUIDELINES

More than 70% of health care facilities in Burkina Faso, Cambodia, Ethiopia, and Peru had staff trained in diagnosis and treatment of TB, whereas proportions were lower in Haiti, Malawi, and Zambia (see Table 6.15). In all countries, public facilities were more likely than private facilities to have one or more trained staff. Guidelines were widely (although not universally) available in health care facilities in Cambodia, Ethiopia, and Peru—and, to a lesser extent, Burkina Faso and Zambia; they were only in half or fewer of all facilities in Haiti and Malawi.

In all countries except Peru, more staff had received training on management of TB/HIV co-infection than in management of MDR-TB. Also, guidelines on management of TB/HIV co-infection were more frequently available (again, except in Peru). These findings are not surprising since TB/HIV guidelines have been available for a longer period of time and since training for managing MDR-TB is needed only once MDR-TB treatment is available. Accordingly, in Peru, where MDR-TB has been more prominent, training and guidelines are more available.

Table 6.15: Among Surveyed Health Facilities that Report to Offer Any TB Services, the Percentage with Trained Staff and Guidelines, by Country, 2008

	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Number of facilities that offer TB services	335	140	156	172	106	284	239
Diagnosis and treatment (management) of TB							
No staff trained (%)	26	20	15	54	46	18	35
One or more staff trained (%)	73	80	79	46	49	82	63
Guidelines available (%)	64	71	80	31	50	75	64
Management of MDR-TB							
No staff trained (%)	78	61	66	83	86	30	70
One or more staff trained (%)	21	39	31	17	9	69	28
Guidelines available (%)	19	34	27	12	13	60	25
Management of TB/HIV co-infection							
No staff trained (%)	67	54	32	74	79	45	39
One or more staff trained (%)	33	46	62	26	15	58	60
Guidelines available (%)	29	45	55	16	15	43	52

Source: DCA Facility Census or DCA Facility Survey 2008

SUMMARY OF QUALITY OF SERVICES FROM DCA FACILITY ASSESSMENT

Based on results of the DCA Facility Assessment, Table 6.16 shows the proportion and density per 100,000 population of health facilities that offer TB treatment or TB diagnosis. For each type of service, it is assessed whether a minimum standard is met. For treatment, this implies a trained staff member, guidelines, and all four main first-line TB drugs. For diagnosis, the criteria include at least one trained staff member, guidelines, offering of a smear or culture, and the equipment for a smear or culture. Service readiness for diagnosis and treatment were similar in all countries except in Burkina Faso, where diagnostic readiness was much higher than treatment readiness, and in Cambodia, where the reverse pattern appeared. Only in Ethiopia, Peru, and Zambia do more than half of facilities reporting to offer either diagnosis or treatment meet all of the minimum standards for each. Overall, the results point to considerable room for improvement on basic infrastructure and human resources needed to provide high-quality services. In terms of differences between public and private facilities, minimum standards for diagnosis and treatment were generally, though not universally, higher in public than in private facilities. Overall, these results indicate that public programs are generally better prepared to offer TB services than private programs, but that the scope for improvement remains substantial in both sectors.

Table 6.16: Summary of Indicators of Diagnostic and Treatment Readiness, by Country, 2008

	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Zambia
Population (pooled for districts), millions	3.3	1.4	-	2.7	5.2	3.2	2.6
Total number of facilities visited	541	207	158	206	113	358	338
Number of facilities offering TB diagnosis	27	99	134	97	33	211	128
Density of facilities offering TB diagnosis per 100,000	0.8	7.2	-	3.6	0.6	6.6	4.4
Percentage with trained staff	85	77	83	70	58	80	67
Percentage with guidelines	78	65	84	49	61	75	65
Percentage offering diagnosis with sputum smear or culture test	93	98	99	97	100	99	72
Percentage with lab equipment available to conduct smear or culture test	70	54	93	87	97	81	71
Percentage facilities meeting all minimal standards for diagnosis	63	37	72	47	55	59	45
Number of facilities that offer TB treatments (DOTS)	216	107	141	71	55	191	172
Density of facilities offering TB treatment per 100,000	6.5	7.7	-	2.6	1.1	5.9	5.9
Percentage with trained staff	80	89	79	75	47	89	76
Percentage with guidelines	68	73	82	54	47	86	74
Percentage with essential drugs*	27	84	96	85	91	82	86
Percentage facilities meeting all minimal standards for treatment	21	64	70	44	44	70	63

*Isoniazid, rifampicin, ethambutol, and pyrazinamide
Source: DCA Facility Census or DCA Facility Survey 2008

6.7 INTERVENTION COVERAGE

The primary measure of intervention coverage in global TB monitoring has been the estimated detection rate for smear-positive cases. The case detection rate is estimated as the number of notified smear-positive cases divided by the estimated incidence of smear-positive TB. This indicator has been used to define targets for TB control, but direct measurement of the denominator is not feasible in most places. For purposes of this evaluation study, the case detection rate is not emphasized due to its dependence on modeled incidence rather than on directly observable quantities.

While there are no ideal measures of intervention coverage, some indirect indicators from both the national record review and the DCA Household Surveys in the PDACs are reported.

First, several Country Impact Evaluation Reports describe levels of diagnostic effort in terms of the numbers of TB suspects examined by smear microscopy. Table 6.17 summarizes this information for those countries that included this indicator in their Country Impact Evaluation Reports. Cambodia has shown a steady increase in diagnostic effort since 2001. Haiti, on the other hand, has had a notable decrease since 2004. In Peru, where the rate of diagnostic tests is four times higher than elsewhere, diagnostic efforts dipped from 2002 through 2004, reflecting a general weakening

of the TB program as detailed in their Peru Impact Evaluation Report, but since 2004 they have increased steadily. Rwanda has increased consistently, with the exception of 2006. Vietnam has seen mostly steady figures over the period, and Zambia has seen a dramatic increase in the last two years of reporting. Overall, the evidence in this study suggests an overall increase in diagnostic effort between 2001 and 2007 and also between 2004 and 2007, although there is substantial heterogeneity across countries.

Table 6.17: Number of TB Suspects Examined by Smear (per 100,000), 1999-2007, by Country

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cambodia			414	601	795	889	1,003	984	1,030
Haiti	890	1,110	1,120	1,330	1,520	1,560	1,510	1,460	1,400
Peru		4,508	4,240	4,138	3,800	3,697	4,308	4,452	4,864
Rwanda			572	505	500	509	514	418	655
Vietnam			720	771	773	813	809	846	798
Zambia					228	169		586	786

Source: Country Impact Evaluation Reports

6.8 Prevalence, Mortality, and Morbidity

Direct data on the mortality or epidemiology of TB are relatively uncommon in HBCs. This section begins with a review of the types of information that are available on mortality, incidence, disease prevalence, and prevalence of infection and follows with a summary of analyses in the present study.

Mortality. In the 18 countries in this study (as in general for resource-limited countries), complete vital registration data are not available to assess TB-attributable mortality. The development of new verbal autopsy methods (e.g., a survey module for deaths in the last 24 months) may eventually add new data points on cause-specific deaths in a range of settings, but these methods were not yet sufficiently advanced to be used in this study. The major observable information relating to TB mortality is direct measurement of survival of patients on treatment in DOTS programs; however, high default rates may compromise the quality of the estimates, and these numbers are of unclear relevance to the unknown number of patients not under treatment or who are treated outside of DOTS programs. Treatment success rates as a measure of quality of services are reported above, but no attempt is made here to extrapolate from cohort treatment outcomes to overall measures of TB mortality in the population.

Incidence and prevalence. Direct measurement of the incidence of active TB is not feasible. The most readily available information relating to incidence is the time series of case notifications, although it is important to acknowledge that interpretation of case notifications data is complicated by changes in levels of ascertainment over time, due for example to the implementation of new reporting systems or modalities. Below is a more detailed discussion about the tracking of case notifications over time and ways to enhance the interpretation of these series. As noted above, the estimated detection rate for smear-positive cases has been emphasized in routine reporting on progress in global TB control and is one of the targets of the Stop TB Partnership, but it is not evaluated in the present study. This exclusion is deliberate due to the lack of direct measurements of incidence, which is the denominator of this indicator.

Direct measurement of the prevalence of smear-positive pulmonary tuberculosis is possible through national prevalence surveys, which are available in a limited number of countries but also expected in others over the next several years (see Table 6.18). Only one country in this evaluation study (Cambodia) had data available for this study from a recent prevalence survey. The results are described in the Cambodia Impact Evaluation Report and summarized briefly below.

Table 6.18: National and Subnational TB Disease Prevalence Surveys Conducted and Planned in the 18 Countries Included in the Evaluation Study

Country	National Disease Prevalence Survey Conducted (Year[s])	National Disease Prevalence Survey Planned (Year)	Subnational Disease Prevalence Survey Conducted (Year[s])	Selected as Priority Country for a National TB Prevalence Survey by the Global Task Force Impact Measurement
Benin	No	No	No	No
Burkina Faso	No	No	No	No
Burundi	No	No	No	No
Cambodia	Yes (2002)	Yes (2010)	Yes (1981, 1982, 1983, 1984, 1985, 1988, 1995, 1998)	Yes
DR Congo	No	No	No	No
Ethiopia	No	No	Yes (2001)	No
Ghana	Yes (1957)	No	No	Yes
Haiti	No	No	No	No
Kyrgyzstan	No	No	No	No
Lesotho	No	No	No	No
Malawi	No	Yes (2008)	Yes (1960)	Yes
Moldova	No	No	No	No
Mozambique	No	No	Yes (1961)	Yes
Peru	No	No	No	No
Rwanda	No	Yes (2008)	No	Yes
Tanzania	No	Yes (2009)	Yes (1958)	Yes
Vietnam	Yes (2006/7)	No	Yes (1961)	Yes
Zambia	No	Yes (?)	Yes (1980)	Yes

Sources: WHO. Assessing tuberculosis prevalence through population-based surveys. Manila 2007. WHO. 2007. Measuring progress towards the Millennium Development Goals, report of the second meeting of the WHO Global Task Force on TB Impact Measurement, 6-7 December 2007, WHO Headquarters, Geneva.

While only a relatively small number of future prevalence surveys are planned at this time, the WHO Global Task Force on TB Impact Measurement has recommended that 21 focus countries should carry out at least one prevalence survey between 2008 and 2015. Of these 21 countries, eight are among the 18 countries in the present study (Cambodia, Ghana, Malawi, Mozambique, Rwanda, Tanzania, Vietnam, and Zambia). The list of 21 countries was finalized from a provisional list of 53 countries that was devised based on four criteria relating to levels of estimated prevalence rates, estimated absolute prevalence numbers, HIV prevalence, and the timing of previous or planned TB prevalence surveys. In addition to the eight countries in the final list of 21, an additional six countries in the present study were among the other 32 countries in the preliminary list: Burkina Faso, Burundi, DR Congo, Ethiopia, Haiti, and Lesotho.

The results from the 2002 prevalence survey in Cambodia (described below) led to a considerable change in estimated prevalence and, consequently, a considerable change in the estimate of the case detection rate. Substantial revisions in estimates were also prompted by survey results in Eritrea,

where prevalence in the survey appeared much lower than previously estimated.[7] In Korea[8] and China,[9] repeat prevalence surveys provided clear evidence of declining TB trends (in China, limited to DOTS areas) and, by implication, evidence of the impact of TB control. It has been noted that the cost of surveys can vary substantially depending on sample size and the inclusion of chest radiology (the most expensive component), with an estimated range of costs between US$4 and US$25 per person surveyed.[10] While this expense would imply a cost of up to US$2.5 million for a survey of 100,000 persons with X-ray examinations, if done once every 10 years, then the cost of around US$250,000 per year is relatively modest in relation to total expenditures on TB in most HBCs. Such a cost seems justifiable in order to assess the impact of TB control efforts. This evaluation study highlights a number of ways in which the weakness of existing evidence precludes clear inferences about recent epidemiologic trends, so concrete measurement of trends in prevalence—while costly—is attainable and should be considered more widely.

Annual risk of infection. Though used extensively in the past, annual risk of infection is no longer a central element in routine TB surveillance in part because of methodological challenges in interpreting results of tuberculin skin test surveys. If measured reliably, however, risk of infection would provide useful and timely information for program evaluation because it captures the secondary benefits of treatment in terms of reduction in the transmission of TB infection and would be expected to respond relatively rapidly to effective program implementation.

The tuberculin skin test has historically been the mainstay of efforts to measure prevalence of infection but presents a number of methodological challenges due to its limited specificity. Recent advances in the diagnosis of latent TB infection may present a promising new opportunity to measure changes in risk of infection as an indicator of program impact. At present, however, these technologies are not sufficiently mature to recommend wide implementation for purposes of monitoring. For the purposes of assessing trends in this evaluation study, countries in which at least two tuberculin surveys have been conducted in recent years following standardized methodologies were identified so that some assessment of trends may be undertaken, assuming that biases due to limited specificity might be relatively consistent at two time points. Peru and Tanzania were the only two countries that met this criterion. Results from these analyses are detailed in the Country Impact Evaluation Reports and summarized below.

[7] Sebhatu, M., B. Kiflom, M. Seyoum, N. Kassim, T. Negash, A. Tesfazion, M.W. Borgdorff, and M.J. van der Werf. 2007. Determining the burden of tuberculosis in Eritrea: A new approach. Bulletin of the World Health Organization 85(8): 593-599.

[8] Hong, Y.P., S.J. Kim, W.J. Lew, E.K. Lee, and Y.C. Han. 1998. The seventh nationwide tuberculosis prevalence survey in Korea, 1995. International Journal of Tuberculosis and Lung Disease 2(1): 27-36.

[9] China Tuberculosis Control Collaboration. 2004. The effect of tuberculosis control in China. Lancet 364(9432): 417-422.

[10] Glaziou, P., M.J. van der Werf, I. Onozaki, C. Dye, M.W. Borgdorff, C.Y. Chiang, F. Cobelens, D.A. Enarson, P.G. Gopi, T.H. Holtz, S.J. Kim, F. van Leth, W.J. Lew, K. Lonnroth, P. van Maaren, P.R. Narayanan, and B. Williams. 2008. Tuberculosis prevalence surveys: Rationale and cost. International Journal of Tuberculosis and Lung Disease 12(9): 1003-1008.

Table 6.19: National and Subnational TB Infection Prevalence Surveys Conducted and Planned, by Country

Country	National Infection Prevalence Survey Conducted (Year[s])	National Infection Prevalence Survey Planned (Year)	Subnational Infection Prevalence Survey Conducted (Year[s])
Benin	Yes (1987, 1994)	Unknown	No
Burkina Faso	No	Unknown	No
Burundi	No	Unknown	Yes (1982)
Cambodia	Yes (2002)	Unknown	Yes (1955, 1968, 1981, 1995)
DR Congo	No	Unknown	No
Ethiopia	Yes (1954, 1989)	Unknown	Yes
Ghana	Yes (1957)	Unknown	Yes (2006)
Haiti	No	Unknown	No
Kyrgyzstan	No	Unknown	No
Lesotho	Yes (1956, 1981)	Unknown	Yes (1962, 1992)
Malawi	Yes (1994)	Unknown	No
Moldova	No	Unknown	No
Mozambique	No	Unknown	Yes (1961, 1987, 1988)
Peru	Yes (1999, 2007)*	Unknown	Yes (1981, 1982, 1987, 1993)
Rwanda	No	Unknown	No
Tanzania	Yes (1985, 1990, 1995, 2002)	Yes (2009)	Yes (1958, 1988–1992, 1993-1998, 2000)
Vietnam	Yes (2006)	Unknown	Yes (1955, 1961, 1986, 1990, 1991, 1996)
Zambia	No	Unknown	Yes (1980)

* Source: Peru Country Impact Evaluation Report
Source: WHO. Assessing tuberculosis prevalence through population-based surveys. Manila 2007.

TRENDS IN CASE NOTIFICATION RATES

National-level trends in case notification rates are compiled regularly through the Global TB Database and reported annually by WHO. In this study, this resource is enhanced with subnational notifications data and information on diagnostic intensity that may be used to improve interpretation of case notification trends in the absence of 100% detection of new cases.

Table 6.20 shows notification rates (per 100,000 population) for new smear-positive cases in the 18 countries in this evaluation study from the Global TB Database. Six countries (Benin, Ethiopia, Ghana, Rwanda, Vietnam, and Zambia) had minimal changes (less than 10% in either direction) between the period 2000-2001 and the period 2005-2006. Two countries (Haiti and Mozambique) had moderate increases (between 10% and 20%) between these two periods, and four countries (Burundi, Malawi, Peru, and Tanzania) had moderate decreases. Six countries (Burkina Faso, Cambodia, DR Congo, Lesotho, Kyrgyzstan, and Moldova) had large increases (>20%), with the largest increase—more than doubling—in Moldova.

Table 6.20: New Smear-positive Cases Notified per 100,000 Population, 1998-2006, by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Benin	29	31	32		31	31	31	32	34
Burkina Faso	12	12	13	12	12	13	14	16	19
Burundi	43	45		44	40	42	43	42	38
Cambodia	113	126	116	110	130	140	138	150	136
DR Congo	69	71	71	81	83	97	109	111	105
Ethiopia	29	32	44	46	50	53	54	49	45
Ghana	40	35	36	37	37	36	33	33	34
Haiti	78	81	69	64	70	78	77	79	79
Kyrgyzstan	17	34	26		31	32	34	38	35
Lesotho	136	147	161		164	187	217	216	202
Malawi	80	72	71	70	63	61	66	64	60
Moldova	11	14	16	26	28	31	39	44	44
Mozambique	70	72	73	75	80	82	85	87	87
Peru	111	97	88	83	78	69	68	68	70
Rwanda	63	56	45	38	45	52	46	45	45
Tanzania	74	73	71	71	68	68	69	66	63
Vietnam	71	69	67	68	70	68	70	65	65
Zambia		114	124	122	150	171	153	129	120

Source: Global TB Database (http://www.who.int/globalatlas/)

In this study, subnational information was collected through the national record review that allows a more detailed assessment of patterns over time. Analysis of subnational data (see annex figures) reveals that, for most countries, geographic disparities in notification rates have persisted over the last 10 years or more. Five countries show narrowing geographic disparities over this period (Ghana, Peru, Rwanda, Tanzania, and Vietnam). Two countries (Burkina Faso and Malawi), on the other hand, have seen widening geographic disparities over time. Nevertheless, interpretation of these trends must be undertaken with caution given that notifications are an imperfect measure of trends in incidence, as discussed further in the following section.

Reinterpreting Case Notifications in Light of Changing Diagnostic Intensity

In general, it is challenging to interpret changes in notification rates given major uncertainties in most countries as to changing levels of ascertainment of new cases. Rising case notifications can reflect enhanced efforts at prompt diagnosis of new disease, or they may indicate real increases in the frequency of disease. For the purposes of evaluating progress in global TB control over a relatively short period, as in this evaluation study, this ambiguity makes definitive conclusions about epidemiological impact difficult to attain. One way to potentially enhance the interpretability of trends in case notifications is to reexamine these trends in relation to simultaneous trends in diagnostic intensity. As part of the national record review in this study, countries were requested to report time series on the number of TB suspects that were examined with smear microscopy, ideally at the same subnational level as reporting on other program indicators. A number of countries reported that this information does not reside at the central level. Six countries, however, provided time series on smear examinations, and the results are reported above in the discussion of service coverage and Table 6.17. These results may also be used to normalize trends in case notifications for diagnostic effort. Figure 6.2 shows an example of the result of these calculations for Peru. The first line indicates the reported notification rate of new smear-positive cases per 100,000 from the national record review (which deviates slightly from the national figures in the Global TB Database). The second line indicates the notification rate normalized for changes in diagnostic intensity, measured as the rate of smear examination of TB suspects. The normalized trend is

computed by dividing the reported notification rate by the rate of smear examination in a given year, then multiplying by the rate of smear examination in an index year (the first year in the series). In this example, it is interesting to note that in the non-normalized time trend, the rate of decline in notifications is sharp until 2003 and then slows, while in the normalized time series, a relatively flat trend before 2004 gives way to a steep decline from 2004 to 2007. The latter result is consistent with the recent reinvigoration of the TB program in Peru and pertinent to the evaluation study of the impact of recent scale up.

Figure 6.2
New Smear-positive Cases per 100,000 Notified in Peru, 2000-2007, before and after Adjusting for Trends in Diagnostic Intensity

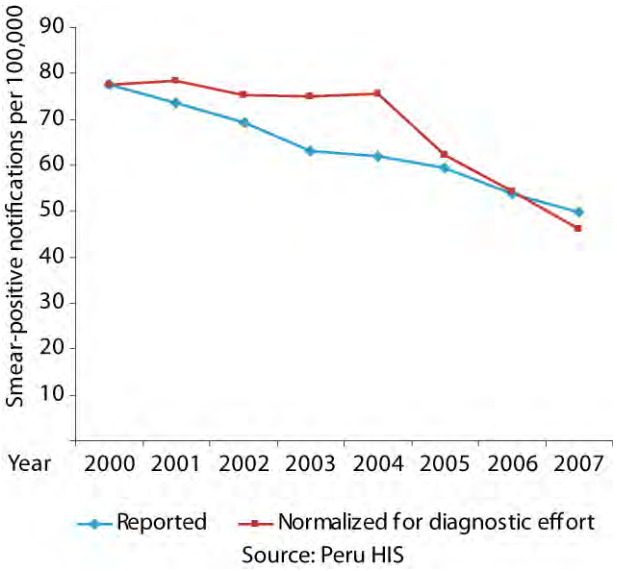


Table 6.21 shows results for all six countries that provided time series on diagnostic intensity. For each country, both the reported smear-positive notifications per 100,000 and the normalized figures accounting for changes in the rate of smear examination (as reported in Table 6.17) are listed. Note that the reported figures in this table are based on the results from the national record review, and thus may deviate slightly from those in the Global TB Database. These reported figures include adjustments for incomplete geographic reporting, as described in Table 6.3.

In Vietnam, accounting for changes in diagnostic effort transforms a relatively flat trend line in notifications into a steady decline over time. In Cambodia, a substantial scale up in diagnostic effort occurred after 2001; accounting for this increase in diagnostic effort produces a dramatic—probably implausibly large—decline in the normalized notification estimates. In Haiti, the reported notification rates rise from 2001 to 2003 and then flatten, whereas the normalized rate remains relatively constant from 2000 to 2006. In Rwanda, accounting for diagnostic efforts has little substantive impact on the assessment of notification trends. In Zambia, the extremely large reported changes in diagnostic effort over time produce implausible oscillations in the normalized trends. Overall, across these six countries, the adjustment for changes in diagnostic effort seems to produce variable results. More effort is needed to critically examine available information on diagnostic intensity and to assess, in a broader array of countries, whether adjusting for changes in diagnostic effort improves the validity of trends in case notifications. The adjustments described here are based on the simplifying assumption that testing twice the number of suspects will lead to doubling the number of cases found. In reality, there must be diminishing returns from increasing diagnostic

effort. The precise relationship is not known and will depend on whether diagnostic effort is expanded, for instance, among risk groups or in the general population or whether increasing diagnostic effort is achieved by increasing the number of sites or by increasing the number of tests per site. Clearer definition of the return to increasing diagnostic effort could help greatly to better adjust case notification trends.

Table 6.21: Trends in Smear-positive Notifications Reported and Normalized for Changing Diagnostic Effort, 1998-2007, by Country

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cambodia										
Reported				110.3	130.2	140.3	138.3	150.5	135.9	134.5
Normalized				110.3	89.7	73.1	64.4	62.1	57.2	54
Haiti										
Reported	76.1	66.9	66.4	64.2	67.7	78.1	77	79.1	79.4	79.9
Normalized	76.1	71.4	56.9	54.5	48.3	48.8	46.9	49.8	51.7	54.2
Peru										
Reported			77.5	73.7	69.2	63.2	61.9	59.4	53.8	49.8
Normalized			77.5	78.4	75.4	75	75.5	62.1	54.4	46.2
Rwanda										
Reported				30.5	45.4	41.9	46.5	45	44.6	42.3
Normalized				30.5	51.5	48	52.3	50.2	51.4	33.5
Vietnam										
Reported				67.6	69.6	67.7	69.6	65.3	65.5	
Normalized				67.6	65	63	61.7	58.1	55.8	
Zambia										
Reported						170.3	151.4	115.3	112.9	113
Normalized						170.3	204.2		43.9	32.8

Sources: National Record Review for Country Impact Evaluation Reports

OTHER EPIDEMIOLOGIC DATA

As noted above, direct measurement of the prevalence of smear-positive TB is possible but has not been undertaken recently for most of the countries in this study. The one country with available results from a recent prevalence survey was Cambodia, which surveyed more than 22,000 people in 2002 and found that the prevalence of smear-positive TB was 269 per 100,000 (95% confidence interval 211-343). Based on the observed case notification rate of 130, this result yields a patient diagnostic rate of 0.48 per person-year (130/269), which indicates that a large fraction of new cases will not be diagnosed even one to two years after onset of clinical disease.

In terms of studies of the annual risk of tuberculosis infection, two countries in this study—Peru and Tanzania—have completed multiple national surveys on the prevalence of infection during the last 10 years. Peru completed national surveys in 1997-1998 and 2007-2008. The earlier study estimated the annual risk of infection to be around 1.5% in Lima and Callao, and around 0.2% outside of Lima and Callao. The more recent study pointed to substantial decreases in Lima and Callao over the interval between surveys, to a level of 0.8%, which implies an annual decline of 6%. Outside of Lima and Callao, the estimated risk of infection in the later study was around 0.8%, which implies an increase of around 13% yearly. Overall, the national figures were relatively stable between the two time points.

Results from the series of tuberculin skin tests in Tanzania have been reported previously.[11] Time trends in the annual risk of TB infection were estimated based on four surveys over the period 1983-2003. The most recent survey found an estimated risk of 0.68% (95% confidence interval 0.55-0.81), implying an annual decline in infection risk of 2.7% over the same period that notification rates for new smear-positive cases doubled. The authors of the study concluded that the impact of the HIV epidemic on TB trends can be minimized by a strong TB control program.

6.9 EVALUATION

RELATIONSHIP BETWEEN FUNDING AND SERVICE AVAILABILITY AND QUALITY

To assess whether there are discernible relationships between levels and trends in funding and variation across countries or changes over time in the availability and quality of services, a range of bivariate associations using indicators described in this report were examined. Financial indicators include total funding in 2003; the ratio of cumulative funding over 2003-2006 to the total in the first two years (2003-2004), interpreted as a measure of scale up; and funding in 2006 per notified case or per capita. Indicators of service availability and quality include the treatment success rate in 2005, a measure of trend in the treatment success rate between 2001 and 2005, trends in TB facility density, and measures of attainment of minimum standards for diagnosis and treatment from the DCA. Treatment success rates use the figures reported in the Global TB Database. Results of these analyses are summarized in Table 6.22 in terms of Pearson's correlation coefficients.

Table 6.22: Bivariate Associations between Funding and Service Availability and Quality

	Total TB Funding, 2003 (US$)	Ratio of Total Funding, 2003-2006 to Total Funding in 2003-2004 (US$)	Total Funding per TB Case, 2006 (Int$)	Total Funding per Capita, 2006 (Int$)
Treatment success in 2005	0.04 (18)	0.14 (17)	-0.27 (18)	0.02 (18)
Slope of treatment success, 2001-2005*	-0.17 (18)	-0.07 (17)	0.21 (18)	-0.06 (18)
Change in facility density, 2003-2007	0.03 (12)	0.08 (12)	-0.18 (12)	0.07 (12)
Fraction of facilities meeting minimum standards for diagnosis in 2008	0.47 (7)	0.22 (7)	0.18 (7)	**-0.75 (7)**
Fraction of facilities meeting minimum standards for treatment in 2008	0.66 (7)	**0.72 (7)**	**-0.83 (7)**	-0.08 (7)

Each cell shows Pearson's correlation coefficient, with number of units in parentheses. Bolded figures are significant at p<0.10.
* Slope estimated through linear regression of treatment success probabilities on time
Sources: Funding indicators from Chapter 4; indicators of service availability and quality from this chapter.

Only one correlation was significantly different than zero at the 0.05 level, namely the fraction of facilities meeting minimum standards for treatment in relation to funding per case. Two others approached significance: the minimum treatment standard fraction in relation to the funding scale-up indicator (p = 0.07), and the minimum diagnostic standard fraction in relation to funding per capita. The highest observed correlations overall apply to the indicators of diagnostic and treatment service readiness. Of note, the two strongest results relate readiness indicators to funding per TB case or per capita in 2006, and both correlations are negative. These findings highlight one

[11] Egwaga, S.M., F.G. Cobelens, H. Muwinge, C. Verhage, N. Kalisvaart, and M.W. Borgdorff. 2006. The impact of the HIV epidemic on tuberculosis transmission in Tanzania. AIDS 20(6): 915-921.

of the difficulties in making causal inference about inputs and outputs, which is that funding may be endogenous. In other words, if funding is directed toward areas where there is the greatest need, then short-term trends may reflect unfavorable outcomes driving increased funding intensity rather than increased funding driving better outcomes. Overall, the evidence on bivariate associations between funding and service quality and availability is rather weak, so any over-interpretation of these results should be discouraged.

ESTIMATED RANGES FOR TB DEATHS AVERTED THROUGH DOTS

Approximate ranges around the numbers of deaths from TB averted through DOTS over the period 2003 through 2006 were computed based on a series of simple assumptions. The analysis is confined to treatment of smear-positive cases. First, two different estimates of the probability of death under DOTS were defined. The low estimate takes the country-specific cohort treatment results, pooled over the years 2003-2005, and assuming that the total probability of death includes those cases with a registered outcome of death plus half of cases with a registered outcome of treatment failure or default. A high estimate takes the total probability of death as the sum of cases recorded as died, failed, or defaulted. Next, two different counterfactual probabilities of death were constructed. A high probability is defined as the probability of death that would be expected for untreated cases, based on the longitudinal study of TB natural history in Bangalore.[12] A low counterfactual probability is defined as the expected deaths under non-DOTS treatment. The expected deaths under non-DOTS treatment are computed based on the ratio of treatment success in non-DOTS versus DOTS programs globally in the 2005 treatment cohort. A lower estimate of the total number of deaths averted through DOTS is computed as the difference between the estimated number of deaths under the high estimate of DOTS mortality and the estimated number of deaths under non-DOTS treatment. A higher estimate of the number of deaths averted through DOTS is computed as the difference between the estimated number of deaths under the low estimate of DOTS mortality and the number of estimated deaths in a "no-treatment" scenario. It is noted that mortality among defaulters remains an important source of uncertainty, so the low and high estimates reflect two possible assumptions—either that half or all of patients with outcomes of failure or default will eventually die from TB.

Among the 18 countries in this study, a total of 1.2 million smear-positive cases were registered between 2003 and 2006 (see Table 6.23). The estimated actual number of deaths among smear-positive patients treated under DOTS ranged between 106,000 and 138,000 in these countries. The lower estimate of the number of death averted by DOTS is 147,000, and the higher estimate is 694,000. The true value is expected to lie nearer to the lower than to the higher estimate, as prior analyses of trends in estimated case detection have suggested that most patients recruited under DOTS would likely have been detected and treated anyway in the public health system.[13] As a sensitivity analysis, values for the untreated case fatality probability that are 20% higher or lower than the Bangalore estimate were considered, which yields high estimates of deaths averted of 854,000 or 534,000, respectively. In another sensitivity analysis around the low estimate of deaths

[12] Olakowski, T. 1973. Assignment Report on a Tuberculosis Longitudinal Survey, National Tuberculosis Institute, Bangalore, WHO Project: India 0103. SEA/TB/129. WHO Regional Office for South East Asia.
[13] Dye, C., C.J. Watt, D.M. Bleed, and B.G. Williams. 2003. What is the limit to case detection under the DOTS strategy for tuberculosis control? Tuberculosis 83(1): 35-43.

averted, the proportion of treatment failures and defaulters assumed to die was set at 100%, which yields lower estimates of deaths averted of 156,000 rather than 147,000.

Table 6.23: Estimated TB Deaths Averted through DOTS, 2003-2006, by Country

Country	Smear-positive Cases Registered, 2003-2006 (000s) A	Estimated Probability of Death Under DOTS* (%) Low B	High C	Counterfactual Probability of Death† (%) Untreated D	Non-DOTS E	Estimated Deaths Averted (000s) Low A*(E-C)	High A*(D-B)
Benin	10.7	12	16	67.5	27	1.3	6.0
Burkina Faso	8.6	21	29	67.5	39	0.9	4.0
Burundi	12.7	12	21	67.5	32	1.4	7.1
Cambodia	78.2	5	6	67.5	19	10.3	49.1
DR Congo	244.3	9	12	67.5	24	30.1	142.8
Ethiopia	156.3	8	11	67.5	24	19.5	92.3
Ghana	30.3	16	23	67.5	34	3.2	15.6
Haiti	28.9	9	13	67.5	25	3.5	16.8
Kyrgyzstan	7.2	9	14	67.5	26	0.9	4.2
Lesotho	16.2	11	14	67.5	26	2.0	9.1
Malawi	32.9	19	21	67.5	32	3.6	16.0
Moldova	6.1	20	31	67.5	41	0.6	2.9
Mozambique	69.3	16	20	67.5	31	7.8	35.7
Peru	74.5	6	9	67.5	22	9.5	46.1
Rwanda	17.2	9	12	67.5	24	2.1	10.1
Tanzania	100.7	12	14	67.5	26	12.1	55.9
Vietnam	226.3	5	6	67.5	19	29.9	142.5
Zambia	65.1	10	11	67.5	24	8.1	37.7
All 18 countries	1,185.5					146.7	693.8

* Estimated probability of death under DOTS based on cohort treatment outcomes reported to WHO in 2003-2005. Low probability is computed as the fraction of the cohort that died plus half of those recorded as failed or defaulted. High probability is computed as the fraction that died plus all of those recorded as failed or defaulted

† Counterfactual probability of death in untreated tuberculosis is taken from Bangalore Longitudinal Study (Olakowski, 1973) and represents the fraction of the cohort that had died after five years of follow-up (49.3%), plus the fraction that remained smear-positive (18.2%), under the assumption that the latter group would eventually die from TB. The counterfactual probability of death under non-DOTS treatment is based on the ratio of treatment success in non-DOTS versus DOTS programs globally as reported for the 2005 cohort. Specifically, the calculation is: *Non-DOTS probability of death = 100 – (100 – DOTS treatment success) * 73/85,* where 73 and 85 are the global probability of treatment success in non-DOTS and DOTS treatment, respectively.

Sources: Registered cases and treatment outcomes from Global TB Database. Untreated mortality from Olakowski, 1973.

The estimates of TB deaths averted may be translated into approximate numbers of life-years gained using a set of simplifying assumptions. In each country, the average age of notified TB cases under DOTS was calculated, and life tables from WHO were used to compute the life expectancy at those ages. This value serves as a rough approximation of the number of life-years gained by averting a TB death in each country and ranges from under 21 years in Lesotho to over 44 years in Peru. Applied to the results in Table 6.23, the number of life-years gained, totaled across the 18 countries, was 4.5 million in the lower estimate and 21.4 million in the higher estimate. While this approximation should be regarded as crude given the failure to distinguish life expectancy among HIV-negative and HIV-positive populations, it nevertheless offers a reasonable indication of the order of magnitude of gains that may be attributed to DOTS implementation over this period.

6.10 Conclusions

In this study, the following general patterns are observed: (1) increases in diagnostic effort in most countries; (2) increases in diagnostic facilities in some countries; (3) satisfactory or improving treatment outcomes in most countries; and (4) substantial numbers of averted deaths. In terms of

epidemiologic impact, despite increased diagnostic effort, the overall picture shows little increase in case notifications, which suggests that TB incidence may be relatively stable or declining overall. However, it is important to emphasize that the 18 countries participating in the evaluation study are not a representative sample of the high-prevalence TB countries, as they already benefit from well-established programs, so the overall findings must be interpreted in this light.

Key limitations and recommendations include the following:

- Limited data availability on service availability, diagnostic effort, and epidemiological impact
- Need to strengthen routine data on service availability and diagnostic effort
- Need to take subnational data into account when analyzing national trends, at least with respect to completeness
- Need to expand application of prevalence surveys to assess case detection and epidemiological impact.

Based on the information gathered for this evaluation study, the following conclusions are made:

The evidence base on which to assess the epidemiologic impact of scaled-up efforts against TB is limited. There remains a critical need to strengthen the empirical basis for measuring changes in TB incidence, prevalence, and mortality, and for linking these changes to TB control, including funding. The WHO Task Force on TB Impact Measurement has recommended a range of new work that is needed, including strengthening of surveillance systems, better analysis of routine notification and vital registration data as well as programmatic data, and disease prevalence surveys in at least 21 countries. The analyses presented in this study offer some examples of both the possibilities for detailed examination of routinely collected program data and collection of relevant new information from more intensive data collection in facilities, as well as highlighting some of the key challenges relating to gaps in data availability and quality. As the Global Fund moves forward with developing and refining Model Evaluation Platforms in countries, it will be essential to provide sufficient financial support to ensure that these platforms are developed with rigorous quality assurance measures.

Trends in case notification rates, in the absence of complete detection, offer ambiguous information about underlying epidemiologic trends, as they may reflect a range of factors, including levels of diagnostic effort, types and quality of reporting systems, and care-seeking behavior of people with TB, which may not be constant over time.

Subnational analyses are important for data quality assessment and for monitoring progress. First, completeness of reporting by facilities to districts and by districts to provinces/regions and to the national level should be a high priority in the reporting system, and adjustments for incomplete reporting should be made to reliably assess trends. Second, regular data quality assessments are needed to assess the reporting system and take action to improve it. The systems are well-designed and standardized, but many countries do not have a well-structured independent quality control mechanism. From the programmatic perspective, subnational analyses can provide important information about the need to target the program to lagging provinces or districts. In general, as the standardized monitoring and evaluation systems in place move toward improved quality assurance,

it will be important to consider ways in which routine program information can be augmented to enable period assessment of information quality.

Information on trends in diagnostic intensity may be useful in interpreting trends in case notification, but this information is not readily available in all countries. Adding this information to routine reporting requirements for TB programs might provide a valuable supplement to the current array of routine information collection at relatively modest incremental burden to programs. To use this information to help interpret trends in notifications, a better understanding of the yield of increased diagnostic efforts is needed.

While there is evidence in some countries of improvements in intermediate output indicators on availability and quality of services, for example, in the number of facilities per capita, not all countries in the study saw marked improvements in these measures. In the detailed analysis in PDACs through the DCA Facility Census, important gaps were identified that must be addressed, for example, in the availability of drugs and test equipment and materials in facilities that purport to offer treatment and diagnostic services. Overall, however, there is evidence that diagnostic effort has increased over time in many countries. For example, Zambia, one of the largest recipients of major donor disbursements since 2003, has had more than a tripling of the number of smear examinations undertaken over this period.

The clearest indication of progress appears to be the positive trends in many countries in treatment success rates. Ten of 18 countries in this study have seen modest to large gains in treatment success since 2000-2001. Three countries have maintained already high levels of successful treatment over this period. Of concern are the five countries that have not managed to achieve discernible progress in improving treatment outcomes over this period. Comparison of treatment outcomes to funding across countries suggests that most variation in outcomes across countries relates to factors other than financial resources. However, there are examples of countries like DR Congo, which has received steady and substantial donor funding since 2000 and has shown major improvements in treatment success over the same period.

While the focus of this evaluation study has reflected the major emphasis of global TB control on DOTS, future efforts in evaluating the impact of scaling up responses to TB epidemics should more fully encompass the broad spectrum of TB control activities beyond DOTS, for example, including a more explicit consideration of the effects of HIV on TB incidence and prevalence.

CHAPTER 6 ANNEXES

ANNEX 6.1: ANNEX TABLE

Table 6.1: Among Surveyed Health Facilities that Offer TB treatment (DOTS), the Percentage with Specific TB Drugs Available, by Country, 2008

	Burkina Faso		Cambodia		Ethiopia		Haiti		Malawi		Zambia	
Number of districts	13		7		11		9		9		9	
Number of facilities that offer TB treatments (DOTS)	216		107		141		71		55		172	
	Avail. today	**Avail. but Expired**	**Avail. today**	**Avail. but expired**	**Avail. today**	**Avail. but expired**	**Avail. today**	**Avail. but expired**	**Avail. today**	**Avail. but expired**	**Avail. today**	**Avail. but expired**
Ethambutol oral, 100mg	8	6	22	-	6	1	20	1	11	-	19	1
Ethambutol oral, 400mg	14	1	91	-	97	-	74	1	6	-	42	1
Isoniazid oral, 100mg	9	-	23	-	13	-	52	3	15	-	23	-
Isoniazid oral, 300mg	7	1	22	-	52	-	35	3	2	-	24	-
Pyrazinamide oral, 400 mg	9	1	88	-	87	-	23	1	11	-	62	-
Rifampicin oral, 150mg	10	-	33	-	11	-	22	1	7	-	28	-
Rifampicin oral, 300mg	7	1	29	-	20	-	11	1	-	-	20	-
Streptomycin injectable, 1g	10	-	24	-	38	-	72	4	20	-	51	-
Isoniazid + Rifampicin (Rifina oral) (75mg+150mg)	18	-	74	1	58	-	63	1	29	-	51	1
Isoniazid + Rifampicin (Rifina oral) (150mg+300mg)	14	-	25	-	23	1	19	-	4	-	26	1
Isoniazid + Rifampicin (Rifina oral) (30mg+60mg)	9	1	24	-	3	-	14	-	13	-	11	1
Isoniazid +Ethambutol (EH) (150mg+400mg)	22	1	20	-	82	3	92	-	18	-	78	-
Isoniazid+Rifampicin+Pyrazinamide (RHZ, Rifater) (75mg+150mg+400mg)	13	1	18	-	7	-	89	-	2	-	33	1
Isoniazid +Rifampicin +Pyrazinamide (RHZ,Rifater) (30mg+60mg+150mg)	11	1	20	-	3	-	14	-	6		15	1
Other tuberculosis medicines		-	6	-	10	-	2	1	7		16	-

Source: DCA Facility Census 2008

ANNEX 6.2: GRAPHIC DISPLAY OF SUBNATIONAL DATA

The following figures are based on information collected in this study through the national record review. Data were provided by 16 of the 18 countries (all except Ethiopia and Kyrgyzstan). Each of the following pages summarizes data at the first subnational administrative level (usually the province or region) for one country. The legends in the figures have been suppressed to improve readability, and because the primary purpose of the figures is to offer a visual display of the variation across subnational units, to avoid describing the trajectory in any single identified subnational unit. Details on the latter are found in individual Country Impact Evaluation Reports.

Figure A shows the total number of notified new smear-positive cases.

Figure B shows the total number of notified cases, which includes new smear-positive cases, smear-negative cases, extrapulmonary cases, relapse cases, and other previously treated cases.

Figures C and D show notifications of new smear-positive cases or all cases, respectively, expressed as numbers per 100,000 population.

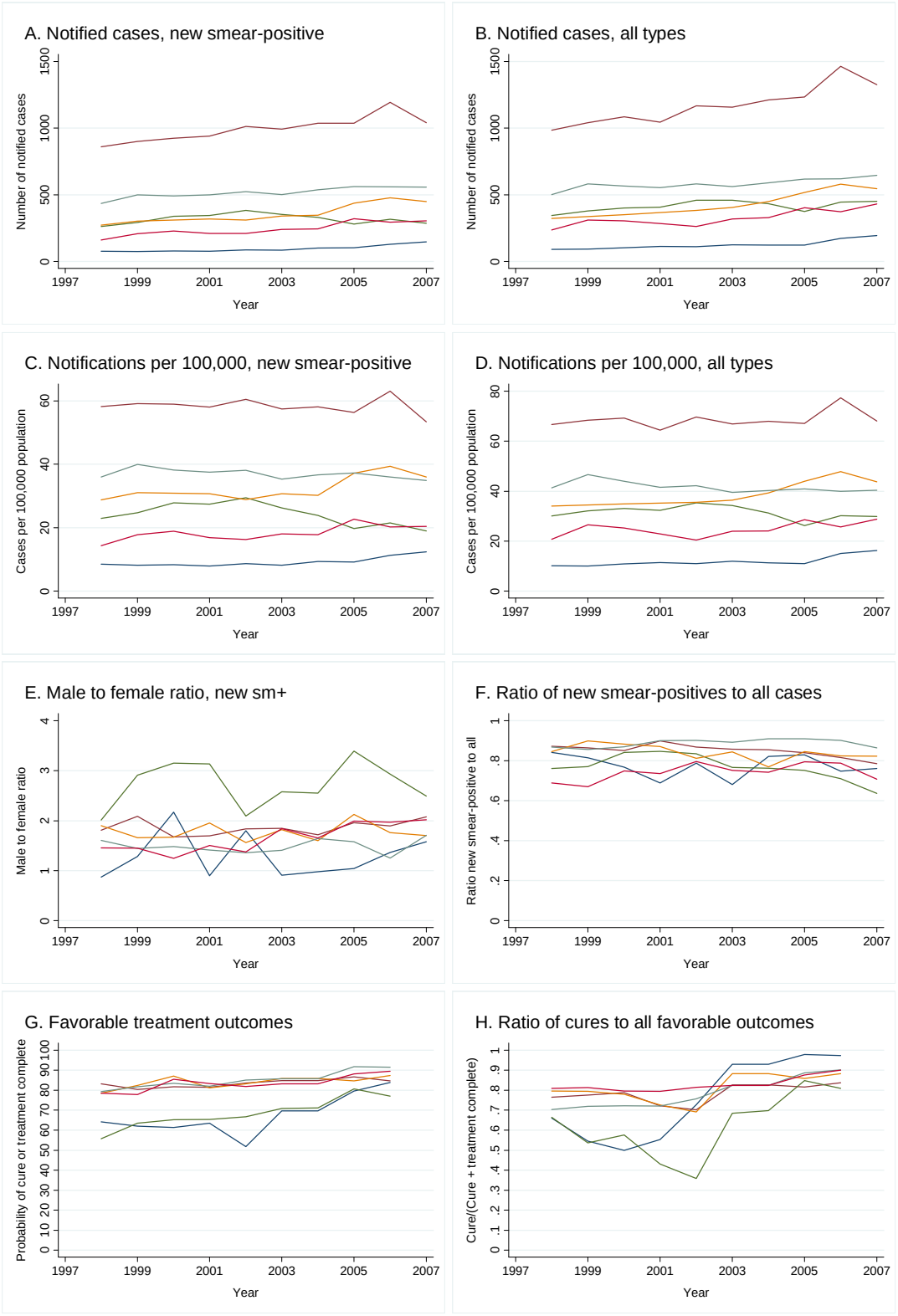
Figure E shows the male-female ratio for new smear-positive notifications.

Figure F shows the ratio of new smear-positive cases to all notified cases.

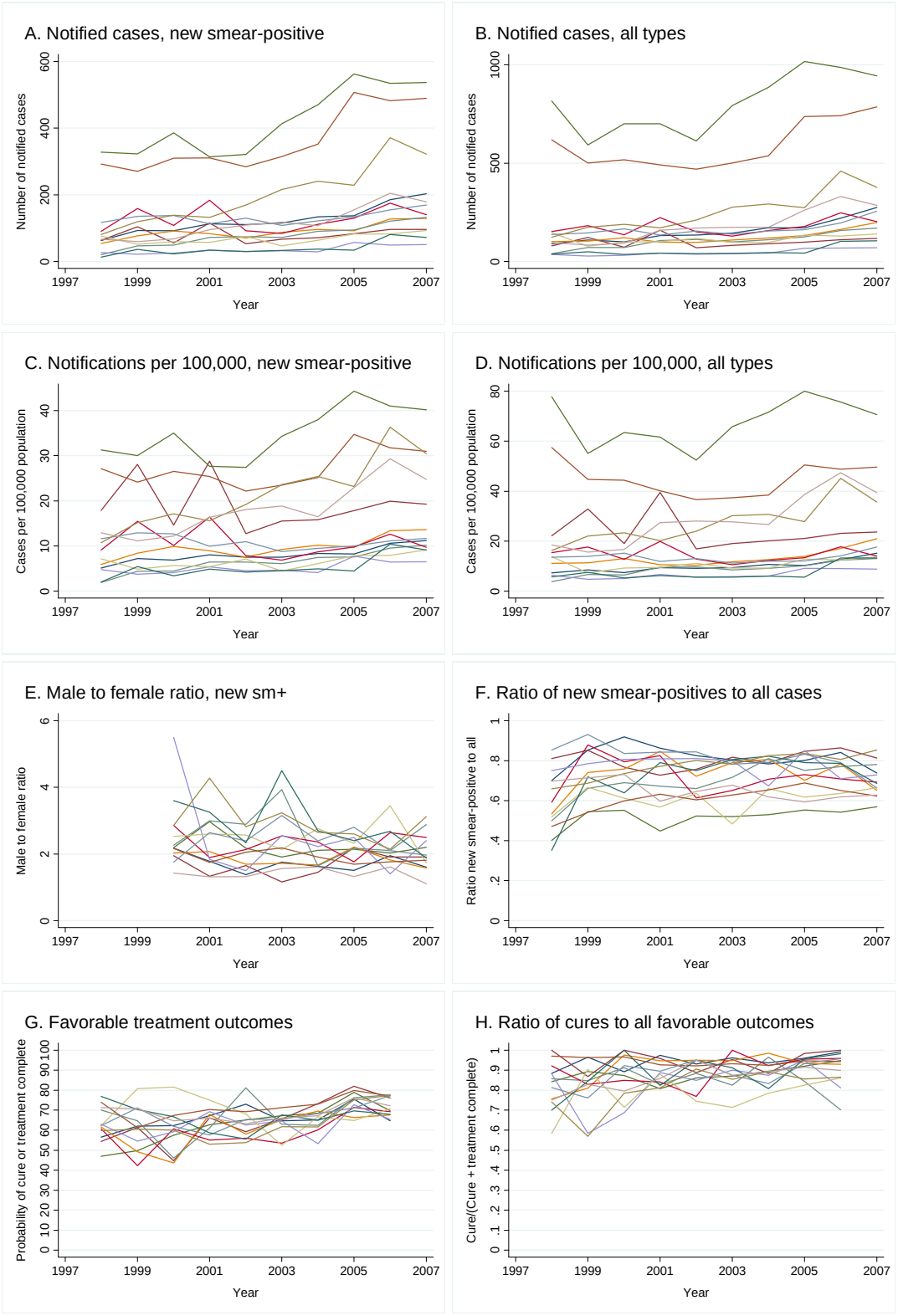
Figure G shows the number of treated patients whose outcomes were either "cure" or "treatment complete," divided by the total number of patients whose outcomes were evaluated.

Figure H shows the number of cures divided by the sum of cures and treatment complete.

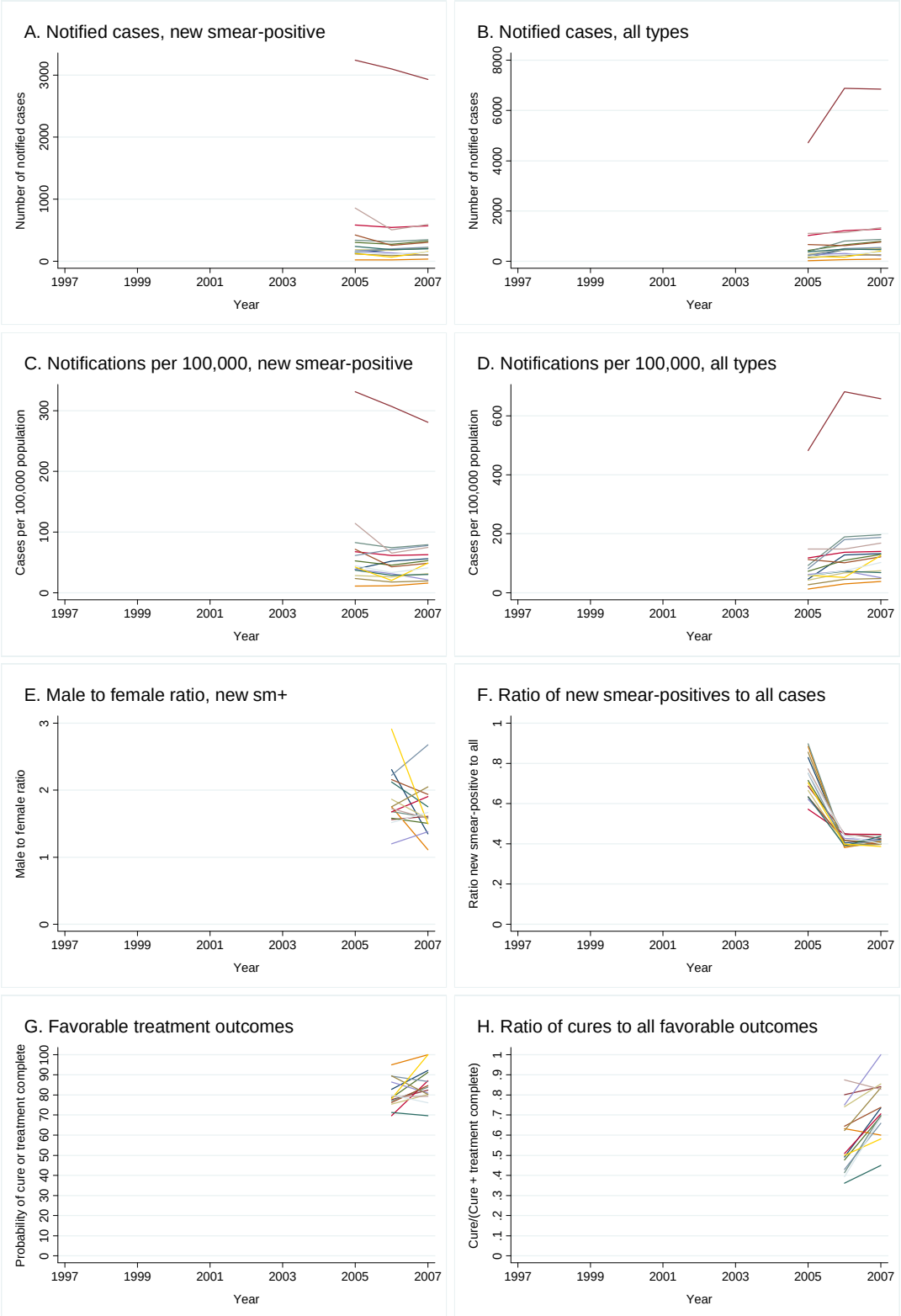
Benin


A. Notified cases, new smear-positive
Number of notified cases
0
500
1000
1500
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
500
1000
1500
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
20
40
60
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
20
40
60
80
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
1
2
3
4
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

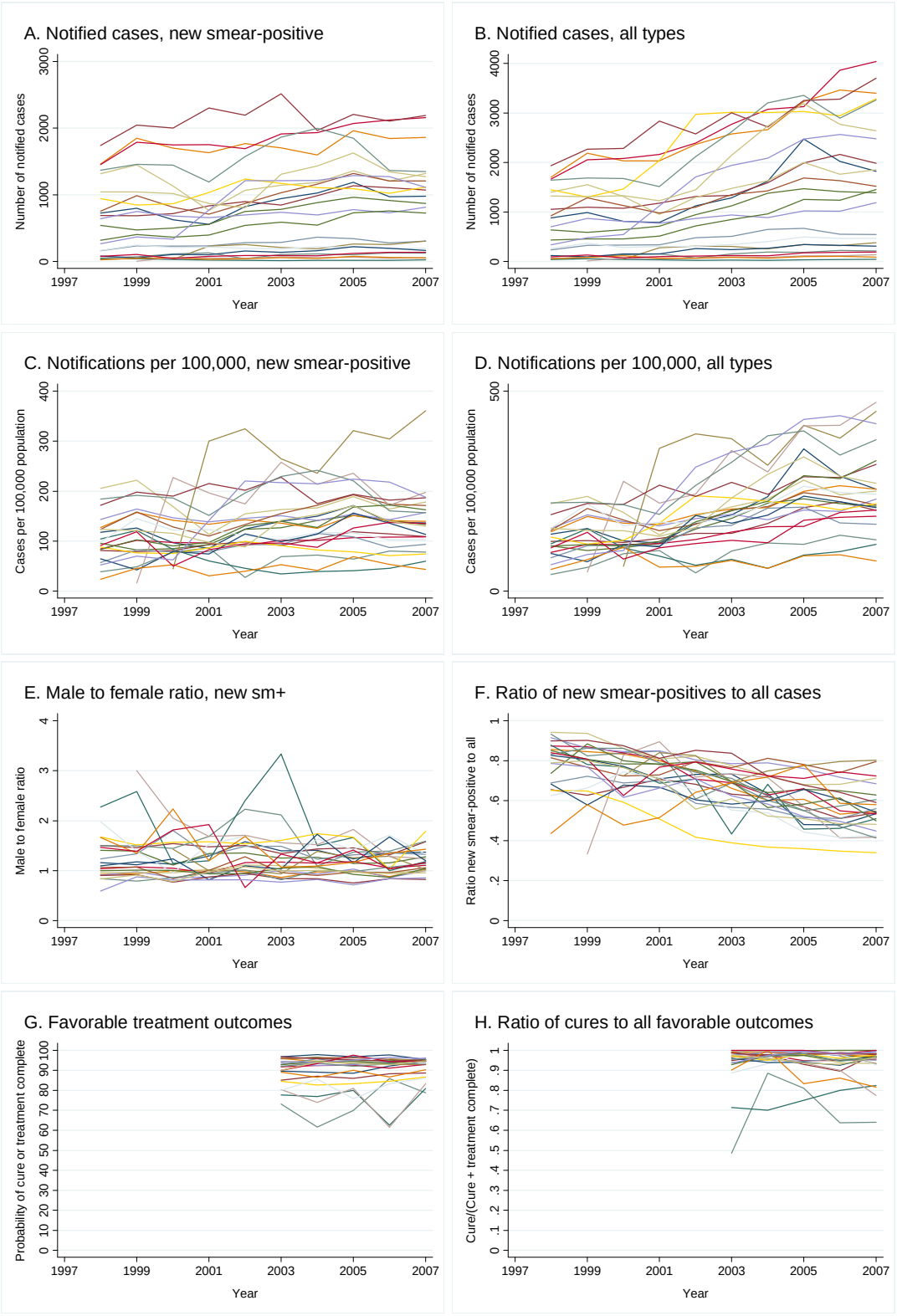
Burkina Faso



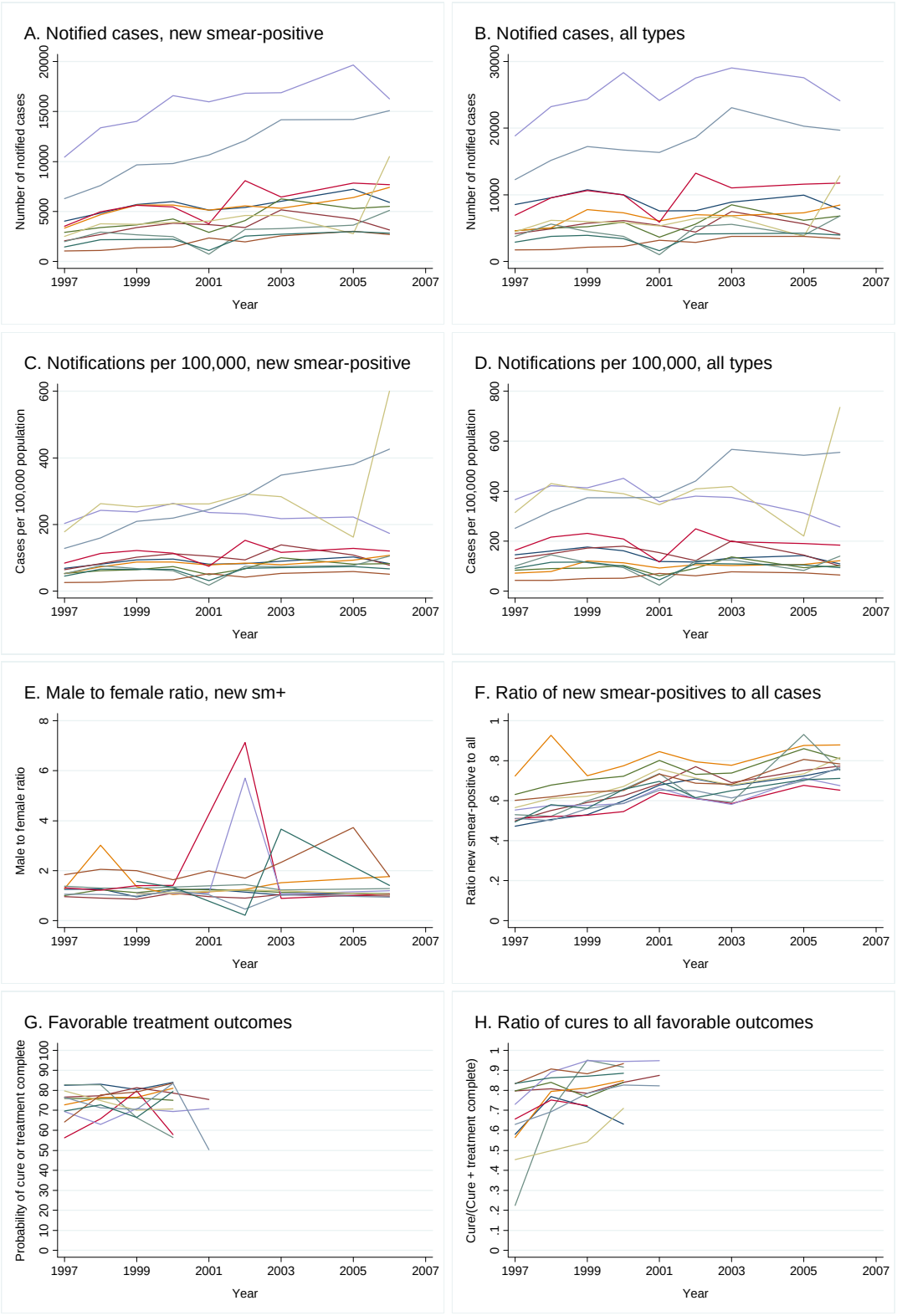
Burundi


A. Notified cases, new smear-positive
Number of notified cases
0
1000
2000
3000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
2000
4000
6000
8000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
100
200
300
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
200
400
600
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
1
2
3
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

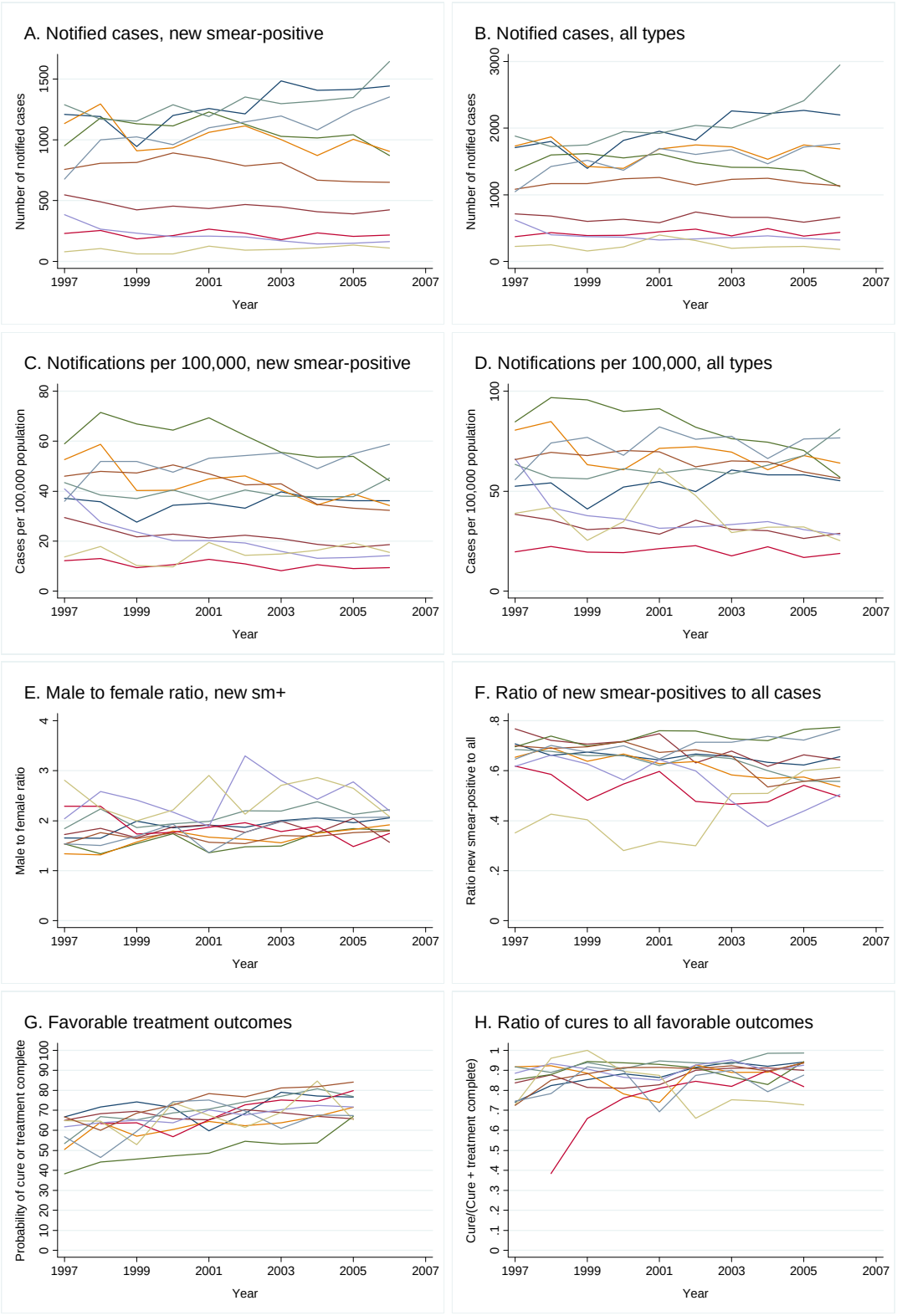
Cambodia


A. Notified cases, new smear-positive
Number of notified cases
0
1000
2000
3000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
1000
2000
3000
4000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
100
200
300
400
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
500
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
1
2
3
4
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

DR Congo


A. Notified cases, new smear-positive
Number of notified cases
0
5000
10000
15000
20000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
10000
20000
30000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
200
400
600
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
200
400
600
800
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
2
4
6
8
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0
10
20
30
40
50
60
70
80
90
100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1997
1999
2001
2003
2005
2007
Year

Ghana


A. Notified cases, new smear-positive
Number of notified cases
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500
1000
1500
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1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
1000
2000
3000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
20
40
60
80
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
50
100
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
1
2
3
4
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
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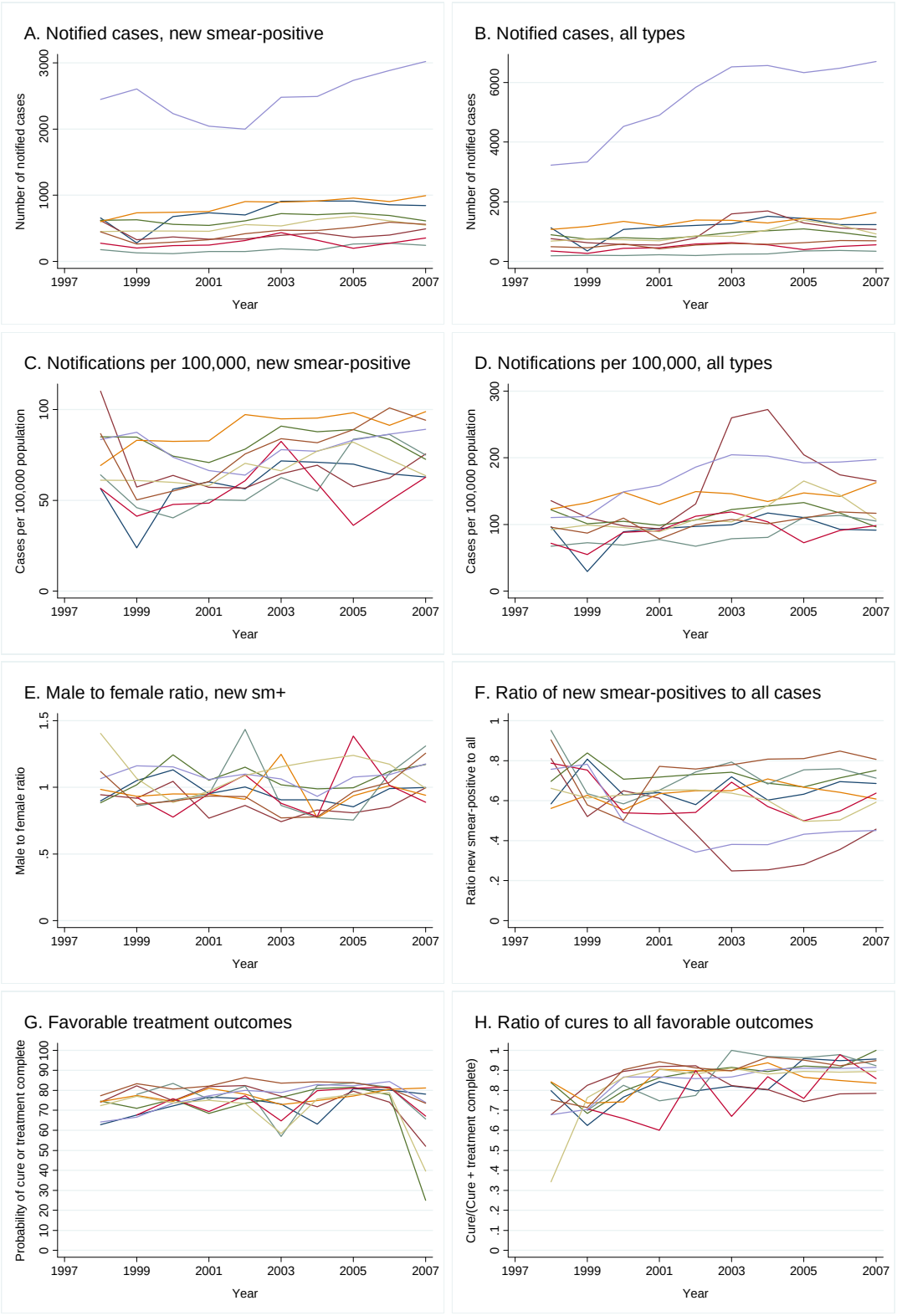
1997
1999
2001
2003
2005
2007
Year

Haiti


A. Notified cases, new smear-positive
Number of notified cases
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1000
2000
3000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
2000
4000
6000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
50
100
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
100
200
300
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
.5
1
1.5
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

Lesotho

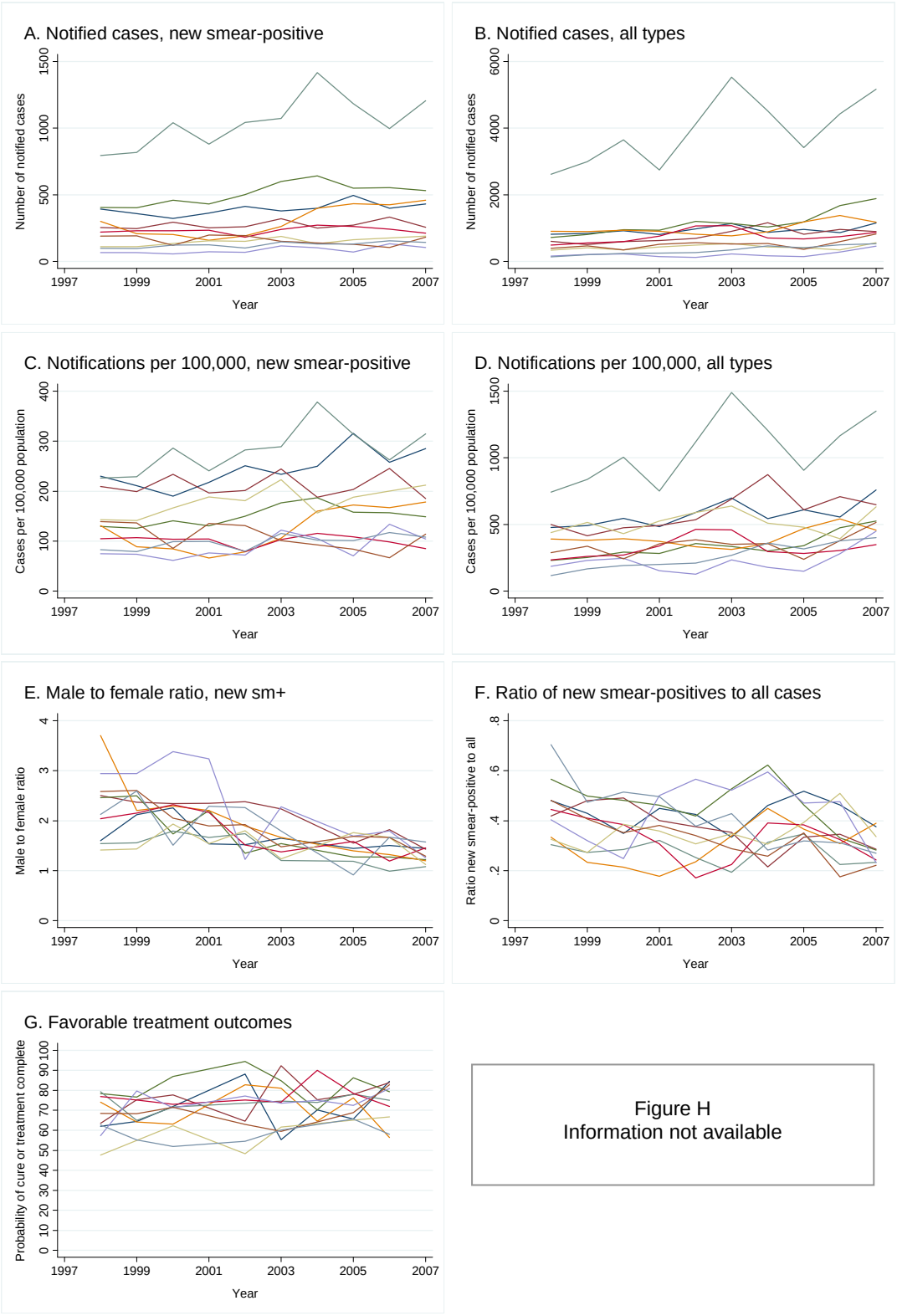
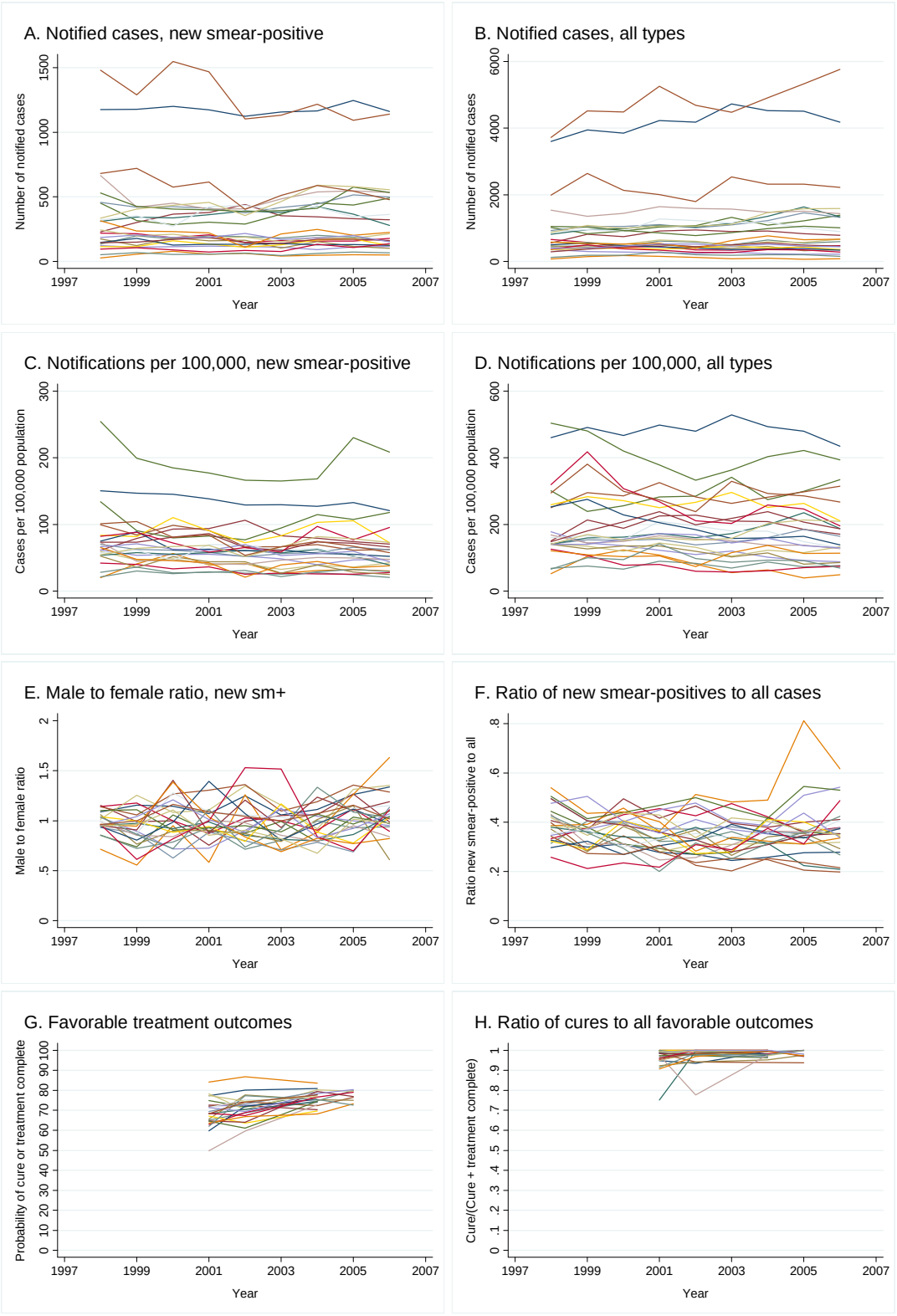
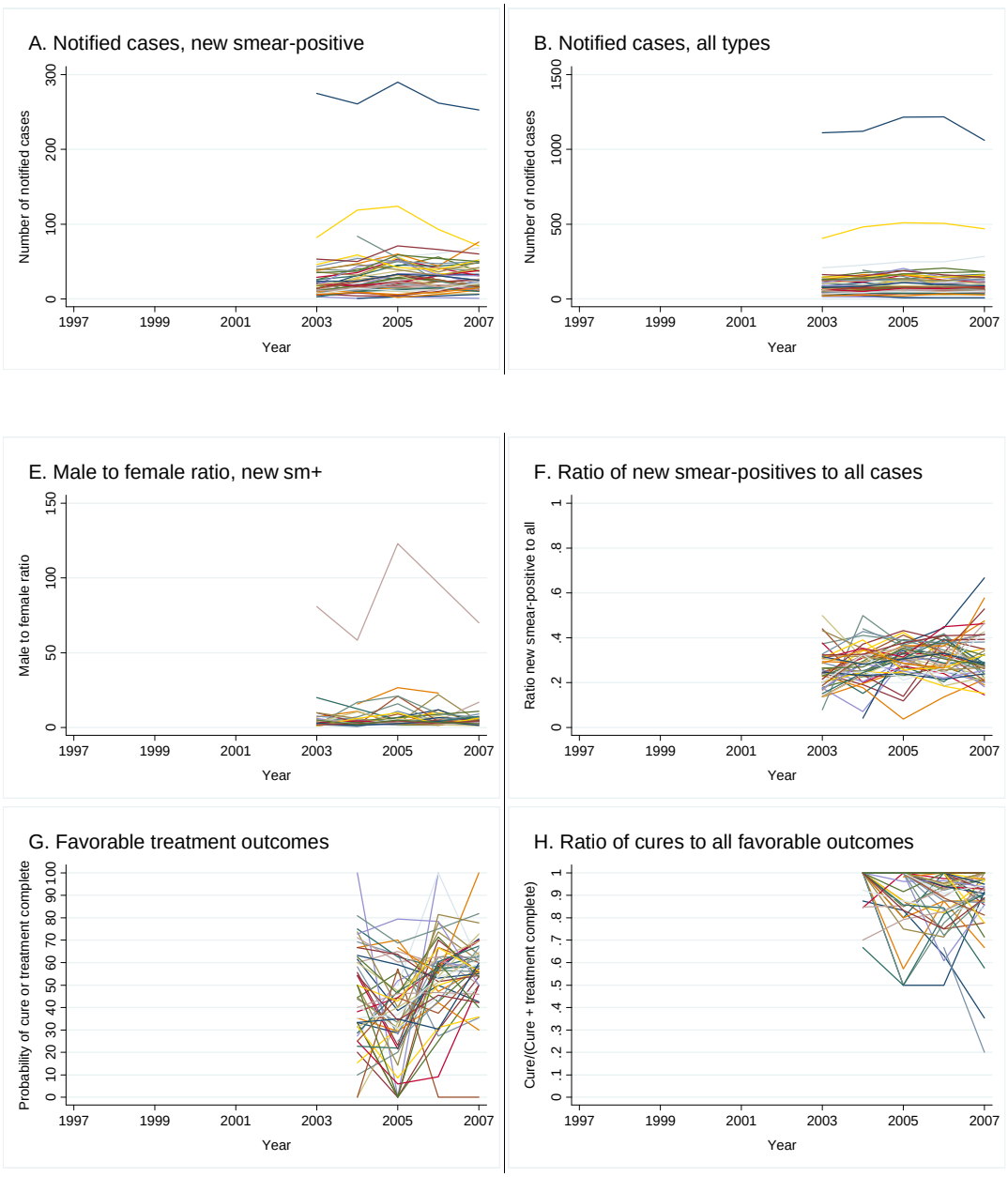


Figure H
Information not available

Malawi


A. Notified cases, new smear-positive
Number of notified cases
0
500
1000
1500
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
2000
4000
6000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
100
200
300
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
200
400
600
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
.5
1
1.5
2
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

Moldova


A. Notified cases, new smear-positive
Number of notified cases
0
100
200
300
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
500
1000
1500
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
50
100
150
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0
10
20
30
40
50
60
70
80
90
100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0
.1
.2
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.4
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.6
.7
.8
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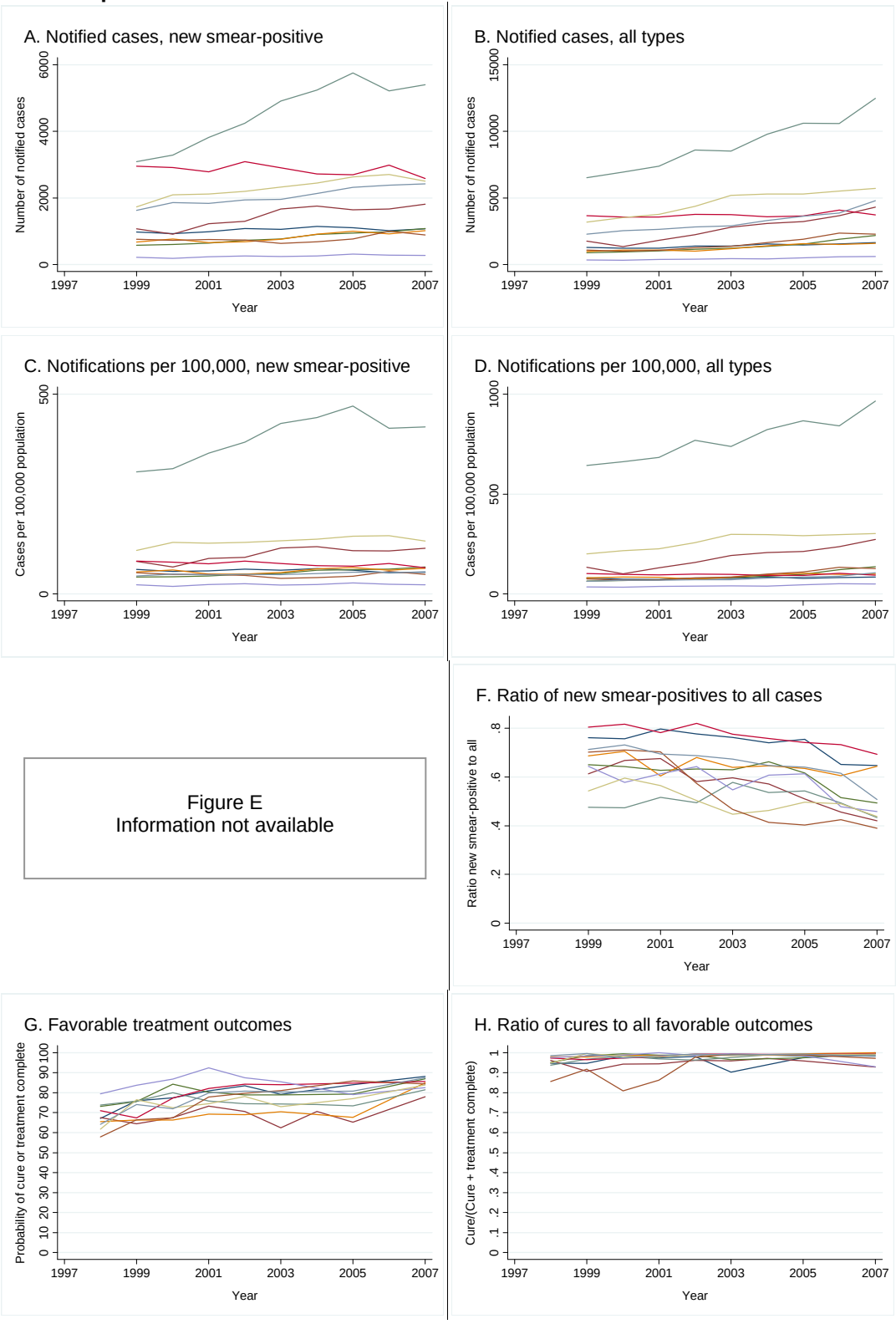
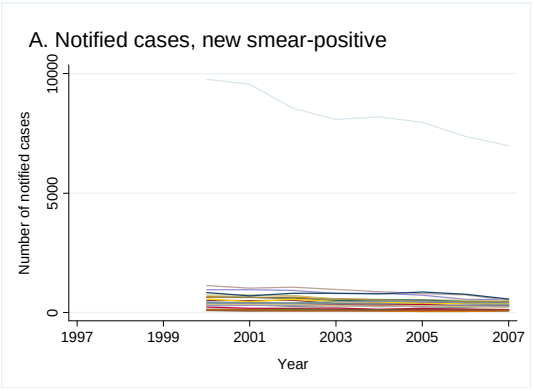
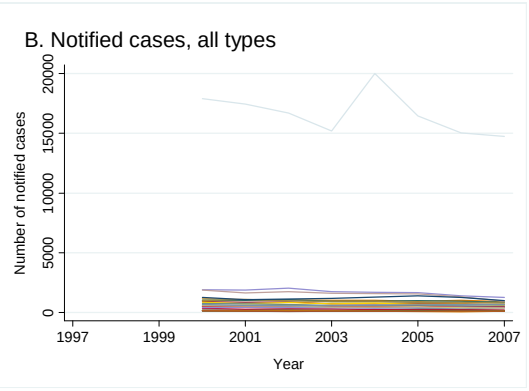
1
1997
1999
2001
2003
2005
2007
Year

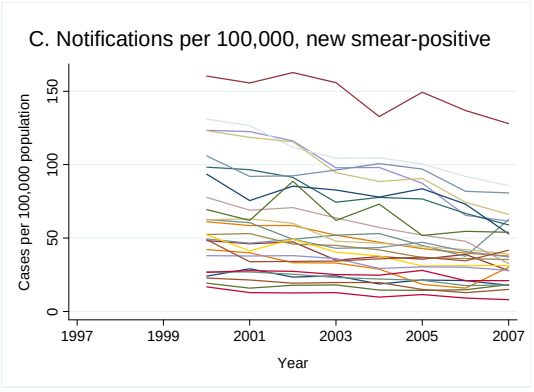
Mozambique


A. Notified cases, new smear-positive
Number of notified cases
0
2000
4000
6000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
5000
10000
15000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
500
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
500
1000
1997
1999
2001
2003
2005
2007
Year
Figure E
Information not available
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

Peru







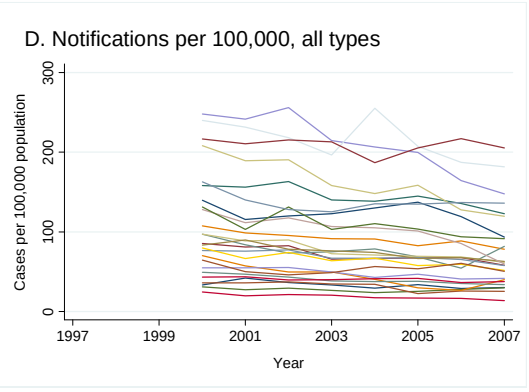
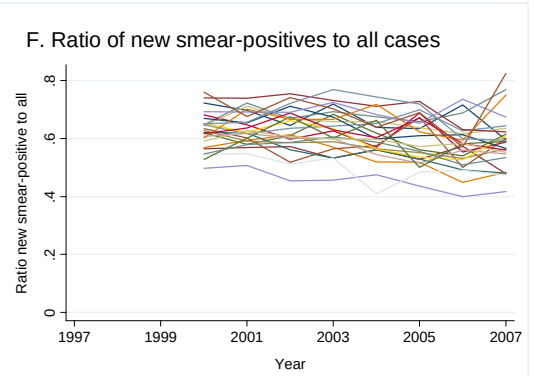


Figure E
Information not available



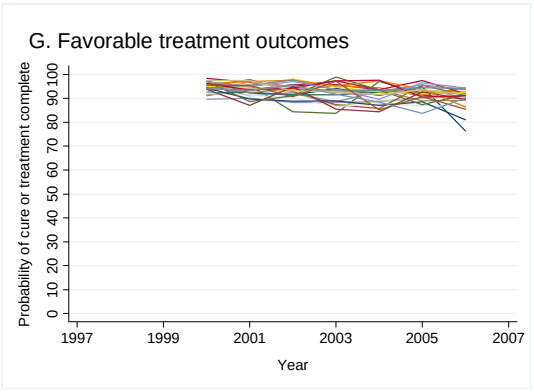
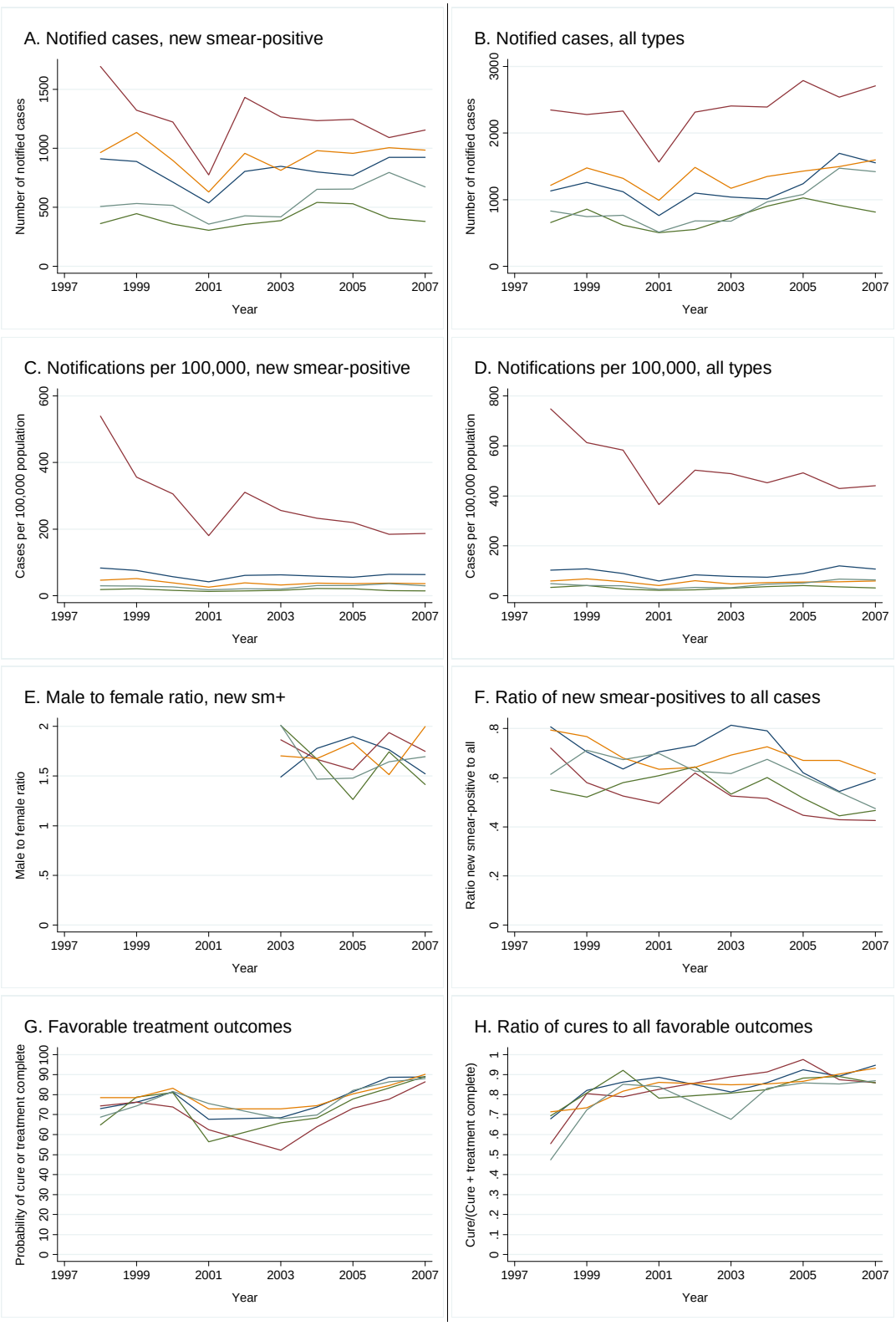
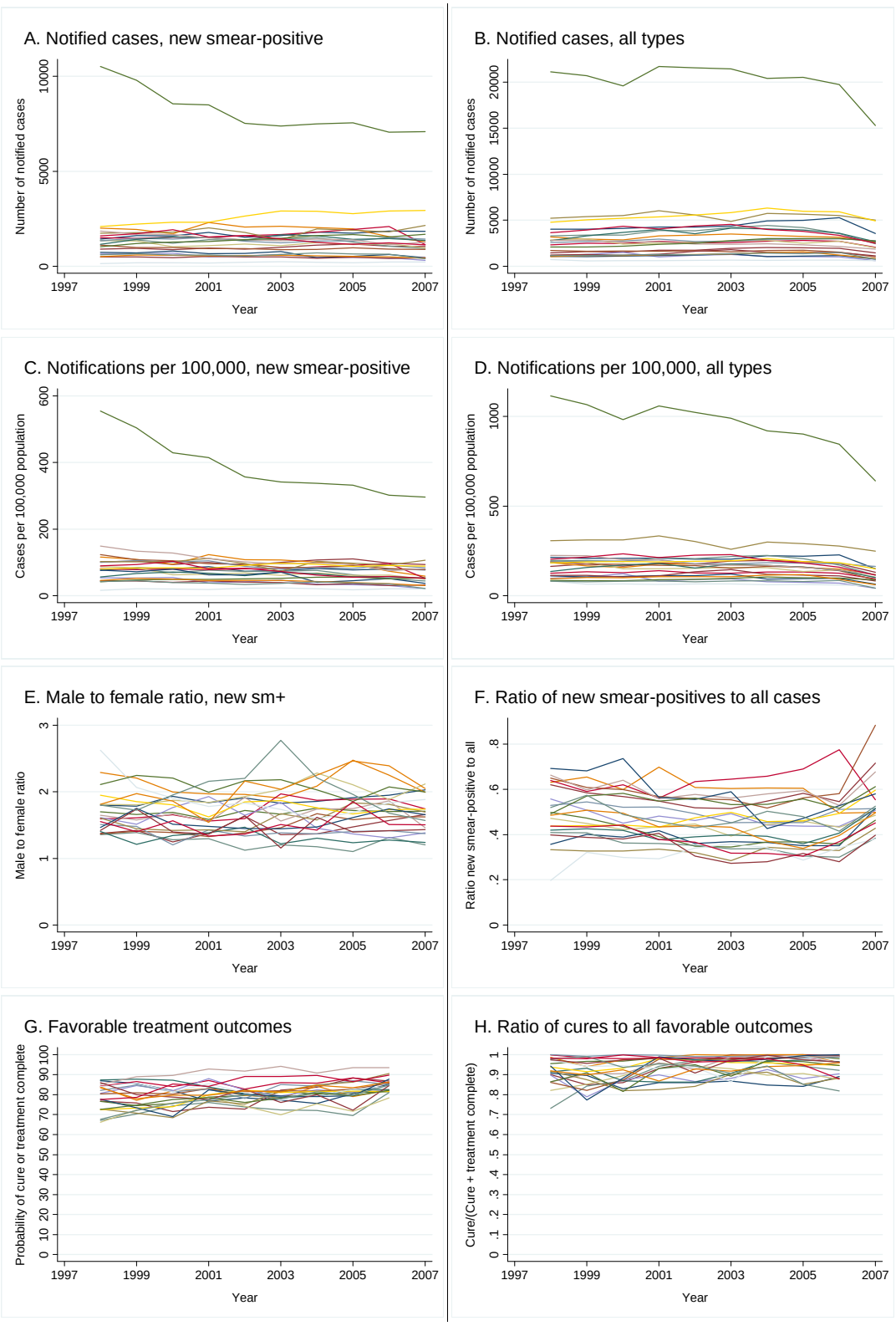


Figure H
Information not available

Rwanda


A. Notified cases, new smear-positive
Number of notified cases
0
500
1000
1500
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
1000
2000
3000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
200
400
600
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
200
400
600
800
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
.5
1
1.5
2
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0
10
20
30
40
50
60
70
80
90
100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1997
1999
2001
2003
2005
2007
Year

Tanzania


A. Notified cases, new smear-positive
Number of notified cases
0
5000
10000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
5000
10000
15000
20000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
200
400
600
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
500
1000
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
1
2
3
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.2
.4
.6
.8
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

Vietnam

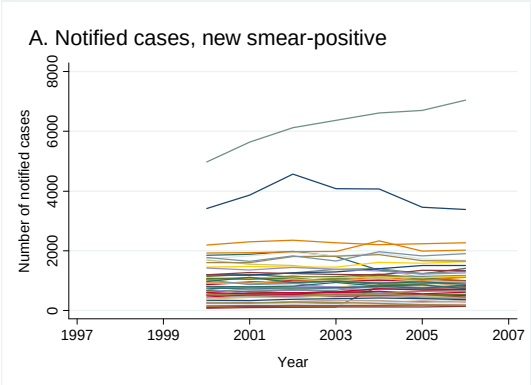


Figure B
Information not available

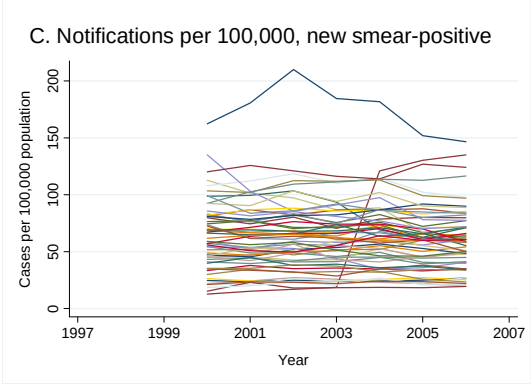


Figure D
Information not available

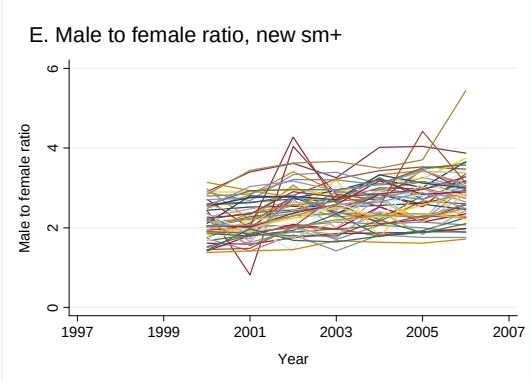


Figure F
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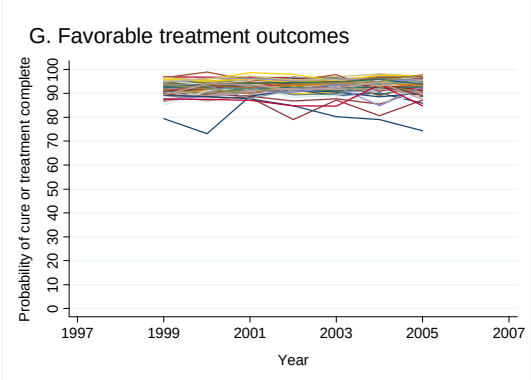
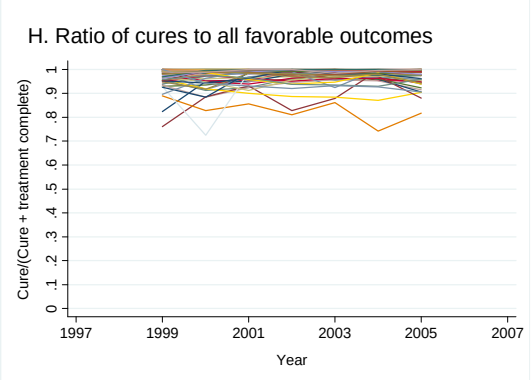
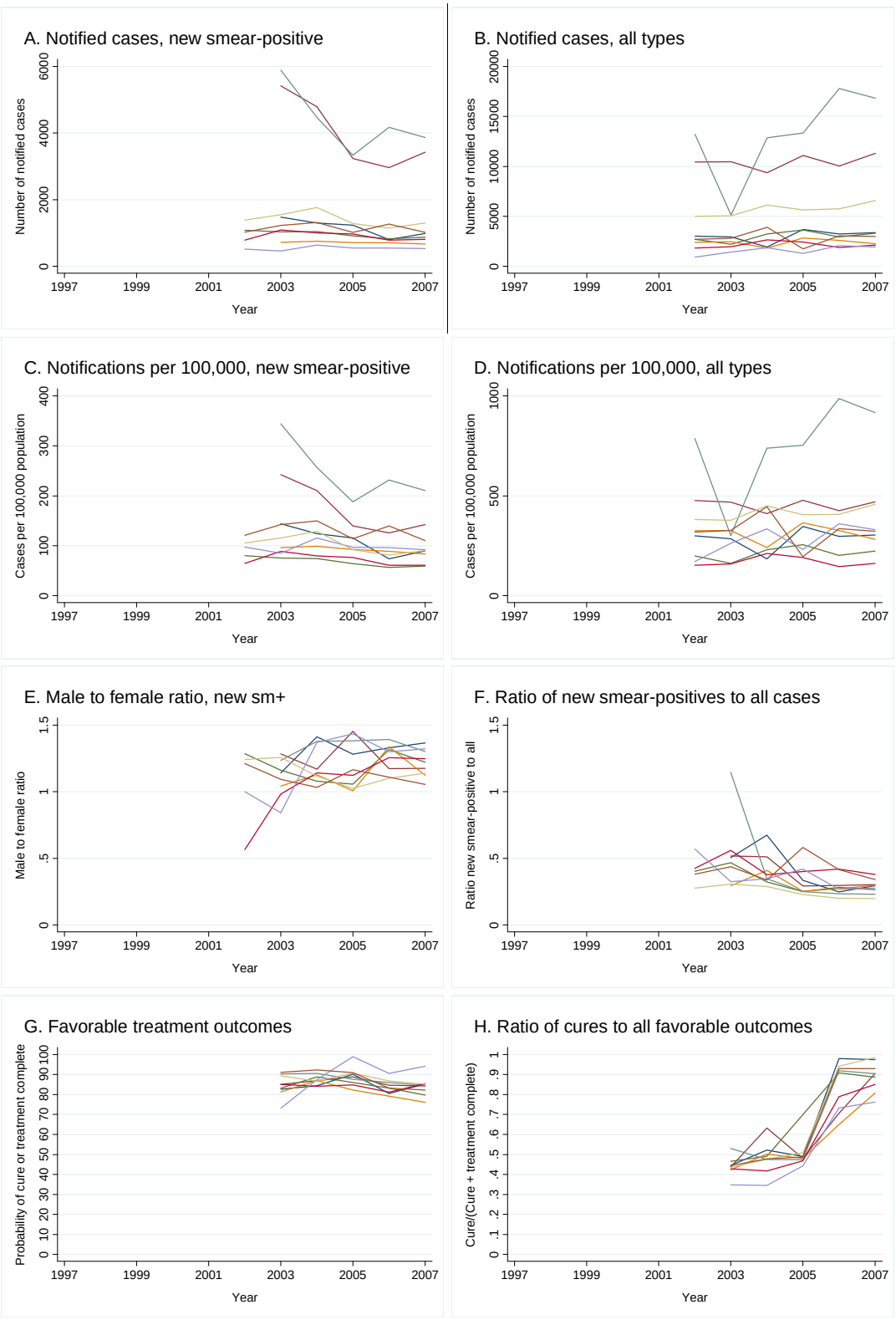




Zambia


A. Notified cases, new smear-positive
Number of notified cases
0
2000
4000
6000
1997
1999
2001
2003
2005
2007
Year
B. Notified cases, all types
Number of notified cases
0
5000
10000
15000
20000
1997
1999
2001
2003
2005
2007
Year
C. Notifications per 100,000, new smear-positive
Cases per 100,000 population
0
100
200
300
400
1997
1999
2001
2003
2005
2007
Year
D. Notifications per 100,000, all types
Cases per 100,000 population
0
500
1000
1997
1999
2001
2003
2005
2007
Year
E. Male to female ratio, new sm+
Male to female ratio
0
.5
1
1.5
1997
1999
2001
2003
2005
2007
Year
F. Ratio of new smear-positives to all cases
Ratio new smear-positive to all
0
.5
1
1.5
1997
1999
2001
2003
2005
2007
Year
G. Favorable treatment outcomes
Probability of cure or treatment complete
0 10 20 30 40 50 60 70 80 90 100
1997
1999
2001
2003
2005
2007
Year
H. Ratio of cures to all favorable outcomes
Cure/(Cure + treatment complete)
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
1997
1999
2001
2003
2005
2007
Year

7 SCALING UP AGAINST MALARIA: SITUATION, TRENDS, RESULTS

7.1 INTRODUCTION

BURDEN OF MALARIA

Malaria is a disease that has a broad geographic distribution, with close to half of the world's population living in areas with some malaria transmission. Globally it is estimated that there were approximately 247 million malaria cases in 2006.[1] However, the burden of malaria, especially in regard to malaria mortality, is largely confined to countries in Sub-Saharan Africa. Of the estimated cases, approximately 70% occur in Africa, with another 20% to 25% in countries in South Asia.[2] The distribution of malaria deaths, estimated at almost 900,000 worldwide in 2006, are even more concentrated in countries in Sub-Saharan Africa, with almost 800,000 deaths occurring among children under the age of five in countries of that region.[3] In Africa, almost all of the malaria burden is due to *Plasmodium falciparum,* while in Asia both *P. falciparum* and *Plasmodium vivax* play a role. The estimated rate of malaria cases and deaths remained largely constant during the 1980s and 1990s in most countries.

DESCRIPTION OF THE INTERVENTIONS AGAINST MALARIA

There are four primary interventions against malaria: the use of insecticide-treated bednets (ITNs), indoor residual spraying (IRS), intermittent preventive treatment during pregnancy (IPTp), and prompt and effective treatment using effective drug therapy.

A recent review of the effectiveness of ITNs[4] has found that effectiveness of nets is quite high, with evidence suggesting that use of multiple nets in a household or a baby sleeping under an ITN can reduce the risk of malaria death of the child by about 70%. Even if the nets are used by other members of the household, there is a strong effect of reducing malaria mortality among the young child. Consequently, multiple indicators related to ITNs are used, including household ownership of nets (both all types of nets and ITNs) and sleeping under nets (children under five and pregnant women). These indicators are routinely collected in the malaria modules of the Demographic and Health Surveys (DHS), the Multiple Indicator Cluster Surveys (MICS), and the Malaria Indicator Surveys (MIS).

IRS has also been rolled out in some countries as an additional way to reduce mosquito prevalence. While no country in the evaluation study has promoted IRS nationwide, numerous countries have used IRS extensively in some regions. Again, reviews have found IRS to be quite effective in reducing malaria mortality. Until recently, indicators to measure IRS were not used consistent, although more recently there has been the development and use of consistent indicators. However, in countries where IRS has been used, there are national reports of the number of households that have been sprayed by year.

[1] The World Health Organization. 2008. World Malaria Report, 2008. Geneva: WHO.
[2] Based on work in: Snow, R.W., C.A. Guerra, A.M. Noor, H.Y. Myint, and S.I. Hay. 2005. The global distribution of clinical episodes of Plasmodium falciparum malaria. Nature 434: 214-217.
[3] UNICEF and RBM. 2007. Malaria & Children. New York: UNICEF.
[4] Eisiele, T. 2008. Review of effectiveness of malaria interventions. Report presented at the Child Health Epidemiology Reference Group. Geneva, June.

IPTp is the third major intervention against malaria. Together with regular ITN use, IPTp can prevent malaria among pregnant women in endemic areas. IPTp is not recommended in areas of low or unstable malaria transmission. The treatment consists of at least two doses of an effective antimalarial drug during the second and third trimesters of pregnancy. This intervention is highly effective in reducing the proportion of women with anemia and placental malaria infection at delivery. Currently, sulfadoxine and pyrimethamine (SP) is considered a safe and appropriate drug for IPTp. The key indicator is percentage of mothers who took more than two doses of IPT during pregnancy.

The fourth prong of the scale up against malaria is the switch to the use of artemisinin-based combination therapy (ACT) for treatment of malaria (or suspected malaria). Since 2003, this has been the recommended treatment option for countries with malaria that have high levels of resistance to SP and chloroquine. Currently this is the recommended drug for all malaria-endemic countries in Sub-Saharan Africa. The expanded use of ACT for treatment is one of the key indicators for successful programs against malaria in African countries.

TYPOLOGY OF COUNTRIES CONSIDERED IN THE EVALUATION

As outlined above, malaria type and transmission level varies widely among the different regions of the world and within countries. Also, in most countries in Sub-Saharan Africa, most malaria is *P. falciparum,* which has a much higher case fatality rate, while in other regions *P. vivax* is the primary malaria type. Also within African countries, there is a large difference in the percentage of the populations exposed to malaria, and the transmission pressure levels are different. Table 7.1 shows the percentage of the population exposed to malaria for each country in the evaluation study.

Table 7.1: Percentage of Country Population Exposed to Malaria, by Exposure Type

Exposure	Country
Endemic (% of the population living in high transmission—low transmission—no transmission zones)	Benin: (100-0-0); Burundi: (21-64-0); Burkina Faso: (100-0-0); DR Congo: (85-10-0); Ethiopia: (14-50-36); Ghana: (98-2-0); Malawi: (77-22-1); Mozambique: (94-4-0); Rwanda: (7-60-33); Tanzania: (75-21-4); Zambia: (83-16-1)
Epidemic/local low transmission zones	Cambodia, Haiti, Kyrgyzstan, Peru, Vietnam
No ongoing transmission	Moldova, Lesotho

Source: Guerra, C., P. Gikandi, A. Tatem, A. Noor, D. Smith, S. Hay, and R. Snow. 2008. The limits and intensity of *Plasmodium falciparum* transmission: Implications for malaria control and elimination worldwide. PLoS Medicine 5(2): 300-311.

Table 7.2: Estimated Under-Five Mortality in 2005 and the Proportion of Under-Five Mortality due to Malaria in the Period 2000-2003, by Country

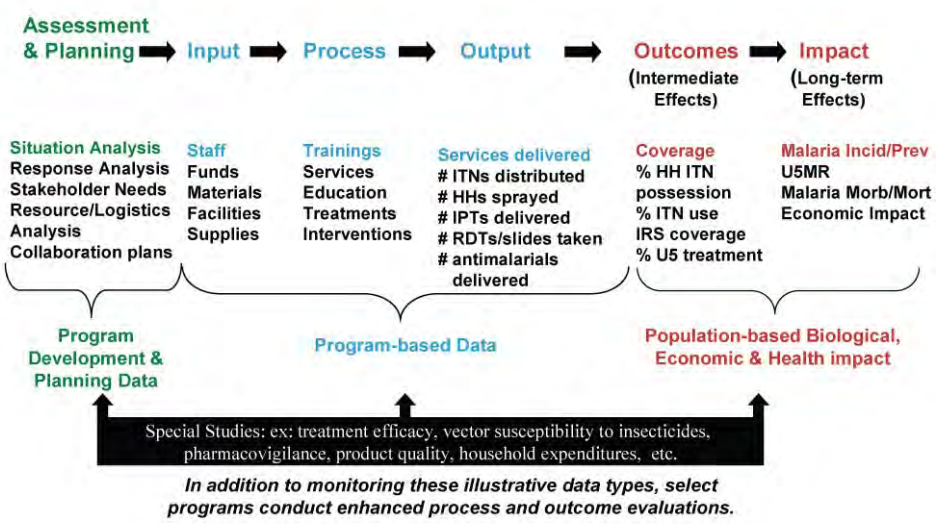
Country	Under-Five Mortality (per 100,000)	Proportion Due to Malaria (%)
Benin	150	27
Burkina Faso	191	20
Burundi	190	8
Cambodia	143	<1
DR Congo	205	17
Ethiopia	164	6
Ghana	112	33
Haiti	120	<1
Kyrgyzstan	64	<1
Malawi	125	14
Mozambique	145	19
Peru	27	<1
Rwanda	203	5
Tanzania	122	23
Vietnam	19	<1
Zambia	182	19

Sources: UNICEF. 2007. State of the world's children: Under-five mortality rate from UNICEF. New York: UNICEF; J. Bryce, C. Boschi-Pinto, K. Shibuya, R.E. Blach and CHERG. WHO estimates of the causes of death in children. 2005. Lancet 365: 1147-1152.

7.2 Evaluation Approach for Malaria

The Roll Back Malaria (RBM) Monitoring and Evaluation Reference Group (MERG) has developed a monitoring and evaluation (M&E) framework that was adapted and used for the evaluation study (shown in Figure 7.1). For malaria, the evaluation study focused on the assessment and measurement of inputs notably funding, processes such as distribution of nets, outputs in terms of service delivery, outcomes in terms of coverage of interventions, and impact on malaria disease burden. The analysis focused on trends in national coverage of key indicators using existing data and new data from the District Comprehensive Assessment (DCA), which was conducted in 8 of the 18 evaluation study countries, as a way to evaluate the quality of coverage.

Figure 7.1
Malaria's Monitoring and Evaluation Framework Illustrative Data Types



For the evaluation study this framework was applied to the four major sets of interventions (IRS, ITNs, IPTp, and treatment with ACT). This resulted in documentation of the trends in available indicators for inputs, process, outputs, and outcomes. Most endemic countries have solid trend data on the key indicators in each category except for the impact indicators.

The indicators for measuring impact, defined by RBM and other international organizations, are less sensitive measures. For highly endemic areas of Sub-Saharan Africa, the all-cause under-five mortality rate, mostly measured through household surveys, is recommended as the primary indicator to be monitored by countries.[5] At present, almost no country with endemic malaria has reliable cause-of-death statistics, and the use of verbal autopsies in surveys or local research studies can only partially help fill the data gap. Even in combination with hospital data, verbal autopsies may provide only an idea of the relative importance of malaria, as the ability to detect trends in malaria mortality may be limited. Outside of Sub-Saharan Africa, vital registration and health facility records may provide a useful indication of malarial deaths, if not fully complete then at least as a trend indicator.

In view of the documented reductions in childhood anemia in response to malaria prevention or treatment in endemic Sub-Saharan Africa settings, childhood anemia is an additional impact indicator for those areas.[6] Although anemia is not a specific indicator of malaria, in very young children (between 6 and 60 months or in the most endemic settings between 6 and 24 or 6 and 36 months) malaria may account for a large proportion of moderate-to-severe anemia. Anemia prevalence can be measured precisely in the field through household surveys such as DHS, and it is routinely included in the

[5] Malaria indicators for monitoring of progress toward the UN Millennium Development Goals (MDGs) include the malaria prevalence rate in the general population (where prevalence is replaced by incidence, a more relevant measure of acute malarial morbidity) and the malaria-related death rate in children under five, as well as the more general MDG indicators under-five mortality rate and infant mortality rate.
[6] RBM MERG Task Force on Malaria-related Anemia, Meeting Minutes, 27-28 October 2003 (http://rbm.who.int/merg).

laboratory component of MIS.[7] Care should be taken, in areas of seasonal malaria transmission, not to infer time trends between subsequent surveys if these are done during different seasons.[8]

The prevalence of parasite infection has not been a key indicator. Historically, because of the high prevalence of asymptomatic infection, parasite prevalence has not been a sensitive measure of malaria disease burden. Successful malaria interventions may also reduce malaria morbidity and mortality without immediately producing major reductions in parasite prevalence. However, with large scale up of malaria interventions, parasite prevalence in children is likely to be reduced and will become important as an additional survey-based indicator in both Sub-Saharan Africa settings (provided measurement occurs during the malaria transmission season) as well as outside Sub-Saharan Africa, where, because of lower transmission and less acquired clinical immunity in the population, parasite infection may more closely correlate with morbidity.

For Sub-Saharan Africa, the use of health service-based data as a measure of impact over time is limited. On the one hand, only a minority of malaria cases reach the formal health system, leading to gross underreporting. On the other hand, presumptive diagnosis in clinics likely produces over-reporting of cases when diagnostic testing is not done. However, even with testing, the high prevalence of asymptomatic parasitemia in the larger community not attending facilities means that the facility-based parasitological testing is not fully representative of all malaria infections. Outside Sub-Saharan Africa, malaria cases noted in the service statistics may indicate the time trend in malaria incidence, provided that reporting completeness is stable over time.

The time trends in intervention coverage can be used to model the trend in malaria-specific mortality (and morbidity) in children under five years of age. In this report we use the LiST model,[9] which uses data from published studies that exist on the effectiveness of the main interventions (ITN, IPTp, IRS, and treatment). The LiST model combines the effectiveness data with data from recent household surveys (MICS, DHS, and MIS) on current intervention coverage, on recent febrile illness and child death, and on the parameters needed for comparing like-to-like (e.g., education levels and socioeconomic status) for an analysis of current intervention impact on morbidity and mortality.

The evaluation study also focuses on the geographic distribution of services and issues of equity. For these analyses a critical issue is the possible differentials in service availability in urban and rural areas, as service delivery is usually better in urban areas, although malaria transmission is greater in rural areas. The analyses also focus on the utilization of services by wealth quintile.

In the Primary Data Analysis Countries (PDACs) more in-depth analysis of the quality of services is possible.

[7] WHO/RBM. MIS (http://rbm.who.int/merg).

[8] Definition of anemia levels are Mild anemia 10.0-10.9 g/dl; Moderate anemia 7.0-9.9 g/dl; Severe anemia below 7.0 g/dl

[9] Lives Saved Tool. For the background documentation and the tool for download, see www.jhsph.edu/IIP.

7.3 Input Variables: Trends in Financing and Development of Strategies, Policy, and Guidelines

Funding: Trends in Resources and Expenditures since 2002

Funding for malaria increased dramatically over the period of 2002-2007 in most of the countries under study. Table 7.3 shows the distribution of reported funding between 1998 and 2007 for malaria programs from each country in the evaluation study. Using each country's total reported funding during the period as the base, the proportion spent in each year was calculated. This allows one to examine trends in malaria spending for each country. As shown in Table 7.3, the trend in funding for malaria has been quite dramatic, with most countries showing a strong increase over time. Additional details regarding overall health financing and malaria-specific funding and spending are contained in Chapter 4.

Table 7.3: Funding for Malaria—Percent Distribution of All Malaria Funding by Year, 1998-2007, as Reported by Countries

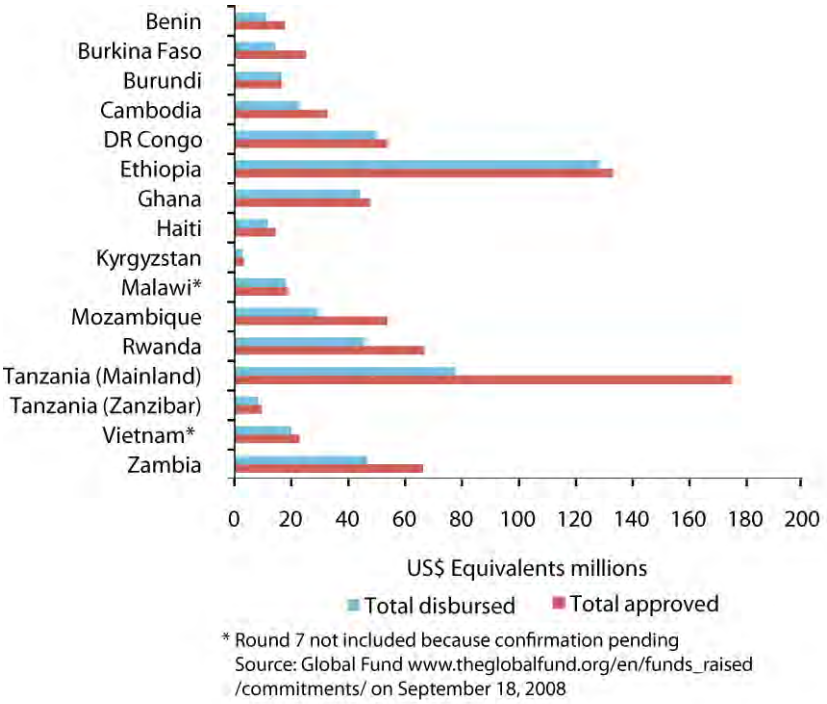
Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Benin	6	5	6	9	9	9	11	9	11	26	100
Burkina Faso	-	-	-	-	4	3	43	49	-	-	100
Burundi	-	-	-	-	-	7	20	29	28	17	100
Cambodia	-	-	-	5	3	2	13	26	22	29	100
DR Congo	-	0.7	0.4	4	2.7	8	8	26	16	34	100
Ethiopia	-	-	-	-	-	-	-	-	-	-	-
Ghana	-	-	-	-	-	4	-	-	97	0	100
Kyrgyzstan	-	-	-	-	-	-	-	-	-	-	-
Haiti	-	-	1	1	1	1	30	23	21	22	100
Malawi	-	-	-	-	28	-	-	73	-	-	100
Mozambique	-	-	-	-	-	-	14	13	19	54	100
Peru	-	-	-	-	-	-	-	-	-	-	-
Rwanda	-	-	-	-	-	-	-	-	-	-	-
Tanzania	-	-	-	-	30	-	70	-	-	-	100
Vietnam	0.0	0.0	1	13	13	11	9	14	14	11	100

Source: Country Impact Evaluation Reports 2008

TRENDS OVER TIME IN GLOBAL FUND FUNDING FOR MALARIA

We examined the total amount of the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) approved malaria grants and disbursement between 2003 and 2007. The data for the 16 countries that have received funds for malaria are presented in Figure 7.2. There is a clear indication that most of the countries have received their approved funding from the Global Fund. Ethiopia and the United Republic of Tanzania (primarily mainland) have received the most funds, and Kyrgyzstan received the least. For some countries, as noted, funding for Round 7 was not included. Disbursement rates averaged 77%, ranging from 44% (Tanzania mainland) to 100% (Burundi).

Figure 7.2
Total Amount of Global Fund Approved Grants and Disbursements, 2003-2007, by Country



* Round 7 not included because confirmation pending
Source: Global Fund www.theglobalfund.org/en/funds_raised /commitments/ on September 18, 2008

DEVELOPMENT OF STRATEGIES, POLICY, AND GUIDELINES FOR MALARIA CONTROL

The broad strategy for malaria control can contain four prongs. These are distribution of ITNs, use of IRS (using DDT) as part of the vector control approach, use of IPTp, and the approach to treatment regimen. Whether countries in the evaluation study had adopted these approaches by 2007 is shown in Table 7.4. Among the 11 malaria endemic countries in Sub-Saharan Africa in this evaluation study, none had adopted the policy of use of ACT in 2003. By 2007, all countries had adopted this as their national policy. Nine countries had adopted as national policy the use of IPTp for pregnant women in areas of high malaria transmission. IPTp is not recommended for pregnant women who do not live in endemic malaria areas. Adoption of a policy does not guarantee implementation, however, and even if implementation follows, there will likely be a delay between adoption and the ability to roll out an intervention.

Table 7.4: Recommended Policies and Strategies for Malaria in 2007, by Country

Country	DDT Used for IRS	ACT Policy Adopted	Parasitological Confirmation for All Groups	IPTp Strategy
Benin	No	Yes	No	Yes
Burkina Faso	No	Yes	No	Yes
Burundi	No	Yes	No	No
Cambodia	No	Yes	Yes	NA*
DR Congo	-	Yes	Yes	Yes
Ethiopia	Yes	Yes	Yes	No
Ghana	Yes	Yes	No	Yes
Kyrgyzstan	-	-	-	NA*
Haiti	-	-	Yes	NA*
Malawi	No	Yes	Yes	Yes
Mozambique	Yes	Yes	No	Yes
Peru	No	Yes	Yes	NA*
Rwanda	No	Yes	Yes	-
Tanzania	Yes**	Yes	Yes	Yes
Vietnam	Yes**	Yes	No	NA*
Zambia	Yes	Yes	Yes	Yes
Summary				
Total adopting policy	6	14	9	9
Total not adopted policy	10	0	6	1
Missing	3	2	1	3

* IPTp is not recommended in countries that do not have endemic malaria transmission.
** Country has policy of IRS in some local areas.
Source: World Malaria Report 2008

7.4 PROCESS VARIABLES: ACT PURCHASES

A critical step in scaling up interventions against malaria is making sure that there are sufficient supplies of commodities available. This section presents the reported ACT purchases by the countries in 2005 and 2006 (see Table 7.5). Most countries have begun to purchase ACT in large quantities, most at levels that would allow them to switch all malaria treatment to ACT if diagnostic testing is used. However, even if testing is not included, the amount of ACT purchased should be sufficient for most countries to make ACT the primary drug for presumptive malaria treatment among children.

Table 7.5: Reported Number of ACT Courses Purchased in 2005 and 2006, by Country

Country	2005	2006	Proportion of Estimated Need
Benin	398,640	2,716,800	54%
Burkina Faso	-	875,520	9%
Burundi	-	2,291,566	96%
DR Congo	168,120	3,714,934	10%
Ethiopia	7,325,730	2,073,990	136%
Ghana	2,177,540	14,970	16%
Malawi	0	0	0%
Mozambique	311,040	961,200	10%
Rwanda	2,681,970	3,299,624	434%
Tanzania	4,406,600	5,069,504	42%
Zambia	1,843,380	3,429,025	73%

Sources: Number purchased from country reports to the Global Fund; estimated need is based on coverage of 80% of estimated cases over the two-year period.

As Table 7.5 shows, there has been a strong move toward purchase of ACT drugs in countries in Sub-Saharan Africa. However, these numbers may be examined with some suspicion, given the huge purchases reported in Rwanda, an amount well over their estimated need even with 80% coverage.

7.5 Output Variable: Service Delivery and Diagnostic Services

Availability and Distribution of ITNs

Table 7.6 shows the number of ITNs sold/distributed for the period 2004-2007. The table also shows the distribution strategies of the 16 countries. It is clear that there has been a huge increase in ITN distribution, with the number of ITNs growing from slightly more than 6.6 million distributed in 2004 to an average of 14 millions nets distributed in the next three years. Also, most countries adopted a strategy of free distribution, at least for pregnant women and children under the age of five.

Table 7.6: Number of ITNs Distributed or Sold in 2004-2007 and Recommended Distribution Strategies in 2007, by Country

	Number of ITN (Conventional and Long-lasting) Sold or Distributed				Recommended Strategies		
Country	2004	2005	2006	2007	Free Distribution	Targeting All	Targeting Children under Five and Pregnant Women
Benin	659,254		76,500		Yes	No	Yes
Burkina Faso	125,000	903,000	412,200	24,000	Yes	Yes	Yes
Burundi	420,793	476,119	274,800	-	Yes	-	Yes
Cambodia	267,144	500,318	452,316	456,581	Yes	Yes	Yes
DR Congo	877,161	791,135	2,379,384	-	Yes	Yes	Yes
Ethiopia	-	4,243,157	9,070,718	7,178,443	Yes	Yes	Yes
Ghana	375,000	618,855	2,100,000	1,477,538	Yes	-	No
Haiti	-	-	39,834	-	Yes	Yes	No
Malawi	1,295,498	815,620	1,508,735	-	Yes	-	Yes
Mozambique	401,802	725,119	683,410	-	Yes	No	Yes
Rwanda	223,926	253,700	1,957,720	-	Yes	No	Yes
Tanzania	1,790,647	2,634,414	2,874,043	2,967,148	Yes (voucher)	No	-
Vietnam	-	1,201,000	800,000	-	-	-	Yes
Zambia	176,082	516,999	1,162,578	2,458,183	Yes	Yes	No

Source: WHO. 2008. World Malaria Report 2008. Geneva: WHO.

DIAGNOSTIC SERVICES

Table 7.7 shows the elements used to judge the quality of services provided by surveyed clinics in PDACs. When examined across PDACs, composite measures of quality were generally low. This finding will be helpful in later interpretation of the modeled impact of treatment on malaria deaths.

Table 7.7: Percentage of Surveyed Facilities Offering Malaria Services with the Infrastructure, Recently Trained Staff, Guidelines, Equipment, and Supplies to Offer Quality Services, by Country, 2008

	Service Quality Elements			
Country	Trained Staff	Guidelines	Diagnostics (RDT or Microscope)	Number of Facilities Offering Malaria Services
Burkina Faso	81	91	9	535
Cambodia	59	65	69	128
Ethiopia	50	44	96	151
Haiti	42	51	65	190
Malawi	93	94	100	49
Peru	65		82	137
Zambia	53	36	50	295

Source: DCA Facility Census or Facility Survey 2008

A second measure of quality of services relates to the ability of clinics to correctly diagnose malaria cases. Large numbers of children and adults with a fever visit health facilities and are often treated for malaria (and not treated for pneumonia or other causes of fever). The DCA Facility Census collected data on the availability of specific diagnostic tests, which are presented in Table 7.8 for four countries.

Table 7.8: Proportion of Surveyed Facilities that Offer Malaria Diagnostic Services, Density of Facilities with Malaria Diagnostic Services per 100,000 Population, and Presence of Malaria Diagnostic Equipment in Facilities that Provide Diagnostic Services, by Country, 2008

			Malaria-Related Characteristics			
Country	District Population	Total Number of Facilities Surveyed	Percentage of Facilities with Malaria Diagnostic Services (%)	Density of Malaria Diagnostic Services (per 100,000 population)	Percentage with Microscope and Slides and Giemsa or Field Stain (%)	Percentage with availability of Rapid Malaria Test (%)
Burkina Faso	3,787,828	506	96	_	5	2
Ethiopia	22,719,017	157	96	0.1	76	58
Haiti	2,534,426	206	92	0.8	50	10
Zambia	2,322,318	283	92	1.1	35	64

Source: DCA Facility Census or Facility Survey 2008

As is shown in Table 7.8, Ethiopia and Zambia have very good diagnostic services based primarily on rapid diagnostic tests. Burkina Faso and Haiti also claim high proportions of clinics with malaria diagnosis, but clearly the diagnostics do not depend heavily on slide stain examination or rapid diagnostic testing.

7.6 Outcome Variables: Coverage of Interventions and Behavior Change

Indoor Residual Spraying

As presented earlier, six countries have policies that promote IRS with DDT. As shown in Table 7.9, the number of households sprayed (with DDT or other insecticides) has increased dramatically in Ethiopia, Mozambique, and Zambia. In the other three countries for which data are available for multiple years (Ghana, Tanzania, and Vietnam), the number of households sprayed has remained nearly constant over the years reported.

With the exception of Mozambique and Zambia, which report spraying in almost one-third of all households, other countries have much lower national coverage because IRS is promoted in only limited geographic areas. For example, while total coverage of IRS is low in Ethiopia and Vietnam, malaria transmission is restricted to subnational zones, so coverage in transmission areas may be much higher. Also, while Tanzania had low national coverage of IRS, in Zanzibar it was reported that more than 90% of all households were sprayed in 2006 and 2007.

Table 7.9: Percentage of Targeted Households Sprayed (IRS) in Countries that Use IRS, 2004-2007, by Country

Country	Years	Number of Households Sprayed	Estimated Coverage (%)
Burundi	2005	79,784	7
Ethiopia	2004	845,693	8
	2005	782,581	7
	2006	1,196,897	11
	2007	1,590,964	14
Ghana	2006	134,000	3
	2007	134,000	3
Mozambique	2004	754,494	18
	2005	1,250,375	30
	2006	1,537,825	36
Tanzania (including Zanzibar)	2006	203,699	3
	2007	231,669	3
Vietnam	2004	1,885,000	10
	2005	2,000,000	10
	2006	1,900,000	10
Zambia	2004	175,192	8
	2005	236,759	11
	2006	537,877	24
	2007	657,695	29

Source: WHO. 2008. World Malaria Report 2008. Geneva: WHO.

COVERAGE OF BEDNETS AND ITNS

Household Ownership of Nets

Tables 7.10 and 7.11 show ownership of all nets and ITNs by area of residence and wealth quintile. All the data except for those in the shaded rows are from nationally representative surveys.

Table 7.10: Percentage of Households with at Least One Mosquito Net of Any Type, by Background Characteristics, 2000-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2001	40	49	35	-	-	-	-	-	DHS 2001
	2006	56	66	50	36	45	55	63	81	DHS 2006
Burkina Faso	2003	40	46	39	34	40	37	39	52	DHS 2003
	2006	52	65	47	37	44	48	53	72	MICS 2006
	2008*	57	-	-	-	-	-	-	-	DCA 2008
Burundi	2005	13	49	11	7	8	11	14	28	MICS 2005
Cambodia	2005	96	95	96	91	95	98	99	97	DHS 2005
	2007	59								NMBS 2007
DR Congo	2007	28	38	22	-	-	-	-	-	DHS 2007
Ethiopia	2000	1	3	1	-	-	-	-	-	DHS 2000
	2005	6	11	5	5	3	4	5	11	DHS 2005
	2007	50	41	59	60	57	56	60	45	MIS 2007
	2008*	39	27	52	-	-	-	-	-	DCA 2008
Ghana	2003	18	10	24	28	24	17	12	11	DHS 2003
	2006	31	21	37	41	33	28	26	24	MICS 2006
Haiti	2006	6	11	4	0	2	5	8	16	DHS 2005
	2008*	11	-	-	-	-	-	-	-	DCA 2008
Malawi	2000	13	32	10	-	-	-	-	-	DHS 2000
	2004	42	56	39	20	32	39	53	72	DHS 2004
	2006	50	72	47	33	40	51	54	72	MICS 2006
	2008*	65	-	-	42	54	48	73	84	DCA 2008
Rwanda	2000	7	30	3	-	-	-	-	-	DHS 2000
	2005	18	40	14	6	14	12	18	45	DHS 2005
	2007	59	68	58	42	54	60	68	71	DHS 2007
Tanzania	1999	30	57	21	-	-	-	-	-	DHS 1999
	2001	37	67	28	-	-	-	-	-	Nat. Stats
	2005	46	74	36	27	32	27	50	82	DHS04-05
	2007	56	79	49	-	-	-	-	-	DHS 2007
	2008	70	49	76	42	48	58	59	86	TNVS 2008
Vietnam	2005	97	90	99	99	99	99	98	91	AIS 2005
	2006	97	92	99	98	100	100	99	90	MICS 2006
Zambia	2002	27	35	23	-	-	-	-	-	DHS 01-02
	2006	50	51	50	44	53	60	61	58	MIS 2006
	2007	64	64	64	60	63	66	62	73	DHS 2007
	2008	72	66	74	76	71	70	67	73	MIS 2008
	2008*	83	-	-	-	-	-	-	-	DCA 2008

* DCA results are not nationally representative and should not be interpreted as providing another national trend point. The results are included here only as background to the DCA.

Table 7.11: Percentage of Households with at Least One ITN, by Background Characteristics, 2003-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2006	25	29	21	11	17	24	31	39	DHS 2006
Burkina Faso	2003	5	12	3	2	2	2	4	13	DHS 2003
	2006	23	45	15	8	13	14	24	52	MICS 2006
Burundi	2005	8	34	6	4	5	6	7	19	MICS 2005
Cambodia	2005	5	2	4	9	6	4	2	1	DHS 2005
DR Congo	2007	9	12	7	-	-	-	-	-	DHS 2007
Ethiopia	2000	0	0	0	-	-	-	-	-	DHS 2000
	2005	3	5	3	3	2	3	3	6	DHS 2005
	2007	48	40	56	57	54	54	59	43	MIS 2007
Ghana	2003	3	2	4	7	2	2	2	4	DHS 2003
	2006	19	15	22	19	20	17	18	9	MICS 2006
Malawi	2004	27	41	25	11	19	25	36	52	DHS 2004
	2006	36	56	34	22	29	37	40	56	MICS 2006
Rwanda	2000	-	-	-	-	-	-	-	-	-
	2005	15	32	12	5	11	9	15	37	DHS 2005
	2007	24	65	54	11	19	24	28	38	DHS 07/08
Tanzania	1999	1	-	-	-	-	-	-	-	DHS 1999
	2001	-	-	-	-	-	-	-	-	-
	2005	23	47	14	6	10	15	22	56	DHS04-05
	2007	39	59	33						DHS 07 (preliminary)
	2008	46	52	28	24	28	37	39	58	TNVS 2008
Vietnam	2005	12	5	14	24	13	10	9	6	AIS 2005
	2006	19	5	23	40	19	15	13	7	MICS 2006
Zambia	2002	14	16	12	-	-	-	-	-	DHS 01-02
	2006	44	45	44	38	48	56	54	51	MIS 2006
	2007	53	53	54	48	63	55	51	60	DHS 2007
	2008	62	59	64	63	63	62	58	65	MIS 2008

The data presented in Tables 7.10 and 7.11 clearly show a rapid and continued increase in household ownership of nets, both untreated and ITNs. This is a consistent finding across all countries with trend data. Another interesting finding is the typically high reported ownership of nets in urban areas and among wealthier populations among most of the countries in Sub-Saharan Africa. This is a bit worrisome because malaria transmission is generally much higher in rural areas and, therefore, coverage of the populations in need may be lower than the national coverage numbers indicate.

These urban-rural differentials are not found or are less pronounced in Ghana and Zambia. In Ghana, the explanation is that there was targeted distribution focusing on distribution in the three northern provinces that are more rural, poorer, and have higher under-five mortality. This targeted approach, which was part of the United Nations Children's Fund's (UNICEF's) Accelerated Child Survival and Development program in the country, was supported by Global Fund for bednet purchases.[10]

[10] Unpublished ACSD Retrospective Evaluation

In Cambodia and Vietnam, net ownership is higher in rural areas, appropriately reflecting the malaria concentration in those areas. Likewise, ownership is roughly equal among all wealth quintiles in these countries, perhaps showing a more appropriate targeting of nets among those at greatest risk for malaria transmission, but any interpretation is tentative given low prevalence of malaria and net ownership.

Use of ITNs

Tables 7.12 and 7.13 show trends in children under age five and pregnant women reported to have slept under an ITN. As with net ownership, these data are broken down by location and wealth quintile.

Table 7.12: Percentage of Children under Age Five Sleeping under an ITN, by Background Characteristics, 2001-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2001	7	14	4	-	-	-	-	-	DHS 2001
	2006	20	25	18	9	15	20	26	34	DHS 2006
Burkina Faso	2003	2	5	1	1	0	1	2	6	DHS 2003
	2006	10	24		4	6	6	9	26	MICS 2006
Burundi	2000	1	15	0	0	1	0	1	5	MICS 2000
	2005	8	40	7	5	5	6	8	19	MICS 2005
Cambodia	2005	4	2	5	8	5	4	1	1	DHS 2005
DR Congo	2001	1	2	0	0	0	0	0	3	MICS 2000
	2007	19	26	14						DHS 2007
Ethiopia	2005	2	4	1	1	1	1	2	3	DHS 2005
	2007	33	36	33	35	33	29	35	33	MIS 2007
	2008	3	2	3	3	4	3	3	1	DCA 2008*
Ghana	2003	4	4	4	6	2	2	3	5	DHS 2003
	2006	22	16	25	24	22	19	21	22	MICS 2006
Malawi	2000	3	12	2	-	-	-	-	-	DHS 2000
	2004	15	30	12	6	9	12	17	34	DHS 2004
	2006	23	43	21	13	19	23	24	41	MICS 2006
Mozambique	2007	7	8	6						MIS 2007
Rwanda	2000	4	21	1	-	-	-	-	-	DHS 2000
	2000	5	24	2	0	1	1	8	32	MICS 2000
	2005	13	26	11	5	11	8	14	31	DHS 2005
	2007	56	62	55	45	53	57	62	62	DHS 07/08
Tanzania	1999	2	5	1	-	-	-	-	-	DHS 1999
	2005	16	40	10	4	6	12	19	49	DHS04/05
	2007	26	49	21	22	28	34	41	67	DHS 07 (preliminary)
	2008	29	33	15	13	13	18	17	54	TNVS 2008
Vietnam	2000	16	4	19	27	15	11	12	4	MICS 2000
	2005	13	3	15	25	15	9	8	5	AIS 2005
	2006	5	12	3	6	3	1	2	14	MICS 2006
Zambia	2002	7	8	6	-	-	-	-	-	DHS 01-02
	2006	23	26	21	19	25	32	26	40	MIS 2006
	2007	29	30	28	19	32	32	29	33	DHS 2007
	2008	41	38	42	39	46	47	35	40	MIS 2008

* In contrast to the Ethiopian DHS and MIS, the Ethiopia DCA likely included many areas that were "non-malarious" (above 2,000 meters elevation) where ITN distribution had not been done.

The data show consistently increasing trends in the proportion of children under five sleeping under an ITN for the years measured. In all countries with trend data, coverage has increased, with a median coverage of 3.5% at time of first measurement of ITN usage rising to a median coverage of 16% at the last measurement.

As with net ownership, there were differences in ITN usage for children by geographic region (urban is higher than rural) and by wealth (poorest having less ITN usage). However, in recent years for Cambodia, Ethiopia, Ghana, Mozambique, and Vietnam, there was equal or higher coverage in rural populations and more equitable coverage across wealth quintiles, which seems to be determined by a strong distribution effort in areas of greatest need. Again, for some of these countries, overall net ownership is low (e.g., Cambodia and Vietnam) so patterns of use by these breakdowns are less robust.

Table 7.13: Percentage of Pregnant Women Age 15-49 Sleeping under an ITN, by Background Characteristics, 2003-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2006	20	26	17	9	13	22	27	29	DHS 2006
Burkina Faso	2003	3	6	2	1	1	3	2	8	DHS 2003
Cambodia	2005	4	2	5	10	2	5	2	0	DHS 2005
DR Congo	2007	7	10	6	-	-	-	-	-	DHS 2007
Ethiopia	2005	1	6	1	1	0	0	1	5	DHS 2005
	2007	33	26	36	37	34	31	36	27	MIS 2007
Ghana	2003	3	2	3	5	3	1	2	3	DHS 2003
Malawi	2004	15	30	12	6	10	13	17	33	DHS 2004
Mozambique	2007	9	9	9	-	-	-	-	-	MIS 2007
Rwanda	2005	17	29	16	8	17	12	19	36	DHS 2005
	2007	60	63	60	47	62	61	63	64	DHS 07/08
Tanzania	2005	16	39	10	4	7	12	16	47	DHS 04-05
	2007	27	48	21						DHS 2007 (preliminary)
	2008	19	24	13	16	9	11	23	31	TNVS 2008
Vietnam	2005	15	1	19	25	12	17	14	8	AIS 2005
Zambia	2006	24	17	27	24	28	18	22	25	MICS 2006
	2007	33	29	34	28	35	39	27	34	DHS 2007
	2008	43	50	41	40	46	38	45	49	MIS 2008

While there are less trend data for pregnant women sleeping under an ITN, the trend data that are available suggest a large increase in coverage, as was seen with ITN usage among children. Zambia again stands out both with a coverage rate of 24% in 2006 and rising to 33% in 2007 (and 42% in the 2008 DCA). Zambia, along with Cambodia, Ghana, and Vietnam, overturn the usual findings, as the percentage of pregnant women sleeping under an ITN is as high or higher in rural areas than in urban areas, and coverage among the poorest quintile is greater than for the wealthiest quintile. For the other countries, this is not the case.

INTERMITTENT PREVENTIVE THERAPY FOR PREGNANT WOMEN

An increasing proportion of pregnant women are receiving one or two doses of SP during an antenatal visit. Tables 7.14 and 7.15 present the proportion of pregnant women (those with a live birth in the last two years) who received one or two doses of SP by country, place of residence, and wealth quintile.

Table 7.14: Percentage of Women who Gave Birth in the Past Two Years who Received One Dose of SP during ANC, by Background Characteristics, 2003-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2006	5	5	5	4	3	5	7	6	DHS 2006
Burkina Faso	2003	0	0	0	0	0	0	0	0	DHS 2003
	2008*	18	21	16	-	-	15	17	25	DCA 2008
DR Congo	2007	38	52	28						-
Ethiopia	2005	2	3	2	0	0	0	0	0	DHS 2005
	2008*	1	1	1	1	0	1	1	0	DCA 2008
Haiti	2005	0	1	0	0	0	0	0	1	DHS 2005
	2008*	3	2	4	1	2	4	3	3	DCA 2008
Malawi	2004	79	85	78	76	73	78	81	90	DHS 2004
	2008*	62			60	66	62	61	61	DCA 2008
Mozambique	2003	11	16	-	-	-	-	-	-	HMIS
	2007	23	24	23	-	-	-	-	-	MIS 2007
Peru	-	-	-	-	-	-	-	-	-	-
Rwanda	2005	2	4	1	1	1	2	2	3	DHS 2005
	2007	40	36	40	40	37	39	46	40	DHS 07/08
Tanzania	2004	53	64	51	48	47	49	62	66	DHS 2004
	2007	59	69	57	46	53	59	63	72	DHS 2007 (preliminary)
	2008*	-	-	-	-	-	-	-	-	DCA 2008
Zambia	2002	1	1	1	-	-	-	-	-	DHS 01/02
	2007	82	91	79	76	77	83	90	92	DHS 2007
	2008*	98	90	91	85	89	92	93	91	DCA 2008
	2008	80	86	77	71	79	80	87	87	MIS 2008

* DCA results are not nationally representative and should not be interpreted as providing another national trend point. The results are included here only as background to the DCA.

Table 7.15: Percentage of Women who Gave Birth in the Past Two Years who Received Two Doses of SP during ANC, by Background Characteristics, 2003-2008, by Country

			Residence		Wealth Index Quintile					Source
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	
Benin	2006	3	3	3	2	1	2	4	5	DHS 2006
Burkina Faso	2003	0	0	0	0	0	0	0	0	DHS 2003
	2006	1	2	1	2	1	1	1	2	MICS 2006
	2008*	9	12	8	-	-	7	9	14	DCA 2008
DR Congo	2007	7	9	6	-	-	-	-	-	-
Ethiopia	2005	1	1	1	1	1	1	2	1	DHS 2005
	2008*	0			0	0	1	0	0	DCA 2008
Ghana	2003	1	1	1	1	1	1	1	1	DHS 2003
	2006	27	35	24	23	21	25	33	41	MICS 2006
Haiti	2005	0	1	0	0	0	0	0	1	DHS 2005
	2008*	3	2	3	1	2	4	3	3	DCA 2008
Malawi	2004	47	54	45	42	43	42	48	57	DHS 2004
	2006	45	52	44	40	42	45	46	52	MICS 2006
	2008*	53			50	52	49	53	62	DCA 2008
Mozambique	2007	20	17	32	-	-	-	-	-	MIS 2007
Rwanda	2005	0.9	1.9	0.8	0.4	0.6	1.3	0.8	1.5	DHS 2005
	2007	13	14	13	12	10	13	19	16	DHS 2007/08
Tanzania	2004	22.3	28.8	20.7	18.8	21.2	18.5	25.6	30.1	DHS 2004
	2007	30	42	28	24	26	28	31	47	DHS 2007 (preliminary)
	2008*	-	-	-	-	-	-	-	-	DCA 2008
Zambia	2006	61	71	56	58	71	61	78-	-	MIS 2006
	2007	63	72	59	53	59	63	68	78	DHS 2007
	2008*	59	66	54	48	57	57	67	59	DCA 2008
	2008	66	75	62	56	65	65	72	78	MIS 2008

* DCA results are not nationally representative and should not be interpreted as providing another national trend point. The results are included here only as background to the DCA.

As previously shown, the majority of countries in Sub-Saharan Africa had reported adopting IPTp as a national strategy, but roll out and coverage of this intervention differs greatly across these countries. Clearly Malawi, Tanzania, and Zambia have shown remarkable progress in scaling up this intervention over the past five years. Other countries, while showing increasing trends, have not reached the same high levels of coverage.

Regarding coverage by geographic areas, as with net ownership, coverage of IPTp was higher in urban areas, probably reflecting higher antenatal visits among women living in urban areas. Likewise there is a fairly sizable difference in IPTp coverage by wealth quintile, with the poorest 20% of the population having lower coverage.

TREATMENT OF FEVER

Among children who reportedly had a fever in the past two weeks, questions were asked about health-seeking behavior and the type of medicines received. Table 7.16 shows the proportion of febrile children under age five receiving any antimalarial medicine by background characteristics and by country.

Table 7.16: Percentage of Febrile Children under Age Five who Received any Antimalarial Medicine, by Background Characteristics, 1998-2008, by Country

			Residence		Wealth Index Quintile					
Country	Year	Total	Urban	Rural	Poorest	Second	Middle	Fourth	Richest	Source
Benin	2001	60	62	60	-	-	-	-	-	DHS 2001
	2006	54	57	53	44	52	57	60	61	DHS 2006
Burkina Faso	2003	50	60	48	37	45	50	59	63	DHS 2003
	2006	48	70	42	36	42	39	58	70	MICS 2006
	2008*	18	24	15	-	-	14	21	24	DCA 2008
Burundi	2000	31	42	31	24	34	30	29	37	MICS 2005
	2005	30	28	30	30	30	29	31	29	MICS 2005
Cambodia	2005	0	1	0	0	0	0	1	0	DHS 2005
DR Congo	2001	52	63	47	44	47	52	54	66	MICS 2000
	2007	30	38	26	-	-	-	-	-	DHS 2007
Ethiopia	2000	3	-	-	-	-	-	-	-	DHS 2000
	2005	3	4	3	1	3	4	4	6	DHS 2005
	2007	10	13	9	14	5	11	9	10	MIS 2007
	2008*	6		5	9	7	6	2	6	DCA 2008
Ghana	1998	61	60	61	-	-	-	-	-	DHS 1998
	2003	63	65	61	59	55	65	77	58	DHS 2003
	2006	61	69	57	49	55	63	71	81	MICS 2006
Haiti	2000	12	7	13	-	-	-	-	-	DHS 2000
	2006	5	7	4	2	6	7	3	9	DHS 05-06
	2008*	4	3	4	2	3	4	6	3	DCA 2008
Malawi	2000	27	34	26	-	-	-	-	-	DHS 2000
	2004	28	42	27	23	26	26	33	40	DHS 2004
	2006	24	30	23	19	23	25	26	29	MICS 2006
Mozambique	2003	15	13	16	-	-	-	-	-	DHS 2003
	2007	18	20	17	-	-	-	-	-	MIS 2007
Rwanda	2000	9	12	9	-	-	-	-	-	DHS 2000
	2000	13	21	12	9	10	12	16	30	MICS 2000
	2005	12	11	13	12	13	11	13	13	DHS 2005
	2007	6	6	6	7	4	1	9	9	DHS 07/08
Tanzania	1999	53	62	52	-	-	-	-	-	DHS 1999
	2005	58	65	57	48	61	57	62	67	DHS04-05
	2007	57	69	54	-	-	-	-	-	DHS 2007 (preliminary)
	2008*	-	-	-	-	-	-	-	-	DCA 2008
Vietnam	2000	7	10	6	8	7	3	6	10	MICS 2000
	2006	3	2	3	6	1	3	2	0	MICS 2006
Zambia	2002	52	49	53	-	-	-	-	-	DHS 01-02
	2006	58	74	55	53	53	68	69	na	MIS 2006
	2007	38	40	38	35	43	37	38	40	DHS 2007
	2008*	31	36	28	30	30	37	27	34	DCA 2008
	2008	43	55	40	39	42	45	47	51	MIS 2008

* DCA results are not nationally representative and should not be interpreted as providing another national trend point. The results are included here only as background to the DCA.
Source: World Malaria Report 2008, Country Report 2008

The major finding regarding treatment is that in no country does there appear to be a significant increase in malaria treatment for children with fever. Even though in a few countries there are small increases of 2 or 3 percentage points, there are several countries where there have been large decreases in coverage.

One possibility is that while coverage of treatment has not increased in these countries, it is possible that the quality of treatment services has increased among those covered due to the use of improved

drug regimens (e.g., use of ACT) that are now the national policy in all of the African countries in the evaluation study or to an increase in the speed with which children are taken for care and treatment. Table 7.17 presents the data that can be used to address these possibilities and suggests that this explanation is not valid.

Table 7.17: Percentage of Children under Age Five with Fever Treated with Antimalarial Medicine, by Promptness of Treatment and by Type of Medicine, 2001-2008, by Country

Country	Year	Any Antimalarial	Any Antimalarial the Same or Next Day	SP/Fansidar	ACT	Source
Benin	2001	60	-	1	0	DHS 2001
	2006	54	42	1	0	DHS 2006
Burkina Faso	2003	50	45	0	-	DHS 2003
	2006	48	41	0	-	MICS 2006
	2008*	18	-	0.2	0	DCA 2008
Burundi	2000	31	-	2	-	MICS 2000
	2005	30	19	2	3	MICS 2005
DR Congo	2001	52	-	1	0	MICS 2001
Ethiopia	2000	3	1	1	-	DHS 2000
	2005	3		1	-	DHS 2005
	2007	9	4	1	4	MIS 2007
	2008*					DCA 2008
Ghana	2003	63	44	0	-	DHS 2003
	2006	61	48	1	4	MICS 2006
Haiti	2000	12	-	-	-	DHS 2000
	2008*	4		1	0	DCA 2008
Malawi	2000	27	-	23	-	DHS 2000
	2004	28	23	23	-	DHS 2004
	2006	24	20	20	0	MICS 2006
Mozambique	2003	15	8	11	-	2003 National Report
	2007	23	18		5	MIS 2007
Rwanda	2000	13	-	2	0	DHS 2000
	2000	13	-	2	-	MICS 2000
	2005	12	7	4	0	DHS 2005
Tanzania	2005	58	51	24	2	DHS 2005
	2006	36	26	2	3	MICS 2006
	2007	57	34	2	20	DHS 2007 (preliminary)
Vietnam	2000	7	-	1	-	MICS 2000
	2006	3	2	2	0	MICS 2006
Zambia	1999	58	-	2	0	MICS 1999
	2002	52	37	2	-	DHS 01-02
	2006	58	37	21	8	MIS 2006
	2007	39	21	23	11	DHS 2007/08
	2008*	31		13	15	DCA 2008
	2008	43	29	21	13	MIS 2008

* DCA results are not nationally representative and should not be interpreted as providing another national trend point. The results are included here only as background to the DCA.

In general, the survey data available have not been able to detect that ACT is being used for malaria treatment, even though it has become national policy and large quantities are being distributed (see Table 7.5). While about half of the countries do have some evidence of the introduction of ACT for treatment, only Zambia has data to suggest that ACT use is above 10%. However, the low levels of ACT usage may be because many of the countries do not have data on drug treatment beyond 2006. It may be higher in future surveys.

While levels of treatment have not increased in most countries and there is little evidence of widespread use of ACT, it may be that treatment for malaria has increased by another measure, namely the speed with which people seek services for children with fever. In Table 7.17, national trends for the percentage of children with fever receiving an antimalarial on the same or next day has not significantly increased in any country except for Mozambique, where coverage increased from 8% in 2003 to 18% in 2007. Mozambique was also one of the few countries that also showed an overall increase in treatment for fever.

As with treatment in general, there is little evidence that the quality of treatment as measured by more prompt treatment of fever has increased during this time period for most countries.

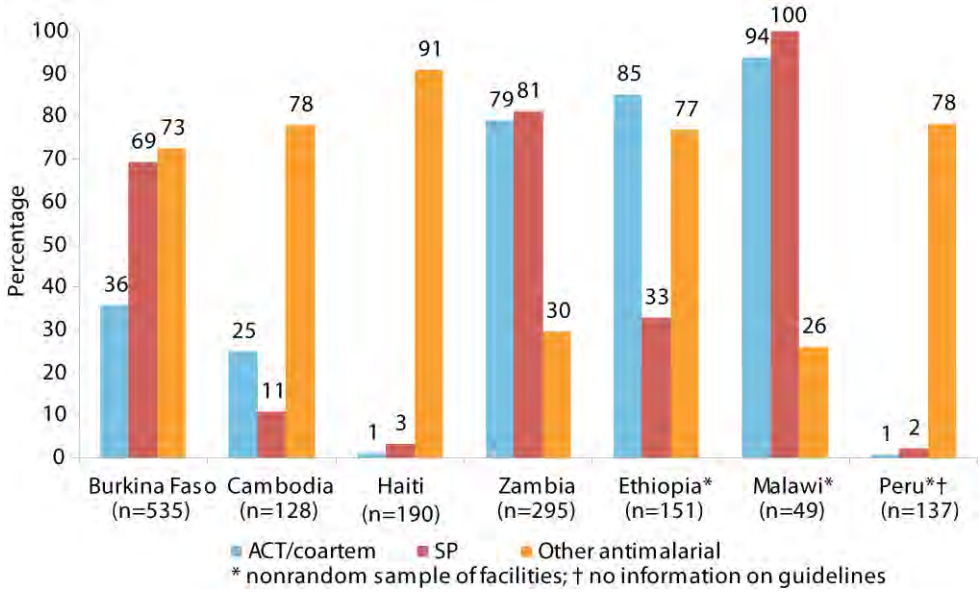
Table 7.18: Among Children under Age Five, the Percentage who Had a Fever in the Two Weeks Preceding the Survey; and among Children with Fever, the Percentage of Children for whom Advice or Treatment Was Sought from a Health Facility or Provider, the Percentage who Took Antimalarial Medicines, and the Percentage who Took Antibiotic Medicines, by Country, 2008

	Among Children under Age Five		Among Children under Age Five with Fever			
Country	Percentage with Fever in the Two Weeks Preceding the Survey (%)	Number of Children	Percentage for whom Advice or Treatment was Sought from a Health Facility or Provider (%)	Percentage who Took Antimalarial Medicines (%)	Percentage who Took Antibiotic Medicines (%)	Number of Children with Fever
Burkina Faso	15	6,885	47.8	18.2	2.8	1,031
Ethiopia	15	3,681	35	6	34	532
Haiti	26	3,647	39.8	3.7	41.9	948
Zambia	26.1	3,614	65.4	31.4	35.2	944

Source: DCA Household Coverage Survey 2008

The data on treatment provide little evidence of improvement over the past five to seven years. Overall coverage shows little increase; in fact, there is more evidence of drops in coverage (e.g., in DR Congo) than there is of an increase. Also, though there has been a big increase in purchases of ACT (see Table 7.5), there is little evidence that ACT was in fact in the clinics at the time of the most recent surveys in countries. Part of the explanation may be that most countries have not conducted surveys recently enough to capture the increased use of ACT, or it may simply be that the surveys do not accurately document the type of treatment used. In fact, in the DCA Facility Census, there were much higher reports of availability of ACT in some countries, suggesting that ACT usage and treatment quality may be increasing but not soon enough to be captured in the national surveys. As Figure 7.3 shows, ACT availability was much higher in 2008 in the facilities surveyed as part of the DCA.

Figure 7.3
Availability (%) of Different Antimalarials in Clinics, by Country, 2008



Source: DCA Facility Census or DCA Facility Survey 2008

7.7 Impact Variables: Changes in Disease Burden

Reported Cases

The number of malaria cases is tracked by all countries, but reporting and diagnostic capacities are poor. Some countries (e.g., Zanzibar) have sentinel clinics in which special efforts are made to track malaria cases and case fatality—mostly hospitals, focusing on admissions, discharges, and deaths. Another method uses laboratory results (percentage of blood smears that are positive) to assess the burden of malaria. Trends over time in selected clinics have shown dramatic changes over time in some of these indicators, but it is difficult to obtain a general picture.

For reported cases, little evidence of improvement can be seen as the trends within countries reflect, in part, changes in the reporting systems where improvements in reporting systems is confounded with increases in case load for malaria (see Table 7.19).

Table 7.19: Trends in Reported Malaria Cases, 1998-2007, by Country

Country	2000	2001	2002	2003	2004	2005	2006	2007
Benin	707,408	717,290	782,818	819,256	853,030	803,462	861,847	-
Burkina Faso	1,032,886	352,587	1,188,870	1,443,184	1,546,644	1,615,695	2,060,867	2,486,337
Burundi	3,057,239	3,365,640	2,649,039	2,259,694	1,749,892	2,361,734	2,161,483	-
Cambodia	62,439	110,161	100,194	119,712	91,855	67,036	89,109	59,848
DR Congo	964,623	2,199,247	-	4,386,638	-	-	5,008,956	-
Ethiopia	383,382	2,264,322	2,515,191	3,143,163	5,706,167	3,361,717	3,759,960	1,214,921
Ghana	3,349,528	3,044,844	3,140,893	3,552,896	3,416,033	3,452,969	3,511,452	3,123,147
Kyrgyzstan	12	28	2,744	468	93	226	320	-
Haiti	16,897	9,837	-	9,837	10,802	21,778	32,739	-
Malawi	3,774,982	3,823,796	2,784,001	3,358,960	2,871,098	3,688,389	4,204,468	-
Mozambique	3,278,525	3,947,335	4,592,799	4,863,403	5,610,884	5,896,411	6,335,757	6,327,916
Peru	69,726	79,473	85,742	79,473		-	-	-
Rwanda	-	998,086	1,066,847	1,205,514	1,289,293	1,638,369	1,418,762	-
Tanzania	-	324,584	369,394	11,379,411	11,898,627	11,441,681	10,566,201	-
Vietnam	74,316	188,122	184,901	164,283	128,382	99,061		-
Zambia	3,602,564	3,838,402	3,760,335	4,346,172	4,078,234	4,121,356	4,731,338	-

Source: WHO. 2008. World Malaria Report 2008. Geneva: WHO.

TRENDS IN SEVERE ANEMIA

Recent MIS surveys are collecting blood to test for parasitemia and anemia. DHS surveys have also included anemia testing for several years, which allows an assessment of longer term trends. Only Zambia (national) and Zanzibar (districts) have information on trends in both parasitemia and severe anemia in children (and adults).

Table 7.20: Prevalence of Severe Anemia* in Children under Age Five, by Background Characteristics, 2001-2008, by Country

			Residence		
		Total	Urban	Rural	
Country	Year	(%)	(%)	(%)	Source
Benin	2001	9	7	10	DHS 2001
	2006	8	6	9	DHS 2006
Burkina Faso	2003	13	5	14	DHS 2003
Cambodia	2005	1	1	1	DHS 2005
DR Congo	2007	4	3	5	DHS 2007
Ethiopia	2005	4	3	4	DHS 2005
	2007	6	3	6	MIS 2007
Ghana	2003	6	4	7	DHS 2003
Haiti	2000	2	3	1.3	DHS 2000
	2005	2	3	2	DHS 2005
Lesotho	2004	2	2	2	DHS 2004
Malawi	2004	5	2	6	DHS 2004
Peru	2000	1	1	1	DHS 2000
Rwanda	2005	8	12	8	DHS 2005
	2007	8	9	8	DHS 2007
Tanzania	2004	4	3	5	DHS 2004
	2007	7.7	8.5	7.5	DHS 2007
	2007	3.4	3.3	3.5	TNVS 2008
Zambia	2006	13	8	15	MIS 2006
	2007/8	4	4	4	MIS 2008**

* Severe anemia defined as HB<8 g/dl

** Personal communication of preliminary report of the 2008 MIS

Trends in the proportion of children under age five with severe anemia are mixed. First, only six countries have nationally representative data on this measure for two points. Of those six countries, there seems to be no evidence that anemia has dropped, and in two countries the anemia rates are higher. As previously discussed, rates of severe anemia are not a very specific measure of impact of malaria intervention, and the time series for this measure is limited, but to date there are no national-level trends in anemia in these countries to support a presumption of a large decrease in malaria morbidity or mortality. However, there have been cross-sectional analyses within the Zambia MIS that found lower rates of anemia in households with ITNs than those without ITNs.

TRENDS IN PARASITE PREVALENCE

There are limited data points for nationally representative parasite prevalence among under-five children to assess trends. However, there is increasing interest in recent years to include this aspect in household surveys. As seen in Table 7.21, trend data for parasite prevalence from a nationally representative survey are only available for four countries: Cambodia, Haiti, Rwanda, and Zambia.

Data for Benin and Burundi are from health-facility based sources; therefore, they do not provide an indication of the parasite prevalence at the population level. In Cambodia and Haiti there has not been a decline in parasite prevalence, but the parasite prevalence in Rwanda and Zambia has dropped significantly. Indeed, in Rwanda the parasite prevalence of 26% in 2005 dropped to 3% in 2007. In Zambia the prevalence dropped by 40% between 2006 and 2007. This could be the result of the good coverage in most of the malaria interventions in these two countries.

Table 7.21: Trends in Parasite Prevalence (%) among Children under Age Five, 2000-2008, by Country

Country	2001	2002	2003	2004	2005	2006	2007	2008	Source
Benin*	-	-	-	36	34		35	-	HMIS 2004-2006
Burundi*	-	-	-	56	46		40	-	HMIS 2004-2006
Cambodia	-	-	-	4	-	-	3	-	
DR Congo	-	-	-	-	-	-	2	-	DHS 2007
Ethiopia							1		MIS 2007
Haiti					4		5		CDC/WHO 2005; GF/SOGEBANK 2007
Mozambique	-	-	-	-	-	-	39	-	MIS 2007
Rwanda	-	-	-	-	26		3	-	DHS 2005, DHS 2007
Tanzania	-	-	-	-	-	-	18	10.5	DHS 2007; TNVS 2008
Zambia	-	-	-	-	-	22	16	10	MIS 2006, MIS 2008**

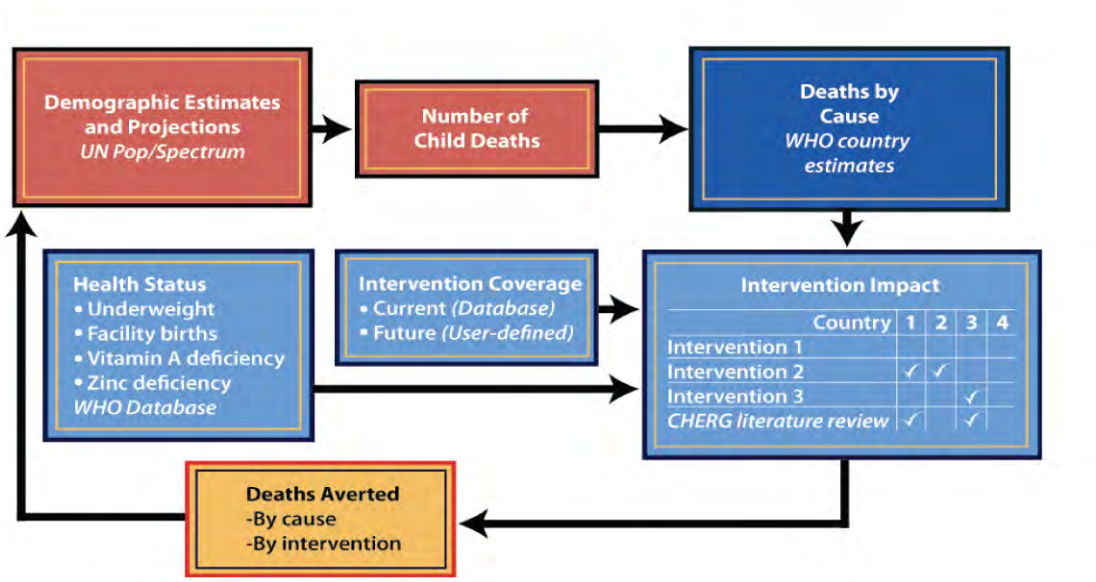
* Not population-based prevalence
** Personal communication of preliminary report from the 2008 MIS

MODELED IMPACT: LIVES SAVED DUE TO SCALE UP OF MALARIA INTERVENTIONS

The modeling approach for malaria used an all-cause model of under-five mortality. This model (LiST) starts with assumptions about the cause of death profile in a country, the level of under-five mortality (from the World Health Organization [WHO] and UNICEF), and current coverage of interventions. It also employs assumptions about the effectiveness of different interventions in reducing cause-specific mortality. This model is based on the earlier work on effectiveness of interventions headed by WHO and UNICEF's Child Health Epidemiology Reference Group and RBM's MERG. Earlier versions of this model have been used to estimate the impact of scaling up interventions in the Lancet series on Child Survival,[11] Neonatal Survival,[12] and Maternal and Child Undernutrition.[13] The model used in this analysis as well as related documentation can be downloaded from www.futuresinstitute.com. A schematic of the model is provided in Figure 7.4.

[11] Jones, G., R. Steketee, R. Black, Z. Bhutta, and S. Morris. 2003. How many child deaths can we prevent this year? Lancet 362: 65–71.
[12] Darmstadt, G.L., Z.A. Bhutta, S. Cousens, T. Adam, N. Walker, and L. Debernis. 2005. Evidence-based, cost-effective interventions that matter: How many newborns can we save and at what cost? Lancet 365, 988-997.
[13] Black, R.E., L.H Allen, Z.A. Bhutta, L.E. Caufield, M. de Onis, et al. 2008. Maternal and child undernutrition: Global and regional exposures and health consequences. Lancet 371: 243-260.

Figure 7.4
Schematic Structure of the Model Used to Estimate the Impact of the Increased Coverage of Malaria Interventions on Deaths in Children under Age Five



This model can be used to estimate the impact of increased coverage of key interventions related to malaria as well as the overall impact of increased interventions on all-cause under-five mortality. There are two primary outputs. First, the model provides an estimate of the number of under-five malaria deaths averted and produces estimates of intervention-specific deaths averted both for direct malaria-related interventions and for all other interventions. Second, overall trends in under-five mortality as well as malaria-specific under-five mortality can be calculated.

Data sources include national surveys (MIS, DHS, and MICS) and health facility and program administrative data. For these models it was assumed that coverage of non-malaria interventions remained constant, and that malaria-specific interventions were scaled up annually. For years with no coverage information, linear interpolation was used to estimate coverage in those years between the measured points. The interventions that were varied in the model are ownership of ITNs and IPTp.

In countries where there was significant use of IRS, we also made a composite coverage value of households protected, which was the sum of houses where a child under the age of five slept under an ITN or the household had been sprayed. Using this value of households protected, additional models were run for Mozambique and Zanzibar.

Table 7.22 presents the estimated number of child deaths averted (or lives saved) by scaling up ITN coverage. Table 7.23 presents similar information for scaling up IPTp coverage. In these tables the period of time in which modeling of lives saved from the scale up of an intervention depends on the availability of a baseline survey, so for some countries with a baseline survey in 2000 there is an estimate for 2001, for others the estimate cannot be made until later.

Table 7.22: Estimated Number of Child Deaths Prevented from ITN Scale up, 2000-2007, by Country

Country	2001	2002	2003	2004	2005	2006	2007	Total
Benin	0	260	540	839	1,159	1,486	1,525	5,809
Burkina Faso			0	816	1,698	2,629	2,703	7,846
Burundi	33	68	106	149	196	205	215	972
DR Congo	0	1,027	2,158	3,390	4,731	6,114	7,594	25,014
Ethiopia	101	206	315	428	545	4,865	9,318	15,778
Ghana			0	761	1,544	2,337	2,351	6,993
Malawi	305	642	1,002	1,380	1,680	1,973	2,000	8,982
Rwanda	38	82	130	182	238	668	1,136	2,474
Tanzania	1,083	2,286	3,584	4,940	6,448	7,922	9,406	35,669
Zambia	0	673	1,384	2,126	2,901	3,709	4,512	15,305
Total	1,560	5,244	9,219	15,011	21,140	31,908	40,760	124,842

Notes: ITN coverage is assumed constant from last follow-up estimate to 2007.
Based on the change in proportion of children who slept under an ITN the night before the survey (Minimum value).
Where there are more than two coverage estimates, linear interpolation is assumed between each point.

Table 7.23: Estimated Number of Child Deaths Prevented from IPTp Coverage Scale up, 2001-2007, by Country

Country	2001	2002	2003	2004	2005	2006	2007	Total
Benin*	0	2	6	10	13	19	24	74
Burkina Faso			0	2	8	13	18	41
DR Congo	0	30	80	127	190	249	338	1,014
Ghana			0	34	94	146	172	446
Malawi				0	6	23	28	57
Mozambique								0
Rwanda*					0	23	94	117
Tanzania				0	153	505	798	1,456
Zambia	0	57	236	379	601	792	1,029	3,094
Total	0	89	322	552	1,065	1,770	2,501	6,299

*IPTp is not national policy in Burundi and Ethiopia because of low transmission setting.
Notes: Proportion of pregnant women who gave birth in the last two years and received two doses of SP.
IPTp coverage is assumed constant from last follow-up estimate to 2007.
IPTp coverage assumed to be 0% as it was not measured during this survey.

The modeled lives saved (or deaths averted) show a clear impact of scaling up both ITNs and IPTp. Overall, it was estimated that in the 10 malaria-endemic countries in the year 2007, more than 27,000 deaths were averted as a result of ITN use and another 2,500 by IPTp. The cumulative effects for these two interventions over the years modeled were just under 125,000 lives saved by ITN use and approximately 6,300 lives by IPTp.

In Zambia, the modeled impact of scaling up ITNs and IPTp shows that 5,541 deaths were averted from increased use of ITNs and IPTp in 2007. Also in Zambia, where there is a large IRS program, these estimates of deaths averted from all three interventions would be even higher. Modeling of the combined effects of all three interventions was not possible because there was not enough information on the overlap of IRS and net ownership. However, national reports from Zambia have

estimated that 29% of households were sprayed in 2007, so the estimated lives saved here should be viewed as a minimum value.

It is interesting to note that while there has been much progress in Zambia on coverage and a great reduction in under-five deaths resulting from increased coverage of ITNs, IRS, and IPTp, the estimated number of malaria deaths remains high. Overall, there are still an estimated 10,000 deaths in children under five in Zambia due to malaria. There are another 60,000 under-five deaths due to other causes.

Mozambique has only one national survey and, therefore, there was not a baseline to estimate lives saved. However, Mozambique, along with Zanzibar, has implemented a large IRS program. To investigate the importance of IRS scale up, we used data on households covered either by the use of ITNs or IRS in these two countries. Using these values of households protected in the model (and, based on the review of Eisele, using the same level of effectiveness for the two interventions),[14] it was estimated that by 2007 Mozambique's scale up of ITNs, IPTp, and IRS had reduced malaria deaths by almost 20%. In Zanzibar, where coverage of IRS was greater than 90% in both 2006 and 2007, the model estimates that the deaths due to malaria were reduced by more than 90%.

7.8 Scale up of Interventions to Control Malaria: Country Fact Sheets and a Case Study of Zambia

In Annex 7.1, tables of time trends of key indicators for each country are presented. This annex serves as a series of country fact sheets for malaria. The following is an in-depth analysis of the situation in Zambia.

Case Study of the Malaria Control Program in Zambia

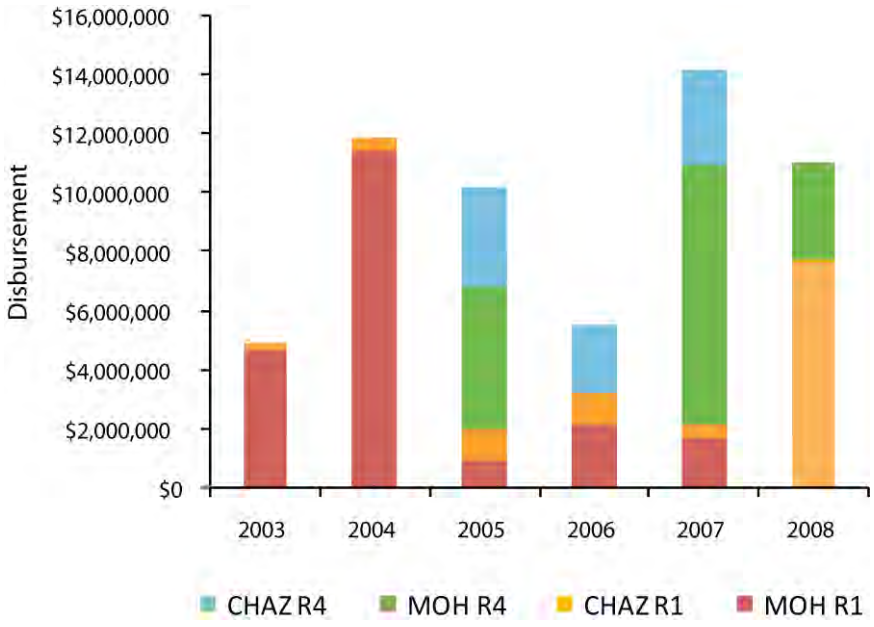
Zambia Brief: Zambia is a nation of approximately 12 million people living in 9 provinces and 72 districts and has long been considered fully malaria endemic with regular and moderate to high transmission in all districts with a strong seasonal pattern of high transmission between December and May associated with the rains. Zambia had an initial National Malaria Control Strategic Plan from 2000-2005 and updated this for 2006-2010, where they set forth ambitious goals to scale up malaria interventions: ITNs, IRS, prevention in pregnancy with IPTp and ITNs, and management of cases with diagnosis, using microscopy and rapid diagnostic tests (RDTs), and with prompt, effective treatment with ACT using artemether-lumifantrine.

Zambia Resources: With a sound policy and strong and consistent leadership from the Ministry of Health and the National Malaria Control Center (NMCC), Zambia has attracted resources from a variety of sources. The Government of Zambia (GOZ) has provided increasing resources between 2000 and 2008 for malaria control. In many respects, this amount is the most difficult to quantify as the GOZ supports national staff who provide the vast majority of the services and the spectrum of facilities (e.g., hospitals, health centers, health posts, laboratories) where the services are provided or coordinated. The bilateral and multilateral donors have also provided substantial resources. From 2000 to 2003, the U.S. Agency for International Development (USAID) was the main direct

[14] Eisiele, T. 2008. Review of effectiveness of malaria interventions. Report presented at the Child Health Epidemiology Reference Group. Geneva, June.

bilateral donor, providing about US$4 million per year. Zambia was approved for Global Fund grants in Round 1 (US$39.3 million), Round 4 (US$42.7 million), and Round 7 (US$37.5 million), and a total of US$57.6 million of Global Fund resources have been expended to date (see Figures 7.5 and 7.6). Zambia received a World Bank booster program 3-year award of US$20 million between 2006 and 2008. A cooperative agreement between the Malaria Control and Evaluation Partnership in Africa (MACEPA), with funding from the Bill and Melinda Gates Foundation, began in 2005 and provides approximately US$3.5 million per year in support. And intermittent bilateral support for malaria from Japan International Cooperation Agency (JICA) and district health support from multiple donors contributing to the Sector Wide Approach (SWAp) have continued to provide a variety of support needed for program action. Most recently, USAID support has been increased through the President's Malaria Initiative (PMI) to approximately US$14 million per year. The sum of this support is substantial between 2003 and 2008, with current disbursements from the Global Fund accounting for approximately 40% to 45%. And, while USAID and the Global Fund were the initial donors in the early period, this investment is likely to have encouraged additional investment from the World Bank, MACEPA, and PMI.

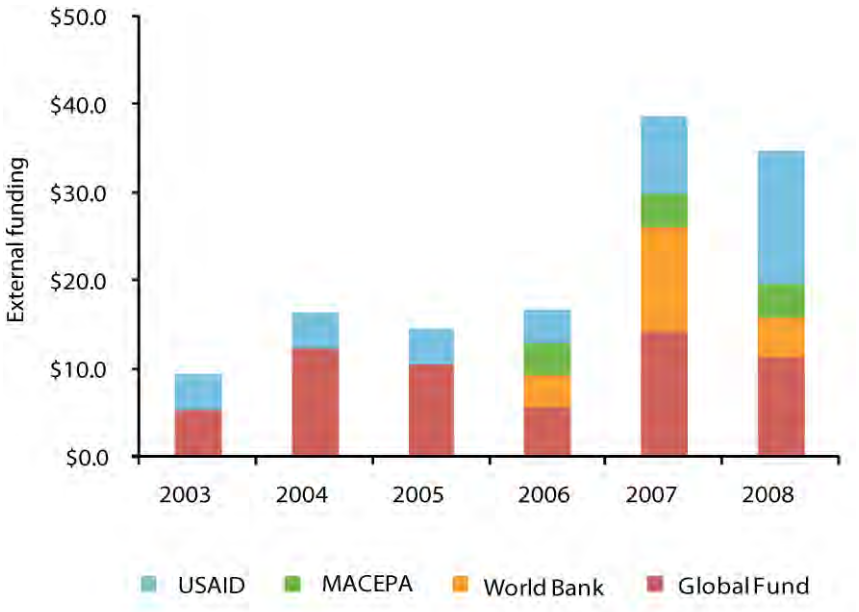
Figure 7.5
Yearly Global Fund Disbursements (US$) for Malaria, by Recipient and Funding Round, 2003-2004, Zambia



Total Round 1 and 4 Global Fund grants available = US$81,995,607; disbursed as of Oct 2008 = US$57,606,050. (70%) and remaining available funds = US$24,389,557. The approved GF Round 7 grant of US$37,502,022 is pending approval.

Source: Funding levels for the Global Fund from http://www.theglobalfund.org; Round 1 and 4 for Churches Health Association of Zambia (CHAZ) and Ministry of Health (MOH)

Figure 7.6
Estimated External Funding (US$ Millions) for Malaria Control, 2003-2008, Zambia



Sources: Funding levels for the Global Fund from http://www.theglobalfund.org; Funding amounts from other donors are estimated from personal communications with staff from each organization.

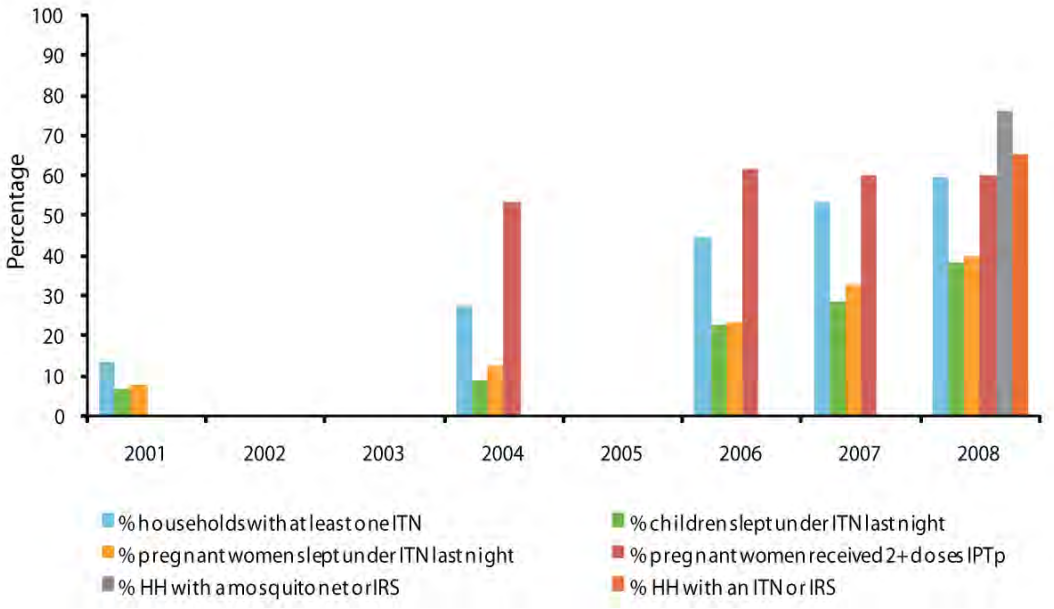
Tracking Progress: To ensure that available prevention and treatment interventions reach all Zambians, the NMCC has monitored the procurement and distribution of needed commodities. And, to assess the progress as they tried to achieve greater than 80% coverage of the key interventions in the population, they had initial information to use as baseline from the 2001-2002 DHS and follow-up information from the 2004 RBM survey. They have tracked subsequent progress using routine reporting from the Health Management Information System and their 2006 MIS, the 2007 DHS, and most recently from their 2008 MIS. Routine health information reported from health facilities across the nation allow for tracking of fever cases, malaria diagnosis, hospital admissions, and treatment activities.

Achieving Results: Progress has been steadily in the positive direction (with a few challenges along the way).

- ***Inputs→Outputs:*** Over the past three years, NMCC has procured and distributed through District Health Management Teams and the Reproductive Health Programme approximately 4.3 million ITNs (now all are long-lasting or LLINs). They have achieved high coverage of targeted households with IRS in 15 districts and are planning expansion of this to reach 36 districts in the coming year. They have expanded LLIN and IPT distribution in antenatal clinics nationwide. They have also taken steps to improve microscopy and RDT use and expanded the use of prompt and effective ACTs for treatment in all health facilities and are extending the use of treatment through their community health worker network.
- ***Outcomes/Coverage:*** From initially low levels of prevention intervention coverage found in the 2001-2002 DHS, NMCC has expanded their program with particular emphasis on achieving higher coverage. As shown in Figure 7.7, they have shown a substantial increase in population coverage of ITNs and regular use of ITNs and of IPTp. Their IRS program has systematically

mapped the target spray areas, and their data for the 2007-2008 malaria season showed that coverage of targeted households reached 70% to 90% in the 15 districts. The summary figures from national surveys suggest that 76% of households have either a mosquito net (treated or not) or have been sprayed in the past year, and 67% have either an ITN or IRS in the last year. At that level of population coverage, one can expect that there is substantial community benefit even for those without an ITN or IRS.

Figure 7.7
Malaria Prevention Intervention Coverage, 2001-2008, Zambia



Source: DHS and MIS surveys

Through increased use of malaria diagnostic tools, Zambia is further focusing malaria treatment on those with documented malaria infection and coverage with ACT is expanding. Table 7.24 summarizes the changes in coverage indicators between the 2006 and 2008 MIS.

Table 7.24: Changes in Malaria-related Indicators between 2006 and 2008, Zambia

	2006 MIS	2008 MIS	Percent Change
Number of households	2,999	4,405	
Own more than 1 ITN	44.4%	59.6%	+34%
Own more than 2 ITNs	18.8%	29.5%	+57%
Households with IRS in the last 12 months	27.0%	42.7%	+58%
Households with ITN or IRS in last 12 months	n/a	65.5%	
Child slept under ITN last night	22.8%	38.1%	+67%
Pregnant woman slept under ITN last night	23.4%	40.0%	+71%
Pregnant woman took any antimalarial preventive treatment	76.9%	88.1%	+15%
Pregnant woman took 2+ doses IPTp	61.2%	60.3%	-1%
Treatment for fever with any antimalarial	57.9%	43.3%	-25%
Treatment for fever with antimalarial on same/next day	37.0%	28.9%	-22%
Child with fever had finger prick (diagnostic used)	n/a	10.9%	
Proportion of fever treated using Coartem	12.7%	12.7%	0%
Malaria parasitemia in children <5yrs	21.8%	10.1%	-54%
Urban-Rural	4.9%/28.8%	4.3%/12.4%	-12.2%/-57%
Mean hemoglobin	10.0g/dl	10.9g/dl	+9%
% with Hb<8.0 g/dl	13.3%	4.3%	-68%
% with Hb<8.0 g/dl	Range by province: (7.4-20.3)	Range by province: (1.2-6.9)	

- **Impact (Disease and Death/Survival):** The consequences of this program effort can be seen in the health data as well. Compared with 2006, malaria parasite prevalence in children under five years of age has been reduced by approximately 50%, and moderate-severe anemia in these children has been reduced by approximately 70% to remarkably low levels.

  Information from DHS surveys shows that under-five mortality has decreased overall by 29% during the approximately five-year interval from 168/1,000 live births in 2002 to 119/1,000 live births in 2007, and there is a suggestion that malaria interventions have contributed to a substantial portion of this improvement. This suggestion is based on the consistency of the documented improvements in malaria control in recent years and the fact that all of the mortality improvement is seen in post-neonatal infant mortality (after the neonatal period or first 28 days of life), where there has been a 38% reduction, and in the mortality of 1- to 4-year-old children with a 36% reduction (see Table 7.25). These are the age groups where one would expect malaria interventions to have their largest impact.[15]

[15] Further analysis suggests that the scale up of malaria prevention nationwide, while not the only improvement in Zambian health indicators, is likely to have been a substantial contributor to this progress.

Table 7.25: Changes in Child Mortality Rates, 2001-2002 and 2007, Zambia

	2001-2002 DHS	2007 DHS	Percent Change
Infant mortality	95	70	-26%
Neonatal mortality	37	34	-8%
Postneonatal mortality	58	36	-38%
Child mortality (1-4yrs)	81	52	-36%
Under-five mortality	168	119	-29%

Note: Mortality calculated as deaths per 1,000 live births, except for child mortality, which is calculated as deaths per 1,000 children surviving to 12 months of age.

- **Equity:** The benefit of high national coverage has reached the rural and the poorest in Zambia at the same rate as the more urban and more well-to-do populations. Because any cost (including the cost of malaria illness) affects the proportion of income/assets more among the poor, the proportional benefit of reducing malaria is at its highest in this vulnerable group. Analysis of recent national surveys has established wealth quintiles based on household assets and examined intervention coverage and infection and anemia rates by wealth quintile. Based on the recent surveys (see data in tables 7.10 through 7.16), there is relative equity in service delivery based on wealth for some but not all of the prevention interventions. For example, IRS is focused on the urban and periurban areas, and as expected, rates varied by wealth quintile from 20.5% in the lowest to 49.8% in the highest quintile. Receipt of treatment for malaria on the same or next day was similar across the lowest four quintiles (28%, 29%, 26%, and 27%) but was higher in the highest quintile (39%).

  Malaria remains a disease of poverty. The proportion of children under five years of age with malaria parasitemia (by microscopy) from lowest to highest quintile was 13%, 14%, 12%, 7%, and 3%; however, this is also driven by rural-urban differences (parasitemia rates of 12% and 4%, respectively), where low-wealth homes are more likely to be in rural areas. It is worth noting that with the substantial reduction in severe anemia in young children (now less than 5% overall) following the introduction of high coverage with malaria prevention interventions, the anemia rates (Hb<8gm/dL) did not differ significantly across low-to-high wealth quintiles (3.9%, 4.1%, 4.2%, 6.8%, and 2.6%).

- **Socioeconomic Progress:** A recent review of data in the copper mining and sugar industries, where companies support malaria control efforts in the workforce and in the surrounding communities, showed that this investment is improving production and is cost-saving. In regularly collected data between 2001 and 2007, these industries have seen that their investment in prevention has led to a marked reduction in malaria cases in their workforce and families and has improved work attendance and improved production-per-worker and production overall for the plants. And, in 2006, data accounting for money spent on malaria prevention and treatment and money recouped from fewer cases, fewer lost work hours, and better production was gained—Mopani Copper Mines saved US$295,718, and Zambia Sugar PLC saved US$550,379.[16]

  Building on progress, Zambia now seeks to complete its national coverage and to take additional steps to reduce further the malaria burden. The government is increasing its focus on the

[16] Banda, P., et al. 2008. Economic Impacts of malaria on industry in Zambia: Case studies of Mopani Copper Mines and Zambia Sugar PLC. Late breaker Abstract #2718; American Society of Tropical Medicine and Hygiene Meeting, Dec 7-11; New Orleans LA, USA.

infection and disease. Newly available community techniques for mapping cases and transmission areas, facilitating prevention coverage, and moving to an approach of testing and treating the infected population in villages are under consideration. The current broad partnership in Zambia is an important opportunity, as many organizations including the GOZ, the Global Fund, PMI, the World Bank, the Bill and Melinda Gates Foundation (via MACEPA), the SWAp partners, JICA, and many others are continuing to support malaria control efforts.

7.9 Overview of Findings and Conclusions

Based on the Malaria M&E Framework (see Figure 7.1), we can review the findings from our evaluation in terms of successes and challenges and the role of the Global Fund in influencing and supporting progress. That is, the progress in a country can be examined in the specific categories: (1) have they chosen and implemented good polices and strategies **(good policy and strategy);** (2) have they been able to attract sufficient resources (money and people) to manage and deliver in their program **(inputs);** (3) have they used the resources efficiently and delivered services to those in need **(process and outputs);** (4) have they achieved high coverage with the package of interventions **(outcomes);** and (5) have they reduced the burden of disease, particularly among those most at risk **(impact).** The ability to determine the progress in these areas is contingent on the development and improvement of M&E systems in the countries. While it was understood from the outset of this evaluation study that many partners have contributed to the global malaria control effort, we suggest that there is substantial evidence that the Global Fund's contribution to progress in malaria control has been timely (often preceding the investment from other major donors) and substantial (at or above resource levels from other donors).

Policy and Strategy

Most of the countries have been responsive in adopting the WHO-recommended policies and strategies for the key malaria interventions (see Table 7.26). However, there is a delay, in most countries, between the adoption of the strategy and implementation and scale up. This delay occurs for various reasons, including the lack of funding and lack of capacity in the health system. Amin et al. describe the reasons of delay in implementation of ACT in Kenya and conclude that availability of funding and lack of legislation are the main reasons.[17] ACT scale up has been delayed in most of the countries. In Burkina Faso, the policy was adopted in 2004; however, the scale up only started in 2007. Zambia was the only country to implement the ACT intervention one year after adoption. Ethiopia and Tanzania were among the first to adopt the policy, but the implementation in Tanzania only started in 2003. Only a few countries have adopted and implemented an IRS strategy. The adoption of parasitological confirmation for all groups is also scanty and some countries (Malawi, Tanzania) did not adopt it, yet an ACT policy is implemented. ITN usage is one success story that nearly all the countries have adopted and scaled up. We should note that only Ethiopia and Zambia have adopted all the strategies, however, at different periods.

[17] Amin, A.A., D. Zurovac, B.B. Kangwana, J. Greenfield, D.N. Otieno, W.S. Akhwale and R.W. Snow. 2007. The challenges of changing national malaria drug policy to artemisinin-based combinations in Kenya. Malaria Journal 6:72.

Policies and Strategies: Many of the updates and appropriate revisions of policies and strategies preceded the financing from the Global Fund—because some of the funding was actually contingent on having an appropriate policy or strategy in place. However, the potential for the Global Fund financing was arguably the most important factor leading to ACT policy adoption and the growing move to using malaria diagnostics for case confirmation (e.g., in Sub-Saharan Africa, the adoption of ACT policies occurred largely after 2003). Similarly, the reintroduction or the expansion of IRS followed the availability of resources from the Global Fund and then other donors for this intervention.

Table 7.26: Year of Adoption of WHO-recommended Strategies, by Country

Country	ITN Targeting U5 and Pregnant Women	DDT in used for IRS	IPT Strategy Used to Prevent Malaria during Pregnancy	ACT Policy Adopted	Parasitological Confirmation for All Group
Benin	No	No	No	-	-
Burkina Faso	2004	No	2005	2004	1998
Burundi	-	-	-	-	-
Cambodia	2000	No	No	2000	2000
DR Congo	2000	No	2002	No	-
Ethiopia	2001	1998	2004	1998	1998
Ghana	1999	No	2003	No	No
Kyrgyzstan	-	-	-	-	-
Haiti					
Lesotho	-	-	-	-	-
Malawi	2002	No	No	2007	No
Moldova	-	-	-	-	-
Mozambique	-	2005	2005	2006	No
Peru	-	-	-	-	-
Rwanda	-	-	-	-	-
Tanzania	2004	No	2001	1998	No
Vietnam	-	-	-	-	-
Zambia	2001	2001	2001	2003	2001

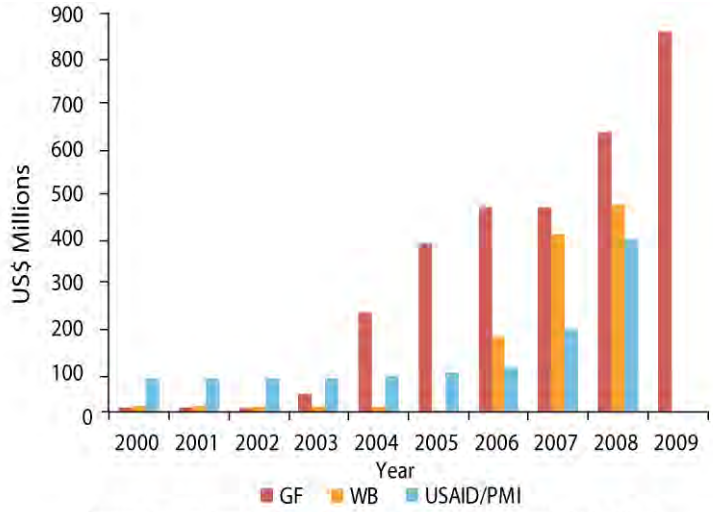
Source: World Malaria Report 2008

ATTRACTING RESOURCES (INPUTS)

As was shown in the financing chapter (see Chapter 4), there has been a clear increase in funds available and disbursed in countries for malaria control programs, and malaria-endemic countries have been increasingly successful in attracting Global Fund and other donor resources for malaria control efforts. Figure 7.8 shows a general schematic of the growing resources in Sub-Saharan African countries from the three major donors (Global Fund, the World Bank, and PMI). There has been consistent increasing funds for malaria control from 2003 to 2009, with the initial increases led by the Global Fund and followed by rapid increases from the World Bank and USAID/PMI. The figure shows when resources were available, so it can be expected that the translation of available funding to actual delivery of interventions has a lag period because of the time required for procurement and delivery to the appropriate districts and communities.

Attracting Resources: Countries have been increasingly successful in attracting Global Fund resources as a sign of their progress. The Global Fund has been a leader in the process of making funding available to countries, and this has arguably stimulated additional support from other major donors. Mechanisms for efficient use of the resources and for attention to the human resource needs remain challenges for the future.

Figure 7.8
Estimates of Available Sub-Saharan African Country Funding from the Global Fund (GF), World Bank (WB), and USAID and USAID/PMI for 2000-2009*



Sources: Websites from the Global Fund, World Bank Booster, PMI, and USAID. N.B., WB, and PMI funds are estimates for funds available. *At the time of preparation, only GF estimates could be made for 2009. These estimates use a typical multiyear allocation for GF grant resources and are not exact for specific country expenditure; similarly estimates for the World Bank and PMI funds are shown per year of expected allocation, but variations may occur at country level.

USING RESOURCES AND DELIVERING SERVICES (PROCESS AND OUTPUTS) AND ACHIEVING HIGH COVERAGE (OUTCOMES) AND REDUCING MORBIDITY AND MORTALITY (SHOWING IMPACT)

The malaria-endemic countries have gradually demonstrated progress, which in some countries is quite substantial. In the following sections, we review some of the highlights for the use of available resources to procure and deliver the specific interventions. As evidenced in recent reports (Malaria in Children 2007 UNICEF and RBM report; World Malaria 2008 WHO Report) and the tables presented in this chapter, there have been increases in money spent, commodities procured, and services delivered. Finally, whether from direct data or from the best available modeling, there is evidence that a growing number of lives are being saved from these investments and in-country work.

IRS FINDINGS AND CONCLUSIONS

IRS is the intervention that varies the greatest among countries of the evaluation study. While only five of the malaria-endemic countries have some policy promoting IRS, those countries have rapidly scaled up the use of IRS. In fact, in Mozambique, Tanzania (Zanzibar), and Zambia, IRS coverage is quite high in the IRS-targeted areas and plays a major role in the number of lives saved in those countries. In Mozambique, for example, estimated protected households, which includes use of nets or IRS, results in an estimated 15,332 deaths averted, most of which are the result of IRS. Likewise, when we ran a model for Zanzibar alone (excluding the rest of Tanzania), we estimated that by 2006 more than 400 malaria deaths had been averted, about a 90% reduction in the estimated malaria deaths in Zanzibar among children under the age of five.

The modeled impact of IRS presented in this report may also underestimate the impact of IRS because in at least Zambia and Tanzania, IRS only occurs in limited areas of the countries. The effectiveness of IRS used in the modeling may be low because it does not take into account the

possibility that in those areas with high IRS coverage and some ITN usage there may be some benefits from herd immunity.

ITN Findings and Conclusions

There is clear evidence that there has been a dramatic increase in ITN procurement, distribution, and usage in the past five to seven years in countries in the evaluation study. This increase is reflected across ITN-related indicators—the number of ITNs purchased by countries has increased, along with ITN ownership and the percentage of children and pregnant women reporting sleeping under an ITN. Most impressive about the current levels of coverage of ITNs is the fact that in 2000 coverage in most countries was very low (generally less than 5% household ownership and often less than 2% household ownership), and few countries had national policies for widespread promotion of ITNs.

One way to investigate the importance of Global Fund support is to examine the association between ITN distribution and Global Fund disbursements during the period 2003 to 2007. To test this association, we produced estimates of ITNs distributed and Global Fund money disbursed per 1,000 population. A simple correlation shows a significant association between these two measures ($r = 0.69$), suggesting a strong association between Global Fund support and ITN coverage. Clearly there are differences among countries in the association, as some countries may have spent more funds on other interventions. However, this correlation suggests that the Global Fund has had a substantial impact on ITN coverage.

With the clear evidence of increases in the ITN procurement, distribution, and use, there is modest but growing evidence that the increases in ITNs have resulted in the drops in the impact measures such as rates of severe anemia, parasite prevalence, and under-five mortality that have been reported in several countries such as Tanzania and Zambia and in benefits suggested in recent published reports from Rwanda, Ethiopia, and Sao Tome and Principe. Current use of models to estimate lives saved all reflect some change at the national level in the period for which data are available, but we expect that future and longer term trends in these indicators will continue to show the benefit of scale up of ITNs.

IPTp Findings and Conclusions

The scale up of IPTp has clearly been one of the major successes in the malaria control effort in Sub-Saharan Africa. Countries with trend data have shown upward trends in coverage, and three countries—Malawi, Tanzania, and Zambia—had coverage of 45%, 57%, and 63%, respectively, at the time of their most recent survey. Given that IPTp is a new intervention (coverage of a single dose of SP in Zambia was 1% in 2001), and much like ITNs, the current levels of coverage in these three countries are quite an impressive success story. Even in Mozambique, coverage of IPTp in 2007 was 20%. In the other countries in the region, IPTp scale up has been less successful with no country showing coverage of above 10%. It remains to be seen if coverage of IPTp can also be scaled up in other countries in Sub-Saharan Africa.

Treatment with ACT Findings and Conclusions

The findings related to ACT are the most perplexing and worrisome of the four primary malaria interventions. While there are data showing that most countries have purchased large amounts of

ACT, there is little or no evidence of a corresponding increase in usage of ACT for treatment of children. A notable exception is Zambia, where 13% of children who were treated for fever were reported to have been treated with ACT in 2006. No other country showed coverage of ACT above 5%.

Part of the reason for the low levels of coverage of ACT may be because of the lag between purchasing drugs and the delivery to countries, to health facilities, and to health workers, and usage of those drugs being reported in surveys. If this is the case, new surveys in the next few years should clearly show large increases in ACT coverage for 2007 and 2008. There is some evidence to support this assumption because the DCA studies did find higher levels of ACT availability in clinics in 2008 in these countries.

Another troubling issue with ACT use has been the general lack of improvement in treatment (in most countries) by any measure. There is little evidence that more children receive antimalarial treatment for fever now than five or seven years ago. There is little evidence that more children receive prompt treatment now or that the service at the clinics has substantially improved. One aspect of this challenge is that as countries expand their malaria control efforts, some have introduced laboratory testing so that only fever cases with malaria parasitemia are recommended for treatment. Consequently, when the surveys ask about children with fever (the denominator) who receive treatment, but the health system is using a different denominator (children with fever who tested positive for malaria), the rates of fever treatment decrease—but because the health service is better, not worse.

Unfortunately, the current data do not allow us to reliably estimate the trends in ACT coverage for "malaria cases" resulting from too few recent datasets and resulting from some surveys not assessing the use of diagnostics for children with fever. However, the data that are available show that of the four prongs for malaria control, treatment shows the least improvement.

Reductions in Malaria Morbidity and Mortality

Just as there are lag periods between available funding and the procurement and delivery of services, we can expect that the benefit of the services will take some time to observe. Among the countries involved in the evaluation study, only a few had recent nationally representative data that would allow assessment of these improvements. Where they exist (e.g., Rwanda, Tanzania, Zambia), the recent surveys demonstrate important reductions (by 50% or more) in parasite prevalence in young children and reductions (again, by 50% or more) in moderate-to-severe anemia in young children.

The malaria community has appropriately recommended tracking changes in all-cause child mortality during the scale-up phase of interventions. This choice is in part because of the challenges of establishing malaria-specific mortality and in part because the benefits obtained with the key malaria prevention interventions have been shown to lead to marked reduction in all-cause child mortality rates. Again, because of expected delays between delivering quality services and seeing the impact on mortality, most countries in the evaluation study did not have sufficiently recent mortality estimates to observe changes. Where mortality has been assessed recently, it appears that there is evidence of improvement that is consistent with the malaria control efforts. And, when using the Lives Saved Model, we estimate that a substantial number of child lives have been saved

due to scaling up of malaria interventions and that this is likely increasing in the most recent years with higher prevention coverage.

M&E Systems and Data Quality

As noted above, the global community's ability to document the progress and challenges for malaria control scale up will depend on timely and quality data from many countries. The countries, the Global Fund, and other donors and partner agencies have been increasingly attending to this need. For malaria control there is a growing wealth of nationally representative time series data available from the MICS, DHS, and MIS household survey programs. All of these surveys produce reliable national estimates of coverage of the three key intervention indicators (pregnant women receiving two doses of SP during pregnancy, children under five sleeping under an ITN last night, and treatment of febrile child with an antimalarial) as well as additional variables such as net ownership that relate to malaria interventions. In most countries, these surveys also have statistical power that allows for reliable estimates at the provincial level, by sex, and by wealth quintile for the indicators related to ITNs, and in some countries for IPTp and treatment as well.

The frequency of these surveys in most countries has also increased in the last five years with the advent of the MIS. The use of this survey, along with the MICS and DHS surveys, means that many countries with endemic malaria have these data every two to three years. Table 7.27 shows the number of times the key indicators were collected in a national household survey since 1999.

Using Resources, Delivering Services, Achieving High Coverage, and Reducing Morbidity and Mortality: Evidence from the evaluation study suggests that countries have been increasingly successful in using their resources (from the Global Fund and others) and have typically shown progress. Much of the progress has been with ITN (now LLIN) coverage, with improved IPTp coverage in a few countries, and with improved IRS coverage in a few countries and their targeted areas. The delivery of malaria diagnosis and treatment services remain the most challenging and merit further attention in the coming years. In countries with sufficient recent data, there is growing evidence that the increasing intervention coverage is leading to reductions in malaria illness, malaria-associated anemia in young children, and in all-cause mortality (suggesting that this includes malaria-specific mortality reductions). In general, in the first five years of the Global Fund, important progress is being made. This progress will likely become more apparent in the coming few years, provided that adequate data are gathered to show these results. And, because available resources for countries has been in a growth phase, only after these five years are countries actually beginning to receive the resources needed to achieve the required full scale up of interventions. To maintain and grow the initial progress, continued attention to efficient support of intervention scale up is required, and additional attention is needed for the areas of improved diagnosis and use of drugs and the health systems (e.g., stable funding as well as stable delivery systems) to sustain high coverage.

Table 7.27: Number of Nationally Representative Surveys that Have Collected the Key Indicators for Each Intervention since 1999, by Country

Country	IPTp	ITNs	Treatment	Parasitemia	Anemia
Benin	1	2	2	0	3
Burkina Faso	1	2	2	0	1
Burundi	0	2	2	0	0
DR Congo	1	2	2	2	1
Ethiopia	2	3	2	1	2
Ghana	0	2	2	0	1
Malawi	2	3	3	0	1
Mozambique	1	2	1	1	0
Rwanda	2	3	3	2	2
Tanzania	2	3	3	1	2
Zambia	3	4	4	2	2

In addition to the strong efforts at promoting more data collection, there has also been a concerted effort to ensure that the different survey programs all use a consistent set of indicators and a standard approach to measuring these indicators. While some indicators have been refined and changed over time (e.g., focus on treatment of a febrile child with an antimalarial within 24 hours), the surveys have also continued to produce the original indicators (treatment without the 24-hour period limitation) so that trends can be calculated.

There has also been an increase in the use of biomarkers in these surveys so that nationally representative data on levels of anemia and parasitemia are available. The measurement of parasite prevalence in children and women, and anemia to a lesser degree, are becoming increasingly important as measures of the impact resulting from the scaling-up interventions.

The data available from routine sources, especially as they relate to the quality of diagnostic and treatment services, are fewer, and those that are available often are of inconsistent quality. For example, the trends in reported malaria cases among the evaluation study countries (see Table 7.19) were generally difficult to interpret and would require much more investigation to determine if these reports could actually be used to evaluate trends. Few countries have data on quality of services (although for this evaluation study some countries did do a quality-of-services assessment), and trends in case reports for most countries are meaningless because there is not sufficient data on completeness or accuracy of reporting to allow for proper interpretation.

Another future priority will be to develop M&E systems that can be used to measure possible herd immunity effects in communities or regions within countries. Five years ago the implementation of systems that could monitor this effect seemed farfetched, but scale-up successes in Zanzibar and Zambia show that herd immunity effects are possible, and the M&E systems should be able to track this. To measure these effects, M&E systems will need to have data on use of ACTs (or treatment by drug regimen), IRS, ITNs, and rate of diagnostic testing and parasitemia. Currently, few if any countries have such systems in place. Fortunately, as this review has shown, more national surveys are including testing for parasites in their surveys, and more recent MIS have included questions that would produce improved estimates of treatment and IRS in households.

Monitoring and Evaluation of Malaria Control: While methods and systems exist to monitor malaria control efforts, one area where there is substantial concern about the roll out of the Global Fund is in M&E of the malaria programs they support. While there are many data from national surveys, including DHS, MICS, and MIS, these are inconsistently available across the spectrum of countries receiving Global Fund resources. There are also fewer datasets from national programs and few reliable datasets related to quality of services. This is clearly a weakness of the efforts to evaluate national malaria programs.

THE ROLE OF CONTEXT AND OTHER FACTORS

One of the things that this impact evaluation was not able to do effectively was to document the impact of other contextual variables that may have had an effect on the ability of countries to apply for and successfully use funds from the Global Fund to implement programs in malaria control. However, a strong case can be made that a critical factor in the success of the Global Fund in addressing malaria was the launching of the RBM Partnership in 1998.

In documenting the rapid scale up of ITN usage, IRS, and IPTp in the malaria-endemic countries in the evaluation study, it is clear that ITN scale up in particular has proceeded at a very rapid pace. Part of the reason for the rapid gains in coverage (funded in large part by Global Fund grants) may be a result of the level of preparedness and commitment of countries in response to the RBM Partnership.

Though this interpretation is not well documented by this evaluation study, in discussing the findings from the analyses with various actors at the country and international levels, almost all mentioned the synergistic effects of RBM and the partner organizations, which worked with national programs to establish national policy and to set a work agenda for malaria control, and the Global Fund, which provided much-needed funding to implement the national plans.

CHAPTER 7 ANNEX

Annex 7.1: Country Fact Sheets

Country Fact Sheet: Benin

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	6	9	9	9	11	9	11	26	-
Funding per sources (US$)									
Global Fund	-	-		3,200,000	2,600,000	4,000,000	900,000	0	7,000,000
World Bank	-	-	-	-	-	-	-	7,300,000	6,200,000
National Program/Government	-	-	100,000	100,000	100,000	100,000	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other			2,900,000	2,300,000	3,300,000	1,200,000	40,000	-	-
Total			3,000,000	5,600,000	6,000,000	5,300,000	940,000	7,300,000	13,200,000
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	No	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	No	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	398,640	2,716,800	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	-	5	-	-
Urban	-	-	-	-	-	-	5	-	-
Rural	-	-	-	-	-	-	5	-	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	-	3	-	-
Urban	-	-	-	-	-	-	3	-	-
Rural	-	-	-	-	-	-	3	-	-
% of U5 receiving any antimalaria medicine									
Total	-	60	-	-	-	-	54	-	-
Urban	-	62	-	-	-	-	57	-	-
Rural	-	60	-	-	-	-	53	-	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	659,254	-	76,500	-	-
% of households with at least one mosquito net									
Total	-	40	-	-	-	-	56	-	-
Urban	-	49	-	-	-	-	66	-	-
Rural	-	35	-	-	-	-	50	-	-
% of households with at least one ITN									
Total	-	-	-	-	-	-	25	-	-
Urban	-	-	-	-	-	-	29	-	-
Rural	-	-	-	-	-	-	21	-	-
% of U5 sleeping under ITN									
Total	-	7	-	-	-	-	20	-	-
Urban	-	14	-	-	-	-	25	-	-
Rural	-	4	-	-	-	-	18	-	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	20	-	-
Urban	-	-	-	-	-	-	26	-	-
Rural	-	-	-	-	-	-	17	-	-
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	707,408	717,290	782,818	819,256	853,030	803,462	861,847	-	-
Prevalence of severe anemia (%)									
Total	-	9	-	-	-	-	8	-	-
Urban	-	7	-	-	-	-	6	-	-
Rural	-	10	-	-	-	-	9	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	36	34	-	35	-
Lives saved, model estimates									
Total	-	65	187	321	468	630	799	822	-
IPT	-	2	6	10	15	20	26	29	-
Nets	-	148	355	576	813	1,066	1,323	1,358	-
Treatment	-	(86)	(174)	(266)	(360)	(457)	(551)	(565)	-

Country Fact Sheet: Burkina Faso

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	7	20	29	28	17	-
Funding per sources (US$)									
Global Fund	-	-	-	-	2,925,513	4,193,558	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government			47,755	52,867	67,387	80,947	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other			470,430	466,558	1,888,432	1,175,867	-	-	-
Total			518,184	519,424	1,955,819	1,256,815	-	-	-
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	No	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	No	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	-	875,520	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	0	-	-	-	-	18
Urban	-	-	-	0	-	-	-	-	21
Rural	-	-	-	0	-	-	-	-	16
% of women receiving IPTp (2 doses)									
Total	-	-	-	0	-	-	1	-	9
Urban	-	-	-	0	-	-	2	-	12
Rural	-	-	-	0	-	-	1	-	8
% of U5 receiving any antimalaria medicine									
Total	-	-	-	50	-	-	48	-	18
Urban	-	-	-	60	-	-	70	-	24
Rural	-	-	-	48	-	-	42	-	15
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	125,000	903,000	412,200	24,000	-
% of households with at least one mosquito net									
Total	-	-	-	40	-	-	52	-	57
Urban	-	-	-	46	-	-	65	-	-
Rural	-	-	-	39	-	-	47	-	-
% of households with at least one ITN									
Total	-	-	-	5	-	-	23	-	13
Urban	-	-	-	12	-	-	45	-	-
Rural	-	-	-	3	-	-	15	-	-
% of U5 sleeping under ITN									
Total	-	-	-	2	-	-	10	-	4
Urban	-	-	-	3	-	-	24	-	6
Rural	-	-	-	1	-	-	-	-	2

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	3	-	-	-	-	4
Urban	-	-	-	6	-	-	-	-	6
Rural	-	-	-	2	-	-	-	-	3
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	1,032,886	352,587	1,188,870	1,443,184	1,546,644	1,615,695	2,060,867	2,486,337	-
Prevalence of severe anemia (%)									
Total	-	-	-	13	-	-	-	-	-
Urban	-	-	-	5	-	-	-	-	-
Rural	-	-	-	14	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	-	-
Lives saved, model estimates									
Total	-	43	89	138	431	748	1,080	1,105	-
IPT	-	-	-	-	-	-	-	-	-
Nets	-	43	89	138	526	943	1,373	1,405	-
Treatment	-				(96)	(195)	(294)	(301)	-

Country Fact Sheet: Burundi

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	7	20	29	28	17	-
Funding per sources (US$)									
Global Fund	-	-	-	-	7,900,000	6,500,000	4,000,000	-	1,300,000
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	14,300,000	13,700,000	13,200,000	16,300,000	19,200,000	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	1,400,000	2,050,000	-	-
Total			14,300,000	13,700,000	21,100,000	24,200,000	25,250,000	0	1,300,000
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	No	-
IPTp	-	-	-	-	-	-	-	No	-
Treatment									
ACT purchased	-	-	-	-	-	-	2,291,566	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of U5 receiving any antimalaria medicine									
Total	31	-	-	-	-	30	-	-	-
Urban	42	-	-	-	-	28	-	-	-
Rural	31	-	-	-	-	30	-	-	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	420,793	476,119	274,800	-	-
% of households with at least one mosquito net									
Total	-	-	-	-	-	13	-	-	-
Urban	-	-	-	-	-	49	-	-	-
Rural	-	-	-	-	-	11	-	-	-
% of households with at least one ITN									
Total	-	-	-	-	-	8	-	-	-
Urban	-	-	-	-	-	34	-	-	-
Rural	-	-	-	-	-	6	-	-	-
% of U5 sleeping under ITN									
Total	1	-	-	-	-	8	-	-	-
Urban	15	-	-	-	-	40	-	-	-
Rural	0		-	-	-	7	-	-	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
IRS									
Number of households sprayed	-	-	-	-	-	79,784	-	-	-
% of targeted households sprayed	-	-	-	-	-	7	-	-	-
Burden									
Number reported cases	3,057,239	3,365,640	2,649,039	2,259,694	1,749,892	2,361,734	2,161,483	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	56	46	-	40	-
Lives saved, model estimates									
Total	-	36	74	116	162	213	224	234	-
IPT	-	-	-	-	-	-	-	-	-
Nets	-	40	83	130	182	239	251	263	-
Treatment	-	(5)	(10)	(15)	(20)	(26)	(28)	(29)	-

Country Fact Sheet: The Democratic Republic of the Congo

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	0.4	4	2.7	8	8	26	16	34	-
Funding per sources (US$)									
Global Fund	-	-			100,000	20,500,000	7,300,000	-	4,200,000
World Bank	-	-					6,000,000	9,400,000	9,300,000
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	100,000	20,500,000	13,300,000	9,400,000	13,500,000
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	No	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	-	2,291,566	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	-	-	38	-
Urban	-	-	-	-	-	-	-	52	-
Rural	-	-	-	-	-	-	-	28	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	-	-	7	-
Urban	-	-	-	-	-	-	-	9	-
Rural	-	-	-	-	-	-	-	6	-
% of U5 receiving any antimalaria medicine									
Total	-	52	-	-	-	-	-	30	-
Urban	-	63	-	-	-	-	-	38	-
Rural	-	47	-	-	-	-	-	26	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	877,161	791,135	2,379,384	-	-
% of households with at least one mosquito net									
Total	-	-	-	-	-	-	-	28	-
Urban	-	-	-	-	-	-	-	38	-
Rural	-	-	-	-	-	-	-	22	-
% of households with at least one ITN									
Total	-	-	-	-	-	-	-	9	-
Urban	-	-	-	-	-	-	-	12	-
Rural	-	-	-	-	-	-	-	7	-
% of U5 sleeping under ITN									
Total	-	1	-	-	-	-	-	19	-
Urban	-	2	-	-	-	-	-	26	-
Rural	-	0	-	-	-	-	-	14	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	964,623	2,199,247	-	4,386,638	-	-	5,008,956	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	-	-	4	-
Urban	-	-	-	-	-	-	-	3	-
Rural	-	-	-	-	-	-	-	5	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	2	-
Lives saved, model estimates									
Total	-	(2,096)	(4,236)	(6,530)	(8,969)	(11,579)	(14,207)	(16,954)	-
IPT	-	68	156	255	368	490	620	757	-
Nets	-	575	1,342	2,178	3,084	4,069	5,081	6,156	-
Treatment	-	(2,739)	(5,734)	(8,963)	(12,421)	(16,138)	(19,908)	(23,867)	-

Country Fact Sheet: Ethiopia

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	-	-	-	-	-	-
Funding per sources (US$)									
Global Fund	-	-	-	-	-	-	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	No	-
Treatment									
ACT purchased	-	-	-	-	-	7,325,730	2,073,990	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	2	-	-	1
Urban	-	-	-	-	-	3	-	-	1
Rural	-	-	-	-	-	2	-	-	1
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	1	-	-	0
Urban	-	-	-	-	-	1	-	-	-
Rural	-	-	-	-	-	1	-	-	-
% of U5 receiving any antimalaria medicine									
Total	3	-	-	-	-	3	-	-	10
Urban	-	-	-	-	-	4	-	-	13
Rural	-	-	-	-	-	3	-	-	9
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-		4,243,157	9,070,718	7,178,443	-
% of households with at least one mosquito net									
Total	1	-	-	-	-	6	-	50	39
Urban	3	-	-	-	-	11	-	41	27
Rural	1	-	-	-	-	5	-	59	52
% of households with at least one ITN									
Total	0	-	-	-	-	3	-	48	17
Urban	0	-	-	-	-	5	-	40	11
Rural	0	-	-	-	-	3	-	56	24
% of U5 sleeping under ITN									
Total	-		-	-	-	2	-	33	3
Urban	-		-	-	-	4	-	36	2
Rural	-		-	-	-	1	-	33	3

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	1	-	33	7
Urban	-	-	-	-	-	6	-	26	4
Rural	-	-	-	-	-	1	-	36	9
IRS									
Number of households sprayed	-	-	-	-	845,693	782,581	1,196,897	1,590,964	-
% of targeted households sprayed	-	-	-	-	8	7	11	14	-
Burden									
Number reported cases	383,382	2,264,322	2,515,191	3,143,163	5,706,167	3,361,717	3,759,960	1,214,921	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	4	-	6	-
Urban	-	-	-	-	-	3	-	3	-
Rural	-	-	-	-	-	4	-	6	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	1	-	-
Lives saved, model estimates									
Total	-	49	108	172	239	311	5,207	9,846	-
IPT	-	16	40	68	98	131	146	155	-
Nets	-	33	68	104	141	180	3,876	7,685	-
Treatment	-	-	-	-	-	-	1,185	2,006	-

Country Fact Sheet: Ghana

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	4	-	-	97	0	-
Funding per sources (US$)									
Global Fund	-	-	-	-	-	-	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	No	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	2,177,540	14,970	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	1	-	-	27	-	-
Urban	-	-	-	1	-	-	35	-	-
Rural	-	-	-	1	-	-	24	-	-
% of U5 receiving any antimalaria medicine									
Total	-	-	-	63	-	-	61	-	-
Urban	-	-	-	65	-	-	69	-	-
Rural	-	-	-	61	-	-	57	-	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	375,000	618,855	2,100,000	1,477,538	-
% of households with at least one mosquito net									
Total	-	-	-	18	-	-	31	-	-
Urban	-	-	-	10	-	-	21	-	-
Rural	-	-	-	24	-	-	37	-	-
% of households with at least one ITN									
Total	-	-	-	3	-	-	19	-	-
Urban	-	-	-	2	-	-	15	-	-
Rural	-	-	-	4	-	-	22	-	-
% of U5 sleeping under ITN									
Total	-		-	4	-		22	-	-
Urban	-		-	4	-		16	-	-
Rural	-		-	4	-		25	-	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	3	-	-	-	-	-
Urban	-	-	-	2	-	-	-	-	-
Rural	-	-	-	3	-	-	-	-	-
IRS									
Number of households sprayed	-	-	-	-	845,693	782,581	1,196,897	1,590,964	-
% of targeted households sprayed	-	-	-	-	8	7	11	14	-
Burden									
Number reported cases	3,349,528	3,044,844	3,140,893	3,552,896	3,416,033	3,452,969	3,511,452	3,123,147	-
Prevalence of severe anemia (%)									
Total	-	-	-	6	-	-	-	-	-
Urban	-	-	-	4	-	-	-	-	-
Rural	-	-	-	7	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	-	-
Lives saved, model estimates									
Total	-	224	454.5	690	1565.5	2475.5	3402	3423	-
IPT	-	-	-	-	-	-	-	-	-
Nets	-	101	206	313	1322	2358	3402	3423	-
Treatment	-	123	248.5	377	243.5	117.5	0	0	-

Country Fact Sheet: Haiti

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-		-	-			-
Funding per sources (US$)									
Global Fund	-	-	-	-	-	4,094,000	3,296,000	2,674,.000	2,707,000
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	200,000	200,000	200,000	200,000	200,000	200,000	375,000	375,000	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	200,000	200,000	200,000	200,000	200,000	4,294,000	3,671,000	375,000	2,707,000
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	-	-
ACT policy adopted	-	-	-	-	-	-	-	No	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	No	-
Treatment									
ACT purchased	-	-	-	-	-	-	-	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	-	0	-	-	3
Urban	-	-	-	-	-	1	-	-	2
Rural	-	-	-	-	-	0	-	-	4
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	0	-	-	3
Urban	-	-	-	-	-	1	-	-	2
Rural	-	-	-	-	-	0	-	-	3
% of U5 receiving any antimalaria medicine									
Total	12	-	-	-	-	-	5	-	4
Urban	7	-	-	-	-	-	7	-	3
Rural	13	-	-	-	-	-	4	-	4
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	-	-	39,834	-	-
% of households with at least one mosquito net									
Total	-	-	-	-	-	-	6	-	11
Urban	-	-	-	-	-	-	11	-	-
Rural	-	-	-	-	-	-	4	-	-
% of households with at least one ITN									
Total	-	-	-	-	-	-	-	-	3
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of U5 sleeping under ITN									
Total	-	-	-	-	-	-	-	-	2
Urban	-	-	-	-	-	-	-	-	2
Rural	-	-	-	-	-	-	-	-	2

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	-	-	1
Urban	-	-	-	-	-	-	-	-	0
Rural	-	-	-	-	-	-	-	-	2
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	16,897	9,837	-	9,837	10,802	21,778	32,739	-	-
Prevalence of severe anemia (%)									
Total	2	-	-	-	-	2	-	-	-
Urban	3	-	-	-	-	3	-	-	-
Rural	1	-	-	-	-	2	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	4	-	5	-
Lives saved, model estimates									
Total	-	-	-	-	-	-	-	-	-
IPT	-	-	-	-	-	-	-	-	-
Nets	-	-	-	-	-	-	-	-	-
Treatment	-	-	-	-	-	-	-	-	-

Country Fact Sheet: Malawi

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007									
Funding per sources (US$)									
Global Fund									
World Bank									
National Program/Government									
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	No	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	-	-	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	-	79	-	-	-	62
Urban	-	-	-	-	85	-	-	-	-
Rural	-	-	-	-	78	-	-	-	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	47	45	-	-	53
Urban	-	-	-	-	54	52	-	-	-
Rural	-	-	-	-	45	44	-	-	-
% of U5 receiving any antimalaria medicine									
Total	27	-	-	-	28	-	24	-	-
Urban	34	-	-	-	42	-	30	-	-
Rural	26	-	-	-	27	-	23	-	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	1,295,498	815,620	1,508,735	-	-
% of households with at least one mosquito net									
Total	13	-	-	-	42	-	50	-	65
Urban	32	-	-	-	56	-	72	-	-
Rural	10	-	-	-	39	-	47	-	-
% of households with at least one ITN									
Total	-	-	-	-	27	-	36	-	58
Urban	-	-	-	-	41	-	56	-	-
Rural	-	-	-	-	25	-	34	-	-
% of U5 sleeping under ITN									
Total	3	-	-	-	15	-	23	-	26
Urban	12	-	-	-	30	-	43	-	-
Rural	2	-	-	-	12	-	21	-	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	15	-	-	-	35
Urban	-	-	-	-	30	-	-	-	-
Rural	-	-	-	-	12	-	-	-	-
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	3,774,982	3,823,796	2,784,001	3,358,960	2,871,098	3,688,389	4,204,468	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	2	2	1	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	-	-
Lives saved, model estimates									
Total	-	344	786	1,278	1,810	2,580	3,300	3,370	-
IPT	-	121	322	557	823	972	1,046	1,088	-
Nets	-	211	441	686	940	1,652	2,376	2,406	-
Treatment	-	12	23	35	47	(44)	(123)	(124)	-

Country Fact Sheet: Mozambique

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007									
Funding per sources (US$)									
Global Fund					6,650,000	-	5,380,000	12,430,000	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	6,650,000	0	5,380,000	12,430,000	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	No	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	311,040	961,200	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-	11	-	-	-	23	-
Urban	-	-	-	16	-	-	-	24	-
Rural	-	-	-	-	-	-	-	23	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	-	-	20	-
Urban	-	-	-	-	-	-	-	17	-
Rural	-	-	-	-	-	-	-	32	-
% of U5 receiving any antimalaria medicine									
Total	-	-	-	15		-	-	18	-
Urban	-	-	-	13		-	-	20	-
Rural	-	-	-	16		-	-	17	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	401,802	725,119	638,410	-	-
% of households with at least one mosquito net									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of households with at least one ITN									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
% of U5 sleeping under ITN									
Total	-	-	-	-	-	-	-	7	-
Urban	-	-	-	-	-	-	-	8	-
Rural	-	-	-	-	-	-	-	6	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	-	9	-
Urban	-	-	-	-	-	-	-	9	-
Rural	-	-	-	-	-	-	-	9	-
IRS									
Number of households sprayed	-	-	-	-	754,494	1,250,375	1,537,825	-	-
% of targeted households sprayed	-	-	-	-	18	30	36	-	-
Burden									
Number reported cases	3,278,525	3,947,335	4,592,799	4,863,403	5,610,884	5,896,411	6,335,757	6,327,916	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	39	-
Lives saved, model estimates									
Total	-	149	337	543	761	1,195	1,637	2,087	-
IPT	-	51	128	216	313	415	518	624	-
Nets	-	98	209	327	448	572	696	823	-
Treatment	-	-	-	-	-	208	423	640	-

Country Fact Sheet: Rwanda

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	-	-	-	-	-	-
Funding per sources (US$)	-	-	-	-	-	-	-	-	-
Global Fund	-	-	-	-	-	-	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	No	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	-	-
Treatment									
ACT purchased	-	-	-	-	-	2,681,970	3,299,624	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-		-	2	-	40	-
Urban	-	-	-		-	4	-	36	-
Rural	-	-	-	-	-	1	-	40	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	1	-	13	-
Urban	-	-	-	-	-	2	-	14	-
Rural	-	-	-	-	-	1	-	13	-
% of U5 receiving any antimalaria medicine									
Total	9	-	-	-	-	12	-	6	-
Urban	12	-	-	-	-	11	-	6	-
Rural	9	-	-	-	-	13	-	6	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	223,926	253,700	1,957,720	-	-
% of households with at least one mosquito net									
Total	7	-	-	-	-	18	-	59	-
Urban	30	-	-	-	-	40	-	68	-
Rural	3	-	-	-	-	14	-	58	-
% of households with at least one ITN									
Total	-	-	-	-	-	15	-	24	-
Urban	-	-	-	-	-	32	-	65	-
Rural	-	-	-	-	-	12	-	54	-
% of U5 sleeping under ITN									
Total	4	-	-	-	-	13	-	56	-
Urban	21	-	-	-	-	26	-	62	-
Rural	1	-	-	-	-	11	-	55	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	17	-	60	-
Urban	-	-	-	-	-	29	-	63	-
Rural	-	-	-	-	-	16	-	60	-
IRS									
Number of households sprayed	-	-	-	-	-	-	-	-	-
% of targeted households sprayed	-	-	-	-	-	-	-	-	-
Burden									
Number reported cases	-	998,086	1,066,847	1,205,514	1,289,293	1,638,369	1,418,762	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	8	-	8	-
Urban	-	-	-	-	-	12	-	9	-
Rural	-	-	-	-	-	8	-	8	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	26	-	3	-
Lives saved, model estimates									
Total	-	38	80	127	177	231	242	253	-
IPT	-	1	2	3	5	7	8	9	-
Nets	-	34	72	115	160	209	218	228	-
Treatment	-	3	6	9	12	15	16	16	-

Country Fact Sheet: Tanzania

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	-	-	-	-	-	-
Funding per sources (US$)	-	-	-	-	-	-	-	-	-
Global Fund	-	-	-	-	-	-	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	4,406,600	5,069,504	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	-		53	-	-	59	-
Urban	-	-	-		64	-	-	69	-
Rural	-	-	-	-	51	-	-	57	-
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	22	-	-	57	-
Urban	-	-	-	-	29	-	-	69	-
Rural	-	-	-	-	21	-	-	55	-
% of U5 receiving any antimalaria medicine									
Total	-	-	-	-	-	58	-	57	-
Urban	-	-	-	-	-	65	-	69	-
Rural	-	-	-	-	-	57	-	54	-
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	1,790,647	2,634,414	2,874,043	2967148	-
% of households with at least one mosquito net									
Total	-	37	-	-	-	46	-	56	-
Urban	-	67	-	-	-	74	-	79	-
Rural	-	28	-	-	-	36	-	49	-
% of households with at least one ITN									
Total	-	-	-	-	-	23	-	39	-
Urban	-	-	-	-	-	47	-	59	-
Rural	-	-	-	-	-	14	-	33	-
% of U5 sleeping under ITN									
Total	4	-	-	-	-	16	-	26	-
Urban	21	-	-	-	-	40	-	49	-
Rural	1	-	-	-	-	10	-	21	-

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	16	-	60	-
Urban	-	-	-	-	-	39	-	63	-
Rural	-	-	-	-	-	10	-	60	-
IRS									
Number of households sprayed	-	-	-	-	-	-	203,699	231,669	-
% of targeted households sprayed	-	-	-	-	-	-	3	3	-
Burden									
Number reported cases	-	324,584	369,394	11,379,411	11,898,627	11,441,681	10,566,201	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	4	-	-	8	-
Urban	-	-	-	-	3	-	-	-	-
Rural	-	-	-	-	5	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	18	-
Lives saved, model estimates									
Total	-	1,291	2,760	4,344	5,995	7,480	9,002	10,562	-
IPT	-	128	328	565	833	1,275	1,788	2,342	-
Nets	-	848	1,786	2,794	3,844	4,979	6,094	7,209	-
Treatment	-	315	646	985	1,318	1,226	1,120	1,011	-

Country Fact Sheet: Zambia

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Funding									
% of total spending between 1998-2007	-	-	-	-	-	-	-	-	-
Funding per sources (US$)	-	-	-	-	-	-	-	-	-
Global Fund	-	-	-	-	-	-	-	-	-
World Bank	-	-	-	-	-	-	-	-	-
National Program/Government	-	-	-	-	-	-	-	-	-
USAID/PMI	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-
Total	0	0	0	0	0	0	0	0	0
Policies and strategies (2007)									
DDT use for IRS	-	-	-	-	-	-	-	Yes	-
ACT policy adopted	-	-	-	-	-	-	-	Yes	-
Parasite confirmation for all age groups	-	-	-	-	-	-	-	Yes	-
IPTp	-	-	-	-	-	-	-	Yes	-
Treatment									
ACT purchased	-	-	-	-	-	4,406,000	5,069,504	-	-
% of women receiving IPTp (1 dose)									
Total	-	-	1	-	-	-	-	82	98
Urban	-	-	1	-	-	-	-	91	90
Rural	-	-	1	-	-	-	-	79	91
% of women receiving IPTp (2 doses)									
Total	-	-	-	-	-	-	61	63	59
Urban	-	-	-	-	-	-	71	72	66
Rural	-	-	-	-	-	-	56	59	54
% of U5 receiving any antimalaria medicine									
Total	-	-	52	-	-	-	5	38	31
Urban	-	-	49	-	-	-	1	40	36
Rural	-	-	53	-	-	-	6	38	28
Nets, availability, possession, and use									
ITN distributed or sold	-	-	-	-	176,082	516,999	1,162,578	2,458,183	-
% of households with at least one mosquito net									
Total	-	-	27	-	-	-	50	64	-
Urban	-	-	35	-	-	-	51	64	-
Rural	-	-	23	-	-	-	50	64	-
% of households with at least one ITN									
Total	-	-	14	-	-	-	44	53	52
Urban	-	-	16	-	-	-	45	53	-
Rural	-	-	12	-	-	-	44	54	-
% of U5 sleeping under ITN									
Total	-	-	7	-	-	-	23	29	39
Urban	-	-	8	-	-	-	26	30	42
Rural	-	-	6	-	-	-	21	28	36

Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
% of pregnant women sleeping under ITN									
Total	-	-	-	-	-	-	24	33	42
Urban	-	-	-	-	-	-	17	29	45
Rural	-	-	-	-	-	-	27	34	39
IRS									
Number of households sprayed	-	-	-	-	175,192	236,756	537,877	657,695	-
% of targeted households sprayed	-	-	-	-	8	11	24	29	-
Burden									
Number reported cases	-	-	-	-	-	-	-	-	-
Prevalence of severe anemia (%)									
Total	-	-	-	-	-	-	-	-	-
Urban	-	-	-	-	-	-	-	-	-
Rural	-	-	-	-	-	-	-	-	-
Parasite prevalence among U5 children (%)	-	-	-	-	-	-	-	-	-
Lives saved, model estimates									
Total	1,223	1,327	2,314	3,376	4,497	5,599	2,306	5,049	-
IPT	-	157	418	741	1,114	1,506	1,773	1,962	-
Nets	998	699	1,193	1,707	2,238	2,745	3,528	4,809	-
Treatment	225	471	703	928	1,145	1,348	(2,995)	(1,722)	-

8 STATE OF HEALTH SERVICES AND SCALING UP

8.1 INTRODUCTION

Several studies have been conducted to assess the effects of scaling up interventions against specific diseases on the health system. Scaling up HIV/AIDS has been the primary focus, because of its high funding levels, the large numbers of people infected in several countries, and its potentially large impact on health service provision with lifelong treatment programs. Scaling up tuberculosis (TB) and malaria control has not been a cause of concern because of the lesser magnitude of these interventions so far.

There are concerns that prioritization of specific diseases, especially HIV/AIDS, may displace both external aid and domestic resources for other health issues, such as maternal and child health (MCH). The System-Wide Effects of the Funds (SWEF) network initiated several country studies to track the effects of the scale up of HIV/AIDS prevention, treatment, and care since 2002, focusing on the effects of Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) contributions. SWEF studies in Benin, Ethiopia, and Malawi not only reported some evidence of Global Fund processes contributing to stronger health systems but also found that weaknesses in longstanding systems such as weaknesses in human resources and procurement systems became more exposed as a result of scaling up.[1] Positive effects included the creation of public/private partnerships, training, and infrastructure strengthening efforts.

The Global HIV/AIDS Network (GHIN) expanded the SWEF's work to a network of researchers in 21 countries; it also included the potential effects of the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), and the World Bank Multi-Country AIDS Program (MAP). The main focus of GHIN-supported assessments is at the subnational level and on health systems capacity, including human resources and coordination.[2] Early findings from studies focusing on the district level in Ethiopia, Malawi, and Zambia suggest that significant progress in scaling up HIV/AIDS services is accompanied by a fairly complex range of positive and negative effects on other services and on the system.[3] Another recent assessment of health systems effects in three countries—Mozambique, Uganda, and Zambia—reports that the major HIV/AIDS donors (PEPFAR, the Global Fund, and the World Bank's MAP) have helped establish HIV/AIDS-specific systems and processes distinct from those for other health programs.[4] These include AIDS-specific reporting

[1] Stillman, K., S. Bennett. System-wide effects of the Global Fund: Interim findings from three country studies. Bethesda MD: Partners for Health Reformplus Project, Abt Associates Inc.

[2] GHIN country studies are based on data collected through a mix of qualitative and qualitative methods, using relatively small health facility surveys, record reviews, and key informant interviews in a limited number of districts.

[3] Global HIV/AIDS Initiatives Network. Global HIV/AIDS initiatives in Zambia: Issues of scale-up and health systems capacity. Interim District report (OSI-Zambia), May 2008. V. Mwapasa, J. Kadzandira. Effect of global HIV/AIDS initiatives on human resources at subnational level in Malawi. Baseline study findings. Presentation 2008. (GHIN website). Banteyerga, H. System side effects of the Global Fund with respect to ART scale up: Evidence from Ethiopia. Presentation 2008. (GHIN website).

[4] Oomman, N., M. Bernstein, S. Rosenzweig. 2008. Seizing the opportunity on AIDS and health systems. Center for Global Development. Washington, DC.

and logistics systems, training, and remuneration—even though all of these processes make extensive use of the resources of the country's broader health system.

There are also concerns that vertical (standalone) programs are less effective at delivering health services than they are at integrated programs. The arguments focus particularly on the limited chances of sustainability and the negative spillover effects both on health systems and non-targeted populations. A recent review, however, concluded that evidence of the relative benefits of vertical versus integrated service delivery is limited.[5] There is also some evidence of positive effects of vertical programs on service delivery, especially when a rapid response is needed. Finally, there are concerns about the ability of health systems to absorb rapidly increasing resources through specific programs effectively and efficiently.[6]

The increasing commitments of the Global Fund, the GAVI Alliance, PEPFAR, the Stop TB Partnership, Roll Back Malaria, and other initiatives to strengthen health systems prove acknowledgement of the need to accompany scale up of standalone programs by broader health system strengthening. A recent World Health Organization (WHO) expert consultation on health systems and Global Health initiatives concluded that the increased resources through these initiatives have a range of mostly positive and sometimes negative "spillover" effects on a country's capacity to address the broader health needs of the population.[7] The meeting participants agreed that the time has come to move from spillover effects to a more systematic framework of active management, thus creating positive synergies rather than mitigating potential adverse effects.

This brief review shows that while there is considerable interest in documenting the effects of scaling up, it is difficult to find conclusive answers about what needs to be done to mitigate the negative and reinforce, disseminate, and build upon the positive. This evaluation study was not designed to provide comprehensive documentation of the effects of scaling up. It first focused on documenting gaps in essential health system components at the central district levels, including infrastructure, medicines and equipment, financing, human resources, information, and service delivery. Such information provides the contextual information for the scale up, shows which areas need priority as part of health systems strengthening, and shows how such efforts can be monitored and evaluated. In the second part, the focus is on using data from district assessments, national health accounts, and household surveys to assess whether HIV services have scaled up disproportionally to other services.

The Global Fund financed its first health systems strengthening grant in Round 5 for three countries, with only one country receiving the funds by 2007 (Cambodia). In 2008, the Global Fund estimated that 35% of approximately US$4 billion of approved financing was for key health

[5] Atun, R.A., S. Bennett, A. Duran. 2008. When do vertical (standalone) programs have a place in health systems? Paper prepared for the WHO European Ministerial conference on health systems, Tallinn, 25-27 June.
[6] Travis P., et al. 2004. Overcoming health systems constraints to achieve the Millennium Development Goals. Lancet 364: 900-906.
[7] WHO. 2008. Maximizing positive synergies between health systems and Global Health Initiatives. Report on the expert consultation on positive synergies between health systems and Global Health Initiatives, WHO, Geneva. 29-30 May.

systems elements.[8] Cross-cutting funding for health systems strengthening was also on the rise (approximately US$186 million was approved in Round 7).

8.2 Funding for HIV and Other Programs

To assess the extent to which HIV funding may have affected funding for other health conditions, data are summarized from international databases on resource flows and disbursements and from the National Health Account (NHA) studies conducted in 2008 in five countries, including four with trend data (see Chapter 4).

In recent years, there have been dramatic increases in funding for health, especially for HIV/AIDS but also for other infectious diseases and health sector development. An analysis of data from the Organization for Economic Co-operation and Development Creditor Reporting System and other sources of global health grants during 1992-2005 showed that the total level of health and population commitments from all donors doubled between 1992 and 2000, and doubled again between 2000 and 2005.[9] HIV/AIDS commitments continued to increase almost linearly from 1997 to 2005 when they constituted approximately 30% of health external funding. Commitments to other infectious diseases and health sector development increased slowly initially but more rapidly after 2001-2003. Commitments for population issues have remained constant at approximately US$1 billion per year since 1992. A study of the patterns in allocations by the four largest health donors in 2005—World Bank US$3.8 billion, U.S. government US$3.5 billion, the Global Fund US$1.05 billion, and Bill & Melinda Gates Foundation US$0.8 billion—also suggested the exceptional position of HIV, with funding levels per death or disability-adjusted life years far outstripping MCH, malaria, and TB.[10] Funding for noncommunicable diseases was almost negligible.

Table 8.1 and Figure 8.1 provide data on the levels of external funding for MCH and for HIV. Data for international funding for MCH have been obtained from a study conducted in the context of the maternal, neonatal, and child survival Countdown 2008.[11]

External funding levels for child health are on average US$10 per child (2005-2006), which is higher than HIV funding per adult (US$1.8 per year) but considerably lower than funding per person living with HIV/AIDS (US$283). The best measure to assess the potential of overall impact of HIV funding on the health system is per capita. There is a positive correlation between the per capita level of funding for HIV and for child health: Countries that receive more funding for HIV are also more likely to receive more external funding for child health. Zambia and Rwanda stand out, as they received high amounts of funding for child health and for HIV. Countries that received

[8] Atun, R. Capacity development: Using Global Fund grants to strengthen health systems. Presentation at the Global Partnership Forum, December 8-10, Dakar, Senegal.
[9] Shiffman, J. 2008. Has donor prioritization of HIV/AIDS displaced aid for other health issues? Health Pol Plann 1:1-6.
[10] Sridhar, D., R. Batnjii. 2008. Misfinancing global health: A case for transparency in disbursement and decisionmaking. Lancet: 372, 1185-91.
[11] Greco, G., T. Powell-Jackson, J. Borghi, A. Mills. 2008. Countdown to 2015: Assessment of donor assistance to maternal, newborn, and child health between 2003 and 2006. Lancet 371:1268-1275.

relatively more for child health included Benin, Malawi, and Tanzania. Cambodia, Haiti, and Lesotho received relatively more for HIV than did other countries (see Table 8.1 and Figure 8.1).

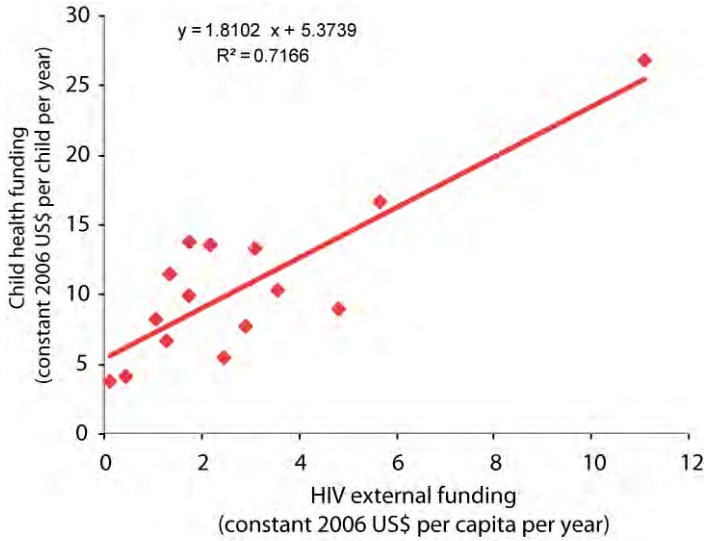
Table 8.1: External Funding for Child Health and for HIV, Ratio of HIV External Funding to Total Health Expenditure and Percent Change in HIV, Child and Maternal Health External Funding, by Country

Country	Child Health External Funding (US$) 2005-2006 Per child	HIV External Funding (US$) 2003-2006 Per capita	Per PLWHA	External HIV Funding Share of THE 2003-2006 (%)	Relative Change in Funding Levels 2003-2006 HIV	Child	Maternal
Benin	13.7	1.8	283	7	1.5	2.9	5.2
Burkina Faso	8.2	1.1	116	5	1.2	1.5	1.0
Burundi	9.9	1.8	111	49	2.1	1.1	-0.9
Cambodia	5.4	2.5	408	10	1.2	-0.2	1.8
DR Congo	4.1	0.5	73	9	2.7	1.2	2.6
Ethiopia	6.6	1.3	111	20	2.1	1.4	2.2
Ghana	11.4	1.4	120	5	1.0	0.0	0.0
Haiti	8.9	4.8	439	14	1.4	2.4	10.2
Kyrgyzstan		.7	1297	3	4.0		
Lesotho	7.7	2.9	26	7	2.9	-0.1	-0.2
Malawi	13.3	3.1	53	23	1.6	0.5	0.8
Moldova			800	1	2.2		
Mozambique	10.3	3.6	61	34	1.9	0.2	0.5
Peru	3.7	0.1	90	1	2.0	0.7	1.1
Rwanda	16.6	5.7	329	27	1.7	1.9	6.0
Tanzania	13.5	2.2	65	27	2.2	0.0	-0.2
Vietnam		0.3	110	1	2.9		
Zambia	26.8	11.1	131	24	1.4	0.4	0.4
Median	9.9	1.8	114	11	1.9	0.7	1.0

PLWHA = people living with HIV/AIDS; THE = total health expenditure
Source: Child health official development assistance: Greco et al. (2008). HIV change refers to 2005-2006 compared with 2003-2004.

Overall, HIV external funding ranges from 1% to 49% of total health expenditure in the 18 countries during 2003-2006. The share is more than one-fifth in the countries in Eastern and Southern Africa, with Burundi as an outlier (49%) and also Lesotho (7% only, relying less on external assistance). The comparison of the increase in external funding for HIV (2003-2004 with 2005-2006) with the increases for child and maternal health (2003 and 2006) shows that increases in HIV funding were larger (median 1.9 times, 1.7 if excluding the three countries with no child health data) than they were for child (0.7) and maternal (1.0) health.

Figure 8.1
HIV External Funding per Capita 2003-2006, by Child Health External Funding per Child, 2005-2006, by Country, 2008 (Constant 2006 US$)

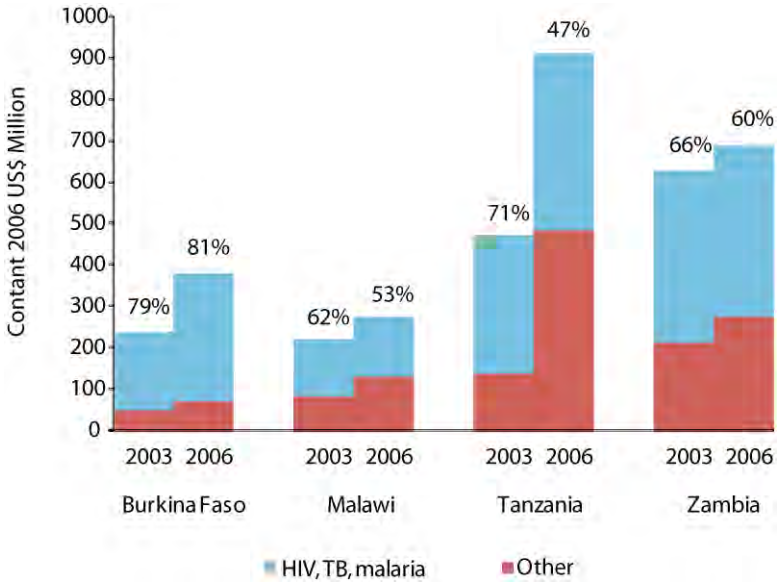


Source: National Health Accounts database, World Health Organization, Geneva

The results of the evaluation study's NHA with subaccounts are presented in Chapter 4. Figure 8.2 summarizes the total health expenditure data, including the government's share, out-of-pocket expenditure, and external funding from four countries with NHA data for 2003 and 2006.[12] It shows that total health expenditure has increased in all four countries and most significantly in Tanzania. HIV, TB, and malaria data are combined, with HIV taking the largest share. The expenditure for other diseases (not HIV, TB, or malaria) remained about the same in Malawi and Zambia, and increased in Burkina Faso and Tanzania. Because HIV expenditures increased more rapidly, the relative share of expenditures for other diseases decreased in three of the four countries and most dramatically in Tanzania, where it decreased from 71% to 47%.

[12] Haiti completed a NHA, but it included only 2006.

Figure 8.2
Total Health Expenditure (Constant 2006 US$ Million), Broken Down by Expenditure on HIV, TB, and Malaria and on Other Health Issues in 2003 and 2006 for Four Countries with NHA (Percentage is Proportional to Other Diseases)



Source: NHA exercises conducted for the evaluation study

Governments' contribution to total health expenditure was approximately one-fifth to one-third of the total health expenditure in the four countries. In Burkina Faso, the overall government share increased from 23% to 32% in 2003 and 2006, respectively, but declined from 35% to 21% in Malawi (table not shown). In Tanzania and Zambia, there was little change (approximately 30% and 24%, respectively). The government's share of the expenditures for other diseases increased in all four countries, especially Burkina Faso, Malawi, and Tanzania (see Chapter 4). Although the proportion of the health expenditures that comes from out-of-pocket expenses decreased between 2003 and 2006, the absolute amounts increased in all four countries.

8.3 State of Service Delivery in Districts

Gaps in health service delivery were documented through the District Comprehensive Assessment (DCA) component of the evaluation study, with district data collection at the facility level providing information on status in infrastructure, human resources, basic conditions for quality of services, and drug availability. Table 8.2 summarizes the DCA data collected in the different countries. Tanzania data were not yet available at the time of the writing of this report. In all countries, nearly all facilities were secondary and primary care facilities. The full district facility censuses were done in four countries (Burkina Faso, Cambodia, Haiti, and Zambia). The District Facility Census and District Household Sample Survey, as specified in the study protocol, were done in three countries (Burkina Faso, Haiti, and Zambia). The maps with the location of the districts are shown in Annex 8.1.

Table 8.2: Summary of DCA Data Collection with Number of Health Facilities and Number of Households and Women Interviewed, by Country, 2008

Subnational entity	Burkina Faso	Cambodia	Haiti	Zambia	Ethiopia*†	Malawi*	Peru*
Number of subnational entities	13 District (1 in each zone)	7 Operational District	9 Départe-ment	9 District (1 in each Province)	11 Woreda	9 District	6 Major Urban Areas
Number of health facilities visited*	504	207	206	283	158	113	358
Number of pharmacies and other facilities visited	190	230	71	99	1	0	3017
Number of households visited	8,049	Na	4,451	4,650	8,514	.	na
Number of women interviewed	9,189	Na	6,041	4,873	7,807	.	na

* Nonrandom sample of facilities
† Unweighted sample of households/women
Source: DCA Facility Assessments and Household Coverage Surveys 2008

The Facility Census included all public and private health facilities, plus the pharmacies. It gathered information on basic infrastructure and equipment; infection control; human resources and training exposure; availability of guidelines, drugs, and commodities; and laboratory support for HIV, TB, and malaria, and for MCH, other infectious diseases, and noncommunicable diseases.[13]

The quality of services and care is a serious concern. Direct measures of quality of services were not obtained; instead the assessment focused on service "readiness" as defined by the availability of necessary training, equipment, and supplies. The presence of trained staff, guidelines, drugs and commodities, basic equipment, and infection control are no guarantee for high-quality care, but the absence of these elements is indicative of suboptimal or poor-quality services.

FACILITY DENSITY

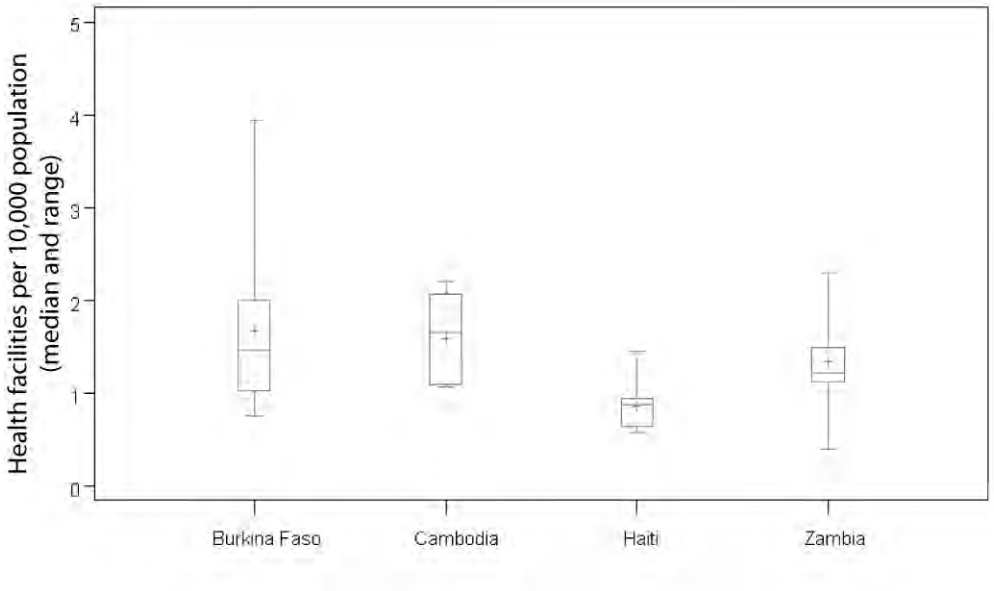
Measures of density of services can only be computed for countries that did a full census of facilities. Thirty-eight districts in four countries—Burkina Faso, Cambodia, Haiti, and Zambia—conducted facility censuses. The average population size of a district was 280,000 people, with all but four districts in the 100,000-450,000 population range. Seven districts are referred to as urban, such as Aire Metropolitaine (part of the capital Port-au-Prince) in Haiti, Livingstone in Zambia, and Bobo-Dioulassou in Burkina Faso, even though these districts may include some areas with rural characteristics. Also, districts that are mainly rural may comprise areas with urban characteristics.

There is considerable variation between districts with regard to the number of health facilities per 10,000 population. The box plot (see Figure 8.3) shows the distribution of density of health facilities in districts for the countries with a district facility census. The median number of facilities is approximately 1 to 1.5 facilities per 10,000 population, ranging from approximately 0.5 to 4 per

[13] It is possible to compare facilities that provide services related to HIV/AIDS with facilities that do not. However, the interpretation of differences is not straightforward; differences may be due to placement bias. For instance, a health center may be selected for the delivery of HIV care and treatment because of its favorable situation and potential, with more health workers, better infrastructure, better supply systems, etc.

10,000. The urban districts stand out in all countries. Haiti has lower facility density, in part because it has larger facilities.

Figure 8.3
Median and Range of District Health Facility Density per 10,000 Population, by Country, 2008



Source: DCA Facility Census 2008

Table 8.3 shows the proportion of facilities that offer specific services, based on the responses of the health workers—antenatal care (ANC), integrated management of childhood illness (IMCI), family planning (FP), malaria treatment and TB treatment (Directly Observed Treatment/Therapy Short Course [DOTS]), and HIV services—in five countries. Compared with other services, facilities are most likely to provide malaria treatment (with or without diagnostic facilities)—except in Cambodia, which does not have malaria transmission in every area sampled. TB DOTS services are offered in a similar proportion of facilities as ANC, except in Haiti, where they are less common. The HIV services are still less commonly available than, for instance IMCI, but they have been scaled up at a remarkable pace (see also Chapter 5). In Zambia, which has by far the highest prevalence of HIV of the four countries, the availability of HIV services is approaching that of IMCI services.

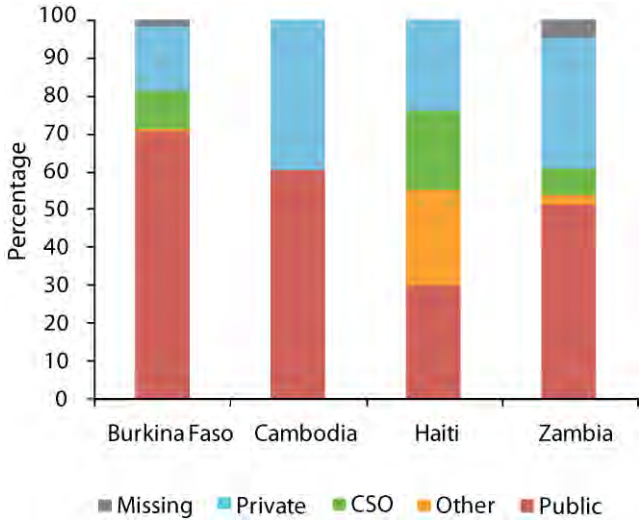
Table 8.3: Percentage of Surveyed Facilities that Offer Specific Services, by Country, 2008

Service	Burkina Faso	Cambodia	Haiti	Zambia
Antenatal care	69	70	90	77
IMCI	56	59	72	67
FP	70	47	81	73
TB DOTS	65	77	42	72
Malaria treatment	97	68	93	91
HIV testing and counseling	27	19	45	70
PMTCT	17	8	24	47
ARV therapy	18	16	31	47

PMTCT = prevention of mother-to-child transmission (of HIV/AIDS); ARV = antiretroviral
Source: DCA Facility Census or DCA Facility Survey 2008

Figure 8.4 describes the distribution of health facilities by administrative authority: public, civil society (including nongovernmental organization), community-based organization, private for-profit, and other (including parastatal, government—not public). In the four DCA countries with full-facility censuses in selected districts, the government administers 60%-70% of the health facilities.[14] The private sector oversees 30%-40% of facilities, and civil society organizations (CSOs) are responsible for the remainder.

Figure 8.4
Percent Distribution of Health Facilities, by Type of Ownership, by Country, 2008

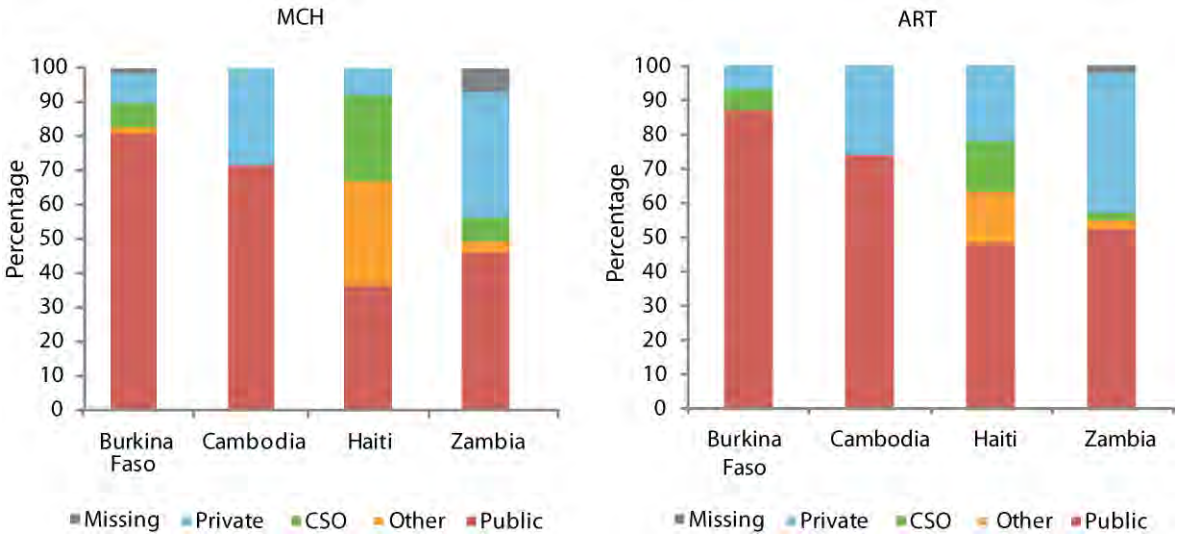


Source: DCA Facility Census 2008

The government is, however, a more prominent provider of MCH services (immunization, antenatal care, and delivery care) in all countries (see Figure 8.5). Approximately one-fifth of facilities are private in three countries, and CSOs are only important providers in Haiti. The situation for antiretroviral therapy (ART) services is quite different, with a much greater prominence of the private sector. Even in Zambia, where major efforts are made to roll out ART services through the public sector and CSOs, nearly 40% of the facilities providing ART are private. In Haiti, the private sector hardly plays a role in ART service provision.

[14] In Haiti, a significant proportion of facilities are classified as "Other," mostly parastatal facilities.

Figure 8.5
Percent Distribution of Health Facilities with MCH and ART Services, by Type of Ownership, by Country, 2008



Source: DCA Facility Census 2008

Scale up may affect the mix of service providers. The Global Fund's emphasis on the inclusion of CSOs and, to a lesser extent, the private for-profit sector may reinforce a shift in health systems, from a previously exclusive focus on the publicly funded health programs to a more comprehensive systems perspective. In PEPFAR-supported countries the emphasis on supporting faith-based organizations may have a similar effect.

HUMAN RESOURCES

The DCA Facility Census in selected countries provides data on clinic staffing, disaggregated by cadre and staff presence on the day of the interview. Table 8.4 shows the number of health workers per 10,000 population for the four countries, and the percentage present on the day of the interview. Overall, in Zambia there were 11 health workers per 10,000, 9 in Cambodia, 8 in Haiti, and only 4 in Burkina Faso. Only a few urban districts—including Lusaka in Zambia—come near the WHO target of 25 health workers (physicians, clinical officers, nurses, midwives combined) per 10,000 population.[15] There are large differences within countries: In Burkina Faso and Haiti, only major urban districts exceeded 10 health workers per 10,000 population. In Zambia, approximately half of the districts exceeded 10 health workers per 10,000 population.

[15] World Health Report 2006.

Table 8.4: Health Worker Density: Number of Doctors, Clinical Officers, Certified Nurses and Midwives; Number per 10,000 Population and Percentage Present on the Day of Visit, by Country, 2008

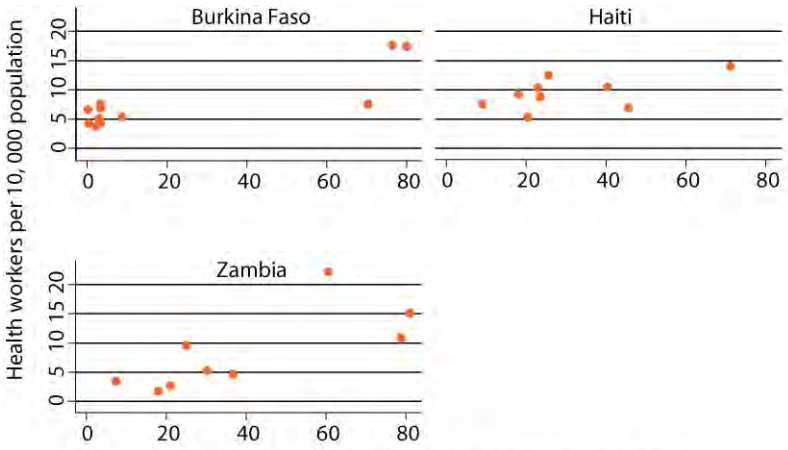
		Burkina Faso	Cambodia	Ethiopia†	Haiti	Zambia
Number of facilities		542	207	158	210	338
Population of selected districts		3,330,998	895,988	na	2,704,095	2,649,178
Doctors	Number	245	280	303	691	532
	Per 10,000	0.7	1.8	na	2.6	2
	% present	34	na	77	73	48
Clinical officers	Number	181	120	292	334	388
	Per 10,000	0.5	0.9	Na	1.2	1.5
	% present	79	76	83	89	67
Nurses	Number	597	533	1,505	766	1,291
Midwives	Number	165	348	332	258	779
Nurses and midwives	Per 10,000	2.3	6.4	na	3.8	7.8
	% present	76	81		8.5	8.3
Nursing assistants	Number	1,366	264	496	949	577
	Per 10,000	4.1	1.9	Na	3.5	2.2
	% present	55	86	85	83	5.9
Health workers*	Per 10,000	36	9.1	na	7.6	11.3

* Includes doctors, clinical officers, nurses and midwives
† Nonrandom sample of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

The actual presence of health workers on the day of the visit gives an indication of how well the health services are functioning. One would expect 70-80% of the staff normally working at the facility to be present on a random day. Legitimate absences are due to leave and illness, and short-term absences for training workshops, field visits, and logistics. The DCA Facility Census asked about presence at the facility for medical doctors, clinical officers, certified nurses, and nursing assistants/aides. Table 8.4 shows the considerable variations, by country, district, and cadre of health worker. The presence of nurses was good: Approximately 75-80% in all five countries, with a high of 85% in Haiti and a low of 76% in Burkina Faso. Nursing assistants were also at work on the day of the visit in more than 80% of cases in three countries, but not in Burkina Faso (55%) and Zambia (59%). Doctors were less frequently present, especially in Burkina Faso (34%) and Zambia (48%). Haiti and Ethiopia had better rates, with approximately three-fourths present on the day of the visit. Approximately four out of five clinical officers, however, were present on the day of the visit in all countries.

Districts with a higher level of economic and social development have more health workers. Figure 8.6 shows the health worker density per 10,000 population, by proportion of households with electricity and piped water for the three countries with facility censuses. The urban districts are all located to the right of the country graph, characterized by better infrastructure and stronger health services. Within the rural districts, however, there appears to be less variation, especially in Burkina Faso. In Haiti and Zambia there is a weak association: Rural districts with higher levels of economic and social development have somewhat higher densities of health workers.

Figure 8.6
Health Workers (per 10,000 Population) by Household Availability of Electricity and Piped Water in Each District, Selected Countries, 2008



Source: DCA Facility Census and DCA Household Survey 2008

The extent to which HIV services have been scaled up equitably has many dimensions. Qualitative data were not collected in this evaluation study.[16] As shown in Chapter 5, the coverage of HIV interventions is higher in districts with higher levels of access, higher densities of health workers, and better education levels (among women). This is primarily because the scale up has been more intense in the urban districts. Among the rural districts, the differences tend to be small. This implies that health system weaknesses, such as poor infrastructure and limited human resources, are likely to become more prominent constraints as the scale up involves more nonurban areas.

Basic Amenities and Equipment

Important prerequisites for the effective delivery of key services are the availability of basic infrastructure and equipment such as electricity, safe water, and communication equipment (telephone, shortwave radio, computer, Internet access). Less than half of the health facilities have access to a safe water source—be it piped water, protected springs and wells, or other sources—within 500 meters of the health facility (see Table 8.5). Water supply for health facilities in Burkina Faso and Cambodia appeared to be better than in the other three countries. The low figures for the Ethiopia hospitals and health centers and the Zambian districts are notable. Most facilities have some source of electricity, but for many facilities it is not available all the time. At least four of five facilities have means of communication, mostly mobile telephones. Finally, a computer with Internet connection is now found in 30% of facilities in Haiti, 28% in Zambia, 20% in Ethiopia, and 5% in Burkina Faso and Cambodia.

Table 8.5: Percentage of Surveyed Health Facilities with Basic Amenities, by Country, 2008

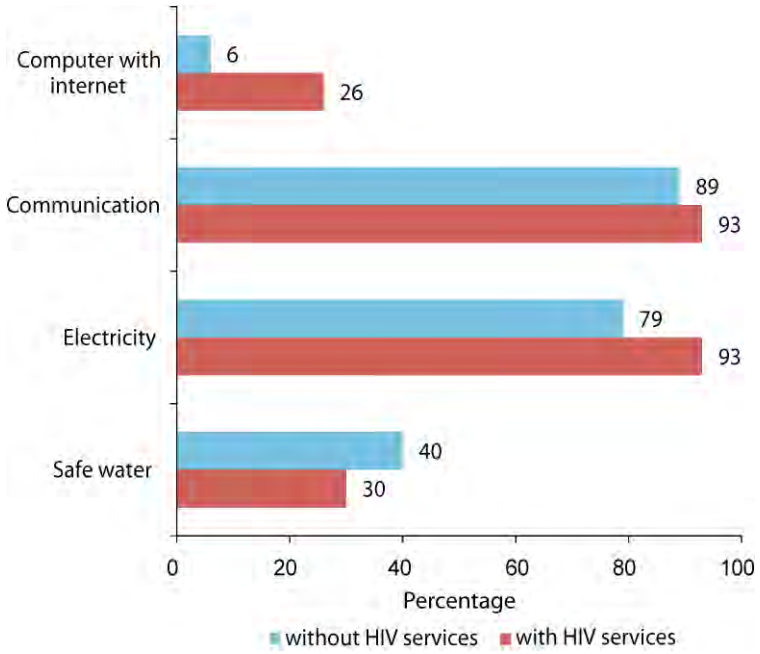
Amenities	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
Safe water source (within 500 meters)	47	67	18	31	21
Electricity (grid, generator, solar)	84	68	92	82	93
Power, 24 hours	50	na	74	54	49
Communication (telephone, shortwave radio)	88	100	80	95	91
Computer with Internet	5	5	20	30	28

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

[16] According to qualitative country studies, the scaling up of interventions against HIV/AIDS and other diseases can have mixed effects on the health workforce. Positive effects include enhanced awareness of the importance of a well-trained workforce to deliver high-quality services, development of new ways to overcome health worker shortages—including incentives—application of potentially more efficient ways of delivering services, and pre- and in-service training of health workers. However, most of these innovative approaches have primarily been developed to increase delivery of HIV interventions. This may give rise to potential negative effects, including displacement of health workers from less well-funded but highly effective programs addressing HIV/AIDS or other priority diseases. Malawi provides an example of mixed effects of external AIDS funding. The Global Fund grant is used to support a national strategy to address human resource constraints to scaling up health services, providing broader benefits to health service delivery by improving salaries for all health care workers by 50%, and implementing recruitment and retention strategies. At the same time, the Ministry of Health instituted a policy to enable nonmedical workers to carry out HIV testing and counseling services, which led to shifting of community health surveillance assistants to the better paid HIV-related jobs. The SA2 report of the Global Fund evaluation study concluded that the Global Fund has focused on short-term in-service training, without much linking to national training plans, while new recruitment using Global Fund grants primarily targets staff working in management and monitoring and evaluation.

Comparing facilities with HIV services (offering counseling and testing, prevention of mother-to-child transmission of HIV/AIDS [PMTCT], or ART) with non-HIV facilities shows that there are only modest differences among the 1,455 facilities in the five countries with a DCA. Facilities with HIV services, which are almost half of all facilities, have slightly less frequently safe water supply, slightly more frequently available electricity and communication equipment, and considerably more frequently available computer with Internet connection (see Figure 8.7). The latter are particularly common in Haiti and, to a lesser extent, in Zambia. These differences, however, can be explained by the urban bias in the location of the facilities with HIV services.

Figure 8.7
Percentage of Health Facilities with and without HIV Services that Have Basic Amenities, in Countries with DCA Facility Assessment, 2008



Source: DCA Facility Census or DCA Facility Survey 2008

Health facilities should have a basic set of equipment to assess and treat patients and protect supplies (e.g., a refrigerator). Most health facilities have the basic equipment: a blood pressure measurement device, a stethoscope, scales, a thermometer, and a refrigerator. The majority of facilities do not have an ophthalmoscope or otoscope, or the equipment to deliver medication (see Table 8.6).

Table 8.6: Percentage of Health Facilities with Basic Equipment for Diagnosis and Care, by Country, 2008

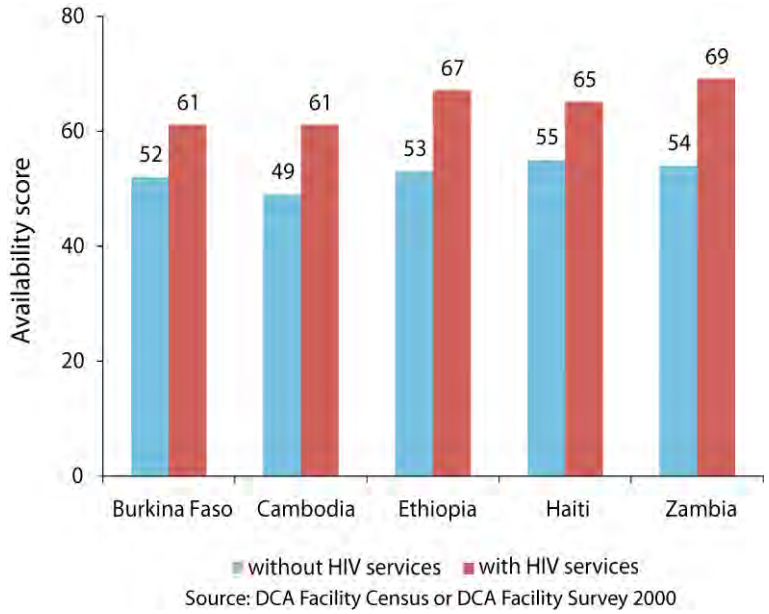
Equipment	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
Blood pressure machine	89	69	99	98	94
Stethoscope	92	94	99	97	94
Adult weighing scale	92	84	96	88	93
Under 5 weighing equipment	73	74	92	87	87
Thermometer for oral or rectal	93	78	74	89	93
Refrigerator	78	67	96	77	93
Ophthalmoscope	6	17	46	26	40
Otoscope	30	44	72	47	48
Infusion kits for IV solution	71	48	68	41	85
Micronebulizer	2	12	9	22	18

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

The availability of equipment did not differ much between types of ownership, except for facilities run by civil society organizations. For the five countries combined, the availability score (percentage available out of the 10 equipments in Table 8.6) was 59% for public facilities, 50% for CSOs, 60% for private facilities, and 61% for parastatals.

Figure 8.8 summarizes the ten basic equipments for facilities with and without HIV services. In all countries, HIV services have scaled up through moderately stronger facilities, where the availability scores are over 60%, compared with approximately 50% in the non-HIV facilities.

Figure 8.8
Basic Equipment Availability Score of Health Facilities, with and without HIV Services, by Country, 2008



Source: DCA Facility Census or DCA Facility Survey 2000

INFECTION CONTROL

Another key requirement for high-quality service delivery is infection control practices, including appropriate sterilization methods and equipment, disposal of sharps and infectious wastes, and availability of an environmental disinfectant and hand washing soap or cleansing solution (Table 8.7). Most facilities do not have proper disposal of sharps and tend to dispose of them in

unprotected pits and other unsafe areas. The practices are only slightly better for infectious waste. Soap for hand washing was available in almost all facilities, but disinfectant was less commonly available in Cambodia and Ethiopia.

Table 8.7: Percentage of Health Facilities with Basic Equipment and Commodities for Infection Control, by Country, 2008

Infection Control	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
Sharps item disposal	8	5	5	10	5
Infectious waste disposal	17	8	12	15	7
Disinfectant available	96	72	73	88	94
Soap available	98	96	95	96	100

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

MEDICINES AND COMMODITIES

This section uses DCA data to assess the availability of 28 generic medicines and commodities at the most peripheral level of the supply chain, the health facility. Table 8.8 shows the availability of selected medicines and commodities in five countries that conducted a DCA/Facility Census. Of the 28 drugs and commodities, all considered essential for basic health care according to WHO, the mean availability was poor, ranging from a low of 38% in Burkina Faso to 51% in Cambodia and Ethiopia. Eight drugs for chronic diseases such as cardiac problems, chronic respiratory problems, diabetes and ulcers have the lowest availability. In Burkina Faso, the drugs were rarely found. In Zambia, the average availability of each of the eight drugs was 32%, which was the highest of all countries. Anti-infectious agents (nine antibiotic and antiparasitic drugs) were on average available in 52-69% of facilities. Contraceptives (oral pills, hormonal injectables, and condoms) were available in most facilities, especially in Cambodia and Ethiopia. Drugs for antenatal or delivery care (oxytocin and magnesium sulphate) were not commonly available, especially magnesium sulphate, but it has to be taken into account that not all facilities provide such care. Special medicines and commodities for children (oral rehydration salts, pediatric suspension of cotrimoxazole and paracetamol, and vitamin A) were available in 60%-70% of cases in all countries.

In cases of essential drug kits that are delivered on a monthly basis, the time of the visit by the study team is critical, because stockouts are more likely to occur when new supplies are due. It is not known when and where this was the case, but the overall picture should present a good snapshot of drug and commodity availability.

Table 8.8: Percentage of Surveyed Health Facilities with Drugs and Commodities, by Country, 2008

Drug Commodity	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
Chronic diseases (NCD, 8 drugs)	4	28	19	18	32
Anti-infectious (9 drugs)	50	57	63	56	69
Contraceptives (3)	60	84	94	66	54
Delivery care (2)	19	39	34	29	33
Pain relief, anti-inflammatory (2)	73	55	62	48	50
Child health (4)	63	73	67	59	70
Median	38	51	51	41	49

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

The results are very consistent with a recent synthesis of WHO/Health Action International surveys in 36 countries for 15 medicines, with public sector availability of 38% and private sector availability of 64%.[17] Comparison of the availability and the quality (expiration dates) of drugs for diseases that are part of the scale up with the drugs that are not may provide useful insights. However, a judgment as to whether the scale up of AIDS, TB, and malaria programs is affecting the supply of other medicines can only be made if there are trend data on drug availability.

Table 8.9 shows the availability of selected nonexpired drugs for child care (cotrimoxazole suspension), infections (amoxicillin), chronic conditions (salbutamol for asthma and gliblenclamide for diabetes), malaria (artemisinin-based combination therapy [ACT]), TB drugs (all four), and ART (any first-line combination). There are marked differences between the medicines and between countries. One would expect that the antibiotics and chronic disease generic drugs would be available in nearly all facilities, TB drugs in a significant part of facilities (designated treatment facilities), ACT in all facilities in endemic districts, and ART in a significant proportion of facilities depending on the size of the epidemic. The main observations are:

- The two antibiotics have high availability, but cotrimoxazol suspension for children is lower than amoxycillin in all countries, especially Haiti, indicative of a shortage of medicines for children.
- The two medicines for chronic noncommunicable conditions have very poor availability almost everywhere, with the exception of Zambia, and in a few instances ART is more commonly available than are noncommunicable diseases drugs.
- ACT for malaria treatment is highly available in Zambia and in the Ethiopian hospitals and health centers but not in the other countries. (Haiti has no ACT in its national policy.)
- TB treatment (four drugs) is available in half or more facilities in Cambodia and Zambia—which ensures widespread access—one-third in Haiti, but only one-ninth in Burkina Faso districts.
- ART first-line drugs are very common in Zambia (33%) with its large epidemic. Haiti has ARV access in one in eight facilities. Burkina Faso and Cambodia have limited access but also have much less severe epidemics.

[17] Cameron, A., M. Ewen, D. Ross-Degnan, D. Ball, R. Laing. 2009. Medicine prices, availability and affordability in 36 developing and middle income countries: a secondary analysis. Lancet 272: 240-9.

Table 8.9: Percentage of Surveyed Health Facilities with Selected Medicines, by Country, 2008

	Cotrim Suspension	Amoxicillin	Salbutamol	Gliblen-clamide	ACT	TB	ART
Burkina Faso	69	74	16	2	31	11	5
Cambodia	63	76	63	20	17	50	3
Ethiopia*	64	83	26	37	81	96	47
Haiti	48	79	26	28	0	34	12
Zambia	73	92	48	43	73	55	33
All facilities	65	80	33	22	40	39	17

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

TRAINING AND GUIDELINES

The DCA Facility Census provides information on training intensity, comparing different programs. Questions were asked about 19 different types of training (with minor country-specific adaptations) in the last two years. These included seven training courses for HIV/AIDS, one for malaria, two for TB, and one for HIV/TB. Table 8.10 shows the proportion of facilities with at least one staff trained in the last two years in selected course subjects, with median scores for all subjects. Figure 8.9 presents the median scores for HIV and non-HIV, TB, or malaria subjects.

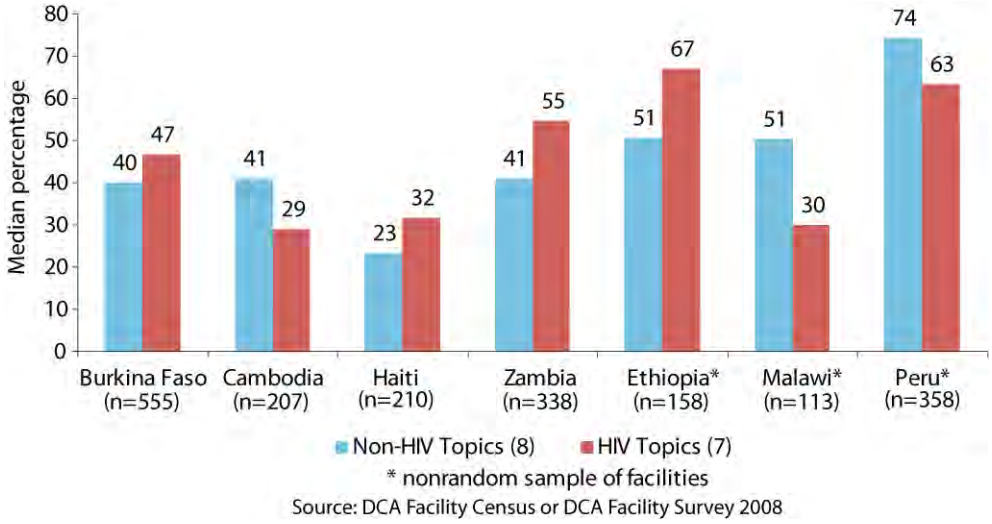
The general picture is a fairly high training intensity for a large number of different subjects. Overall, the exposure to HIV-related subjects was more frequent than to other subjects in four of the five countries. For instance, in Zambia the average exposure to seven HIV subjects was 52%, while overall for all 19 subjects it was 44%, and for the eight non-HIV, TB, and malaria subjects it was 40%. Only in Cambodia were the HIV training subjects less common than other training subjects. Malaria and sexually transmitted infection (STI) courses were particularly common in Burkina Faso. TB diagnosis and treatment and IMCI led in Cambodia and Ethiopia. In Haiti, the frequency of training exposure was lowest among the five countries. In Zambia, STI diagnosis and treatment and HIV testing and counseling were most common.

Table 8.10: Percentage of Surveyed Health Facilities with at Least One Staff Trained in Selected Courses in the Past Two Years, by Country, 2008

	Percentage of Facilities Surveyed with Staff Trained				
Course Subject	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
IMCI (child illness)	42	52	77	28	44
FP	42	38	75	41	36
STI diagnosis and treatment	65	48	68	40	55
Malaria diagnosis and treatment	78	46	44	39	49
TB diagnosis and treatment	52	58	78	40	49
HIV testing and counseling	46	29	54	29	54
PMTCT	47	29	61	31	52
Infection control	44	27	40	22	44
Health information system	37	48	23	22	42
Median (19 subjects)	42	34	52	28	44

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

Figure 8.9
Median District Percentage of Surveyed Health Facilities with Staff Trained in HIV-related Topics and in Other Topics, by Country, 2008



Data were gathered on the availability of guidelines in health facilities (see Table 8.11). For each of the 19 interventions or programs, questions were asked about the availability of guidelines in the facility if a person had been trained in the last two years (except in Cambodia where it was asked in all facilities). The most commonly present guidelines covered a wide range of services, including IMCI, malaria, TB, HIV/AIDS, and general management. Very commonly found guidelines include IMCI in Ethiopia (81% of facilities), TB in Ethiopia (80%), and malaria in Burkina Faso (72%). Haiti has very poor availability of guidelines in health facilities, with a score below 20% for all guidelines combined.

HIV-related guidelines, however, are more frequently available than are other guidelines on IMCI, infection control, or FP in all countries but Cambodia, and the gap is fairly large. Table 8.11 summarizes the information for seven HIV guidelines and for all guidelines; it shows that for every country, HIV guidelines are more available than for all subjects together. This suggests that more needs to be done to keep health workers up to date on non-HIV/AIDS-related developments

Table 8.11: Percentage of Surveyed Health Facilities with at Least One Staff Trained in the Respective Course with Guidelines Available, by Country, 2008

Course Subject	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
IMCI (child illness)	42	52	77	28	44
FP	42	38	75	41	36
STI diagnosis and treatment	65	48	68	40	55
Malaria diagnosis and treatment	78	46	44	39	49
TB diagnosis and treatment	52	58	78	40	49
HIV testing and counseling	46	29	54	29	54
PMTCT	47	29	61	31	52
Infection control	44	27	40	22	44
Health information system	37	48	23	22	42
Median (19 subjects)	42	34	52	28	44

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

Trained staff, guidelines and medicines are fundamental for service delivery. In addition, there is a need for diagnostic capability in health facilities, for the three diseases and for other conditions. Improvements of laboratory capacity have been an integral part of the Global Fund and PEPFAR grants. For instance, approximately two-thirds of TB grants included a laboratory component. Table 8.12 presents the ability of a facility to conduct onsite and offsite testing for HIV, hemoglobin, malaria, TB (sputum), blood glucose, and syphilis. Burkina Faso and Cambodia have poor availability of basic means of lab support; Zambian districts and the Ethiopian hospitals and health centers are two to three times better supplied; and Haiti takes an intermediate position. Notably more facilities are able to offer an HIV test than a hemoglobin test.

Table 8.12: Percentage of Surveyed Health Facilities that Offer Specific Tests, by Country, 2008

Lab Test	Burkina Faso	Cambodia	Ethiopia*	Haiti	Zambia
Number of facilities	542	207	158	210	338
HIV test	24	16	85	46	72
Hemoglobin	6	14	46	46	52
Malaria blood slide	7	28	85	47	56
TB sputum	3	22	46	18	20
Blood glucose	6	16	37	37	45
Syphilis test	5	12	39	49	58
Dipstick urine protein	46	13	68	28	47
Dipstick urine glucose	45	16	64	30	47
Pregnancy test	35	24	68	56	43
Rapid malaria test	2	37	59	10	63
Median (all tests)	18	20	60	37	50

* Nonrandom selection of facilities
Source: DCA Facility Census or DCA Facility Survey 2008

In summary, there is some evidence that HIV services have been scaled up at much greater pace than other services and that there are some distortions in data on the availability of drugs and services. For instance, the high levels of training exposure for HIV/AIDS topics, the imbalance in availability of guidelines biased towards HIV, and the relatively limited availability of basic lab services and medicines compared with HIV-related services are signs of disproportionate attention to scaling up HIV, while ignoring longstanding basic health care deficiencies. It is not possible to judge whether the scaling up of HIV services has affected negatively the training exposure, medicines availability, diagnostic capacity, etc., as this is a cross-sectional approach.

8.4 Trends in Non-HIV Intervention Coverage and Child Mortality

Documenting trends in coverage of interventions and child mortality can help assess the spillover effects of increased resources for HIV, TB, and malaria. There is a need for long-term data to be able to ascertain the long-term trend prior to 2003-2004 and for data points after 2004. These criteria exclude virtually all adult health interventions and many child health interventions. The availability of coverage trend data is best for MCH programs, where surveys have collected data in the same way on a small set of core indicators since the early nineties. It is hypothesized that MCH intervention coverage trends should at least continue at the same pace as before 2003-2004. While it may not be possible to attribute negative trends to disease-focused scale up, such evidence will strengthen concerns that already fragile health systems are being overwhelmed by rapid increases in resources for some programs at the expense of others. The assessment will assume that changes such as falling

immunization coverage reflect undesirable imbalances associated with scale up, unless there is evidence for alternative explanatory phenomena.[18]

Data for MCH/FP coverage indicators have been collected in a standardized way through household surveys (mostly the Demographic and Health Surveys [DHS], sometimes the United Nations Children's Fund Multiple Indicator Cluster Survey [MICS]) since the early 1990s. Data are presented on individual interventions as a summary index. The coverage gap index is a measure based on four MCH/FP program areas; it comprises the following eight indicators, all derived from household survey data:[19]

- Immunization (Bacillus Calmette-Guérin, Diphtheria-Pertussis-Tetanus Dose 3 [DPT3], measles)
- Maternal and newborn care (antenatal care, skilled birth attendance)
- Family planning (need satisfied, if not directly available derived from contraceptive use)
- Health-seeking behavior for treatment of common childhood illnesses (diarrhea and suspected acute lower respiratory infection).

Ideally, up-to-date information on causes of death and disease is available to ascertain the impact of scaling up against the three diseases and the extent to which this affects the burden of disease due to other conditions. As indicated elsewhere in the report, such data are not available for the evaluation study countries. Data on levels and trends in child and adult mortality can also provide information on the health impact of scaling up, even though it is not straightforward to attribute such changes to a specific set of interventions, especially in childhood. Only a few countries have sufficient empirical data to assess trends after 2004: Rwanda (2005-2007) and Zambia (during 2001-2007) have recent surveys with child mortality data.[20] United Nations estimates of adult and child mortality levels and trends, which are published on an annual basis, are not suitable for evaluation, because such estimates are based on predictions based on past levels and trends.

A recent study of trends in the coverage gap index in 40 countries over 1990-2005 found that there is considerable variation in the size of the coverage gap between countries (from less than 20% to more than 70%). It is a robust measure of long-term trends that can also be used to assess changes in the effects of determinants of coverage over time, such as household wealth. Data from the 40 low-income and lower-to-middle income countries indicate an average rate of decline in the coverage gap of just under 1 percentage point per year (0.9 per year between 1990 and 2005), or to put it another way, mean MCH intervention coverage is increasing by 0.9% per year.

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[18] It is acknowledged that it will be difficult to prove causality, but if there is no slow-down or reversal of the pre-2003 trend, this is taken as no clear evidence of negative impact of scaling up of the HIV/AIDS response. If there is an acceleration of the decline, it will be similarly difficult to attribute this to the scale up, but this could be taken as a suggestion of potential positive spillover effects. Similarly, if there is uneven progress in health indicators related to Millennium Development Goal (MDG) 6 (HIV, TB, and malaria) compared with other MDGs, this could be taken as evidence of imbalances in the funding for the scale up.

[19] Countdown 2008 Equity Analysis Group. 2008. Mind the gap: Equity and trends in coverage of maternal, newborn, and child health services in 54 Countdown countries. Lancet 371: 1259-1267. It gives equal weight to the four intervention areas, and each intervention area is composed of one or more indicators.

[20] Tanzania data from the 2007-2008 survey were not yet published.

From the point of view of the evaluation study, the primary quantity of interest is the extent to which trends in coverage of MCH interventions observed before 2003-2004 have changed. In several countries, data are available from multiple national household surveys, but only a few countries have very recent results. In the countries with a DCA Household Survey covering selected districts, the results are not directly comparable to a national survey but can give an indication of the recent trends in coverage for MCH interventions if the household and respondent characteristics in the DCA are comparable with the previous DHS or MICS. In all countries this appears to be the case.[21]

Table 8.13 provides a general picture for 11 countries with multiple household surveys, including a recent survey in 2004 or later. The MCH coverage gap is declining, and in several countries the decline appears to have accelerated in recent years. A comparison of the two most recent surveys in all countries shows that, on average, family planning and immunization interventions made the most progress, followed by antenatal and delivery care; little progress was made in the treatment of common childhood illness.

[21] Details can be obtained from the Evaluation Study Consortium. In a few countries, the characteristics of the households and respondents were slightly more urban and better off than in the most recent national survey. This is particularly the case in countries where one of the districts was located in the capital (e.g., Haiti and Zambia).

Table 8.13: Coverage (%) of MCH Interventions in Selected Countries, Overall Coverage Gap, and Average Annual Change in Percentage Points, 1990-2008

Country	Year	Source	Imm.	ANC	SBA	FP	Met Need	ORT	ARI	Overall Coverage Gap	Average Annual Change in Percentage Points
Benin	1996	DHS	70.9	80.5	63.9	3.4	38.9	58.8	31.7	43.2	
	2001	DHS	75.7	87.4	72.9	7.2	40.6	55.1	35.1	39.6	0.7
	2006	DHS	70.9	88.0	77.7	22.2	50.8	53.7	35.7	37.7	0.4
Burkina Faso	1999	DHS	50.0	63.0	30.9	4.8	31.5	46.0	21.9	59.4	
	2003	DHS	62.7	72.8	37.8	8.8	32.3	62.8	35.9	50.1	2.3
	2008	*DCA*	*75.6*	*85.0*	*56.7*	*15.3*	*43.4*	*44.4*	*46.7*	*41.2*	*1.8*
Cambodia	2000	DHS	56.0	37.7	31.8	18.8	42.2	62.9	36.6	54.3	
	2005	DHS	81.2	69.3	43.8	27.2	61.5	58.4	48.3	36.8	3.5
Ethiopia	2000	DHS	28.4	26.7	5.6	6.3	18.7	44.9	15.8	76.6	
	2005	DHS	39.8	27.6	5.7	13.9	30.6	37.1	18.7	71.3	1.1
	2008	*DCA*	*34.5*	*62.8*	*32.0*		*54.8*	*35.7*	*40.4*	*55.3*	
Ghana	1993	DHS	68.1	85.7	43.7	10.1	35.7	45.6	42.8	46.8	
	1998	DHS	76.2	88.7	44.3	13.3	39.6	67.9	26.2	42.7	0.8
	2003	DHS	82.9	91.9	47.1	18.7	42.5	63.3	44.0	37.9	1.0
	2006	MICS	83.7	92.1	49.7	16.6	44.8	37.0	33.6	41.3	(1.1)
Haiti	1995	DHS	51.0	69.6	21.0	13.2	27.3	57.2	27.2	58.5	
	2000	DHS	52.7	80.3	24.2	22.8	41.4	54.9	37.4	51.9	1.3
	2005	DHS	59.7	84.5	26.1	24.8	46.1	56.9	34.8	48.3	0.7
	2008	*DCA*	*50.4*	*87.7*	*26.5*	*27.4*	*56.3*	*54.6*	*38.2*	*47.4*	*0.3*
Malawi	1992	DHS	90.0	90.6	54.9	7.4	26.7	73.3	53.7	36.8	
	2000	DHS	86.0	92.5	55.6	26.1	50.8	62.1	26.7	36.2	0.1
	2004	DHS	83.3	92.1	56.1	28.1	55.2	70.1	19.6	35.6	0.2
	2006	MICS	88.2	91.9	53.6	38.9	68.6	55.3	51.8	29.2	3.2
Peru	1996	DHS	83.5	71.7	56.4	41.3	85.1	66.8	45.7	27.8	
	2000	DHS	87.5	83.8	59.3	50.4	87.6	68.7	57.9	22.5	1.3
	2004	DHS	89.4	91.6	73.4	46.7	88.3	70.6	68.0	17.6	1.2
Rwanda	2000	DHS	68.6	92.3	27.2	5.7	27.1	30.6	20.3	54.8	
	2005	DHS	72.9	94.4	38.6	10.3	31.4	31.9	26.9	50.0	1.0
	2007	DHS	91.4	95.8	52.1	27.4	56.3	35.0	30.8	36.4	6.8

Table 8.13—*Continued*

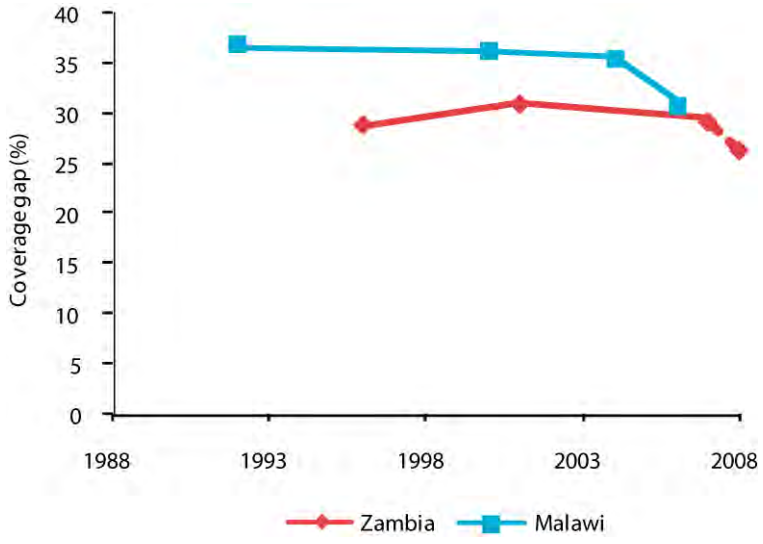
Country	Year	Source	Imm.	ANC	SBA	FP	Met need	ORT	ARI	Overall Coverage Gap	Average Annual Change in Percentage Points
Tanzania	1996	DHS	86.9	89.9	46.7	13.3	41.2	73.7	69.6	33.0	
	1999	DHS	83.2	92.5	43.8	16.9	45.1	67.8	64.5	34.4	(0.5)
	2004	DHS	85.7	94.3	46.3	20.0	55.9	70.0	59.5	30.8	0.7
Zambia	1996	DHS	88.8	95.6	46.5	14.4	49.4	75.4	79.5	28.3	
	2001	DHS	84.6	93.4	43.4	25.3	55.5	66.9	69.1	30.9	(0.5)
	2007	DHS	84.2	93.7	46.5	32.7	62.0	66.8	67.7	29.1	0.3
	2008	*DCA*	*83.9*	*93.1*	*56.6*	*33.1*	*62.4*	*77.8*	*70.5*	*26.2*	

DCA in italics: not a nationally representative sample
Imm. = Immunization; ANC = antenatal care; SBA = skilled birth attendant; ORT = oral rehydration therapy; ARI = acute respiratory infection

Zambia has a very large AIDS epidemic; through PEPFAR, the Global Fund, and other partners significant funds were allocated to HIV/AIDS in recent years, adding up to approximately one-third of total health expenditure. International resource flows for maternal and child health increased by approximately 40% between 2003 and 2006, and funding per child is relatively high (US$27 per year for 2005-2006).

Zambia conducted national surveys in 1996, 2001, and 2007, which indicate that the MCH coverage gap was approximately 30% in the mid-nineties and changed little in subsequent years. After 2001, there may have been a modest improvement, compared with pre-2001, but differences are small (see Figure 8.10).

Figure 8.10
Trend in the MCH Coverage Gap (%), Zambia, Malawi

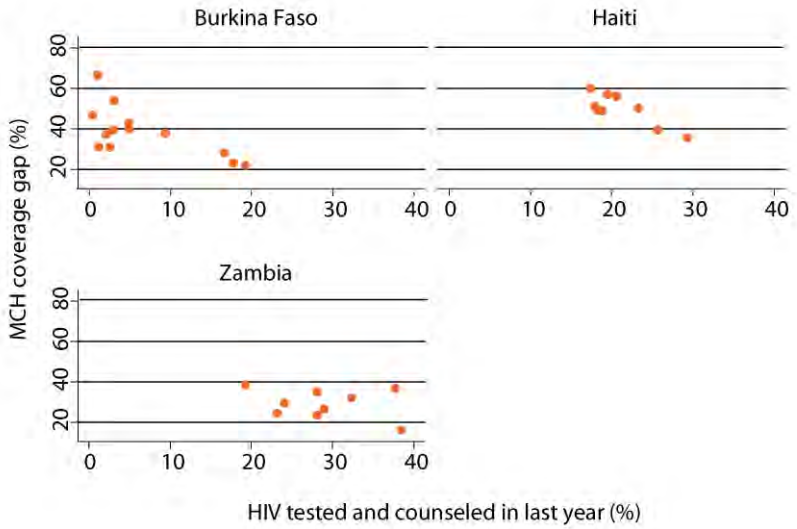


(dotted line indicates DCA 2008, not national sample)
Source: National Household Survey Data

The DCA 2008 shows a slightly smaller coverage gap than does the 2007 DHS, which may, in part, be due to urban bias in Zambia's selection of districts. Figure 8.11 shows district-level correlations between the MCH coverage and HIV testing and counseling among adult women in the last year. Districts with larger MCH coverage gaps tend to have lower uptake of HIV testing and counseling; but the association is weak.

In Zambia, the most recent DHS found an under-five mortality of 119 per 1,000 live births for 2003-2007, compared with 158 in the preceding five-year period. Improved malaria control, a major component of the scale up of interventions in both countries, may have contributed significantly. This is described in detail in Chapter 7. The effect of PMTCT on child mortality is likely to be small, because the scale up of services is relatively recent.

Figure 8.11
MCH Intervention Coverage Gap (%) by HIV Testing and Counseling in the Last 12 Months, Coverage among Women Age 15-49, Selected Countries, 2008



Source: DCA Facility Census and DCA Household Survey 2008

Malawi has a large epidemic and has seen major increases in funding for HIV, including the Global Fund, with approximately one-fifth of its total health expenditure related to HIV/AIDS in 2007. Malawi received approximately US$13 per child per year in official development assistance in 2005-2006 and saw increases of at least 40% in assistance for child health programs and 75% for maternal and neonatal health programs. Coverage trends show little improvement from 1992 to 2004, but the 2006 MICS indicated that substantial progress was made after 2004 (Figure 8.10). The most progress was made in family planning and treatment of acute lower respiratory infection.

Tanzania's epidemic has a national adult HIV prevalence rate on the order of 5%, and HIV external funding accounts for approximately one-fourth of its total health expenditure in 2007. Funding for child health remained the same in 2006 compared with 2003. The coverage gap remained in the range of 30%-35% during 1996 and 2004 (see Figure 8.12). The gap may have increased in the 1990s and then declined in the new millennium, but variation in coverage of the MCH interventions over time is usually small. The recent Tanzania HIV and malaria indicator survey also includes a birth history, which allows assessment of child mortality. Unpublished data suggest that the child mortality decline observed in the first years of the new millennium is continuing at a fast pace.

Rwanda's national HIV prevalence is just under 3%, and the country's response against HIV/AIDS has been extensive. During 2003-2006, external funding for HIV was 27% of total health expenditure. Child and maternal/neonatal international funding increased twofold and sixfold, respectively, between 2003 and 2006, rising to US$21 per child and US$27 per pregnant woman/neonate.

More than half of the health sector aid comes as project support. A review in 2005 showed that Rwanda received more than US$47 million for HIV—which is disproportionate in a country with a 3% HIV prevalence rate—compared with US$18 million earmarked for malaria, the main cause of

mortality and morbidity, and only US$1 million for IMCI and childhood diseases, even though it had low coverage of MCH interventions. HIV funding and programming were considered a threat to the delivery of other health services, especially because of limited human resources.[22]

Three household surveys, in 2000, 2005, and 2007 indicate a gradual decline in the overall coverage gap between 2000 and 2005 and a spectacular decline between 2005 and 2007. The coverage gap decreased from a high of 50% to a low of 36% between 2005 and 2007, bringing it closer to the level of other countries in eastern Africa. Improvements were observed in all four main intervention areas of immunization, family planning, treatment of sick children, and maternal care (see Figure 8.12). Under-five mortality dropped to 107 per 1,000 live births for 2003-2007, compared with 173 in 1998-2002.

Rwanda is a possible example of positive effects of strong leadership and political commitment on health. The well-resourced AIDS program may have provided the impetus for the development of integrated approaches to service delivery, as well as development and implementation of robust health plans to improve access to basic health services. The Rwandan government introduced various health system-related changes, including improved coordination of donors and external aid with government policy; a countrywide independent community health insurance scheme coordinated by the Ministry of Health, thus reaching 73% coverage in 2006; and the introduction of a performance-based pay initiative for health workers.[23]

In *Ethiopia,* it is estimated that HIV/AIDS-related external funding constitutes approximately 20% of total health expenditure. MCH funding increased by 140%-220% between 2003 and 2006, and approximately US$7 per child was available from international sources in 2005-2006. The two DHS surveys, in 2000 and 2005, indicate that Ethiopia has one of the highest coverage gaps in the world (more than 70%), even though the gap declined at approximately 1 percentage point per year during that period (see Figure 8.12). The DCA 2008 shows much better coverage for maternal and neonatal care and use of family planning, and consequently yields much smaller coverage gap. Note, however, that the Ethiopian household survey focuses on populations living in the vicinity of hospitals and health centers in all regions, which is likely to be associated with higher intervention coverage.

[22] Foster Metal. 2006. Scaling up to achieve the health MDGs in Rwanda. Background study for the High-Level Forum meeting in Tunis, June 12-13.
[23] Logie, D.E., M. Rowson, and F. Ndagije. 2008. Innovations in Rwanda's health system: Looking to the future. Lancet 19;372(9634):256-61.

Figure 8.12
Trend in the MCH Coverage Gap (%), Ethiopia, Tanzania, and Rwanda

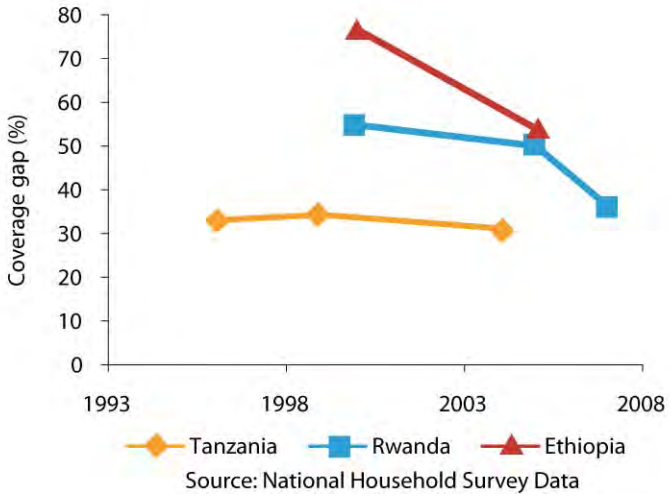
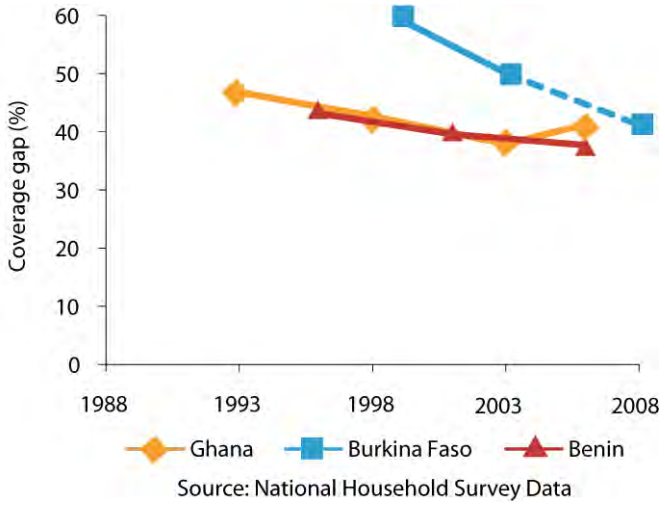


Figure 8.13
Trend in the MCH Coverage Gap (%), Ghana, Burkina Faso, and Benin



In *Ghana,* HIV external funding accounted for approximately 3% of the total health expenditure in 2007. International funding for MCH has decreased by approximately one-quarter between 2003 and 2006. The national surveys—three DHS and one MICS in 2006—indicate a gradual improvement in coverage until 2003 but show a reversal of the trend during 2003-2006 (see Figure 8.13). The main reason for this trend was the lower coverage of treatment for diarrhea and acute respiratory infections in the MICS 2006, compared with the DHS 2003.

Burkina Faso's external HIV funding was approximately 10% of its total health expenditure during 2003-2006. Funding for child and maternal health more than doubled between 2003 and 2006 and reached approximately US$8 per child. The coverage gap in Burkina Faso in 1999 was similar to that in Rwanda in 2000. Between 1999 and 2003, DHS surveys in Burkina Faso indicated substantial progress, with the gap falling by more than 2 percentage points per year (see Figure 8.14). The results of the 2006 MICS have not yet been released. The DCA 2008, however, appears to suggest that the rapid improvements have continued, with major improvements in all

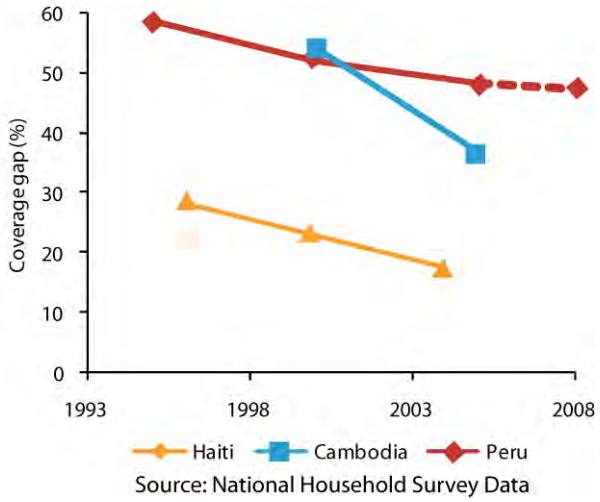
interventions except oral rehydration therapy. The district-level analysis shows major differences between districts, with the urban districts in Ouagadougou and Bobo-Dioulassou having much smaller MCH coverage gaps than many rural districts (see Figure 8.11); some have gaps that are three times larger. The districts with smaller coverage gaps also have a higher uptake of HIV testing and counseling.

In *Benin,* approximately 7% of total health expenditure went to HIV/AIDS in 2007. International funding for child health increased more than twofold from 2003 to 2006; approximately US$14 per child was available in 2005-2006. The coverage gap declined gradually between 1995 and 2006, somewhat faster during the late 1990s than during 2001-2006 (see Figure 8.13). Lack of improvement in immunization coverage and treatment of sick children are the main reasons for the slowing decline.

In *Haiti,* HIV funding was approximately 27% of the total health expenditure during 2003-2006. There were very large increases in international funding for child (2.5 times) and maternal (10 times) health between 2003 and 2006. Haiti conducted DHS surveys in 1995, 2000, and 2005/2006, which showed considerable progress in reducing the coverage gap from 58% to 48%—a decline of approximately 2% per year—although the coverage gap remains the highest in Latin America and the Caribbean and also considerably higher than in most countries in eastern and southern Africa (see Figure 8.14). Results from the DCA Household Survey in 2008 are fairly similar to those from the 2005 survey in terms of overall coverage gap, but the results for individual interventions suggest that immunization coverage has actually declined. The two sources are not strictly comparable: While the characteristics of the 2008 survey DCA respondents and households are similar to those of the Haiti 2005/2006 DHS, they are slightly more urban and wealthier. However, this would lead one to expect somewhat better coverage of interventions. These data suggest possible stagnation of progress in MCH intervention coverage in the last 2-3 years.

Figure 8.12 illustrated the large differences in MCH coverage gap among *départements,* with urban Port-au-Prince showing the smallest gap. HIV testing and counseling coverage is strongly correlated with the MCH gap. Similarly to the other two countries with district data—districts with higher levels of coverage of MCH interventions—Haiti tends to have higher levels of coverage for the HIV interventions. This corroborates the earlier finding that, at this point in time, HIV services tend to be concentrated in districts with better performing health services.

Figure 8.14
Trend in the MCH Coverage Gap (%), Cambodia, Haiti, and Peru



Source: National Household Survey Data

Cambodia's external funding for HIV was approximately one-fifth of its national budget for HIV/AIDS. Child health funding was lower in 2006 than in 2003 by 21%, but maternal and neonatal health funding doubled. DHS surveys in 2000 and 2005 indicate that the overall coverage gap for MCH interventions decreased from 54% to 37% (see Figure 8.14), corresponding to more than 3 percentage points decline per year, one of the fastest recorded in any country since 1990. Major improvements in coverage occurred across all interventions, except oral rehydration therapy for diarrhea. The coverage gap, by wealth quintile, shows that the dramatic improvements were reflected in all wealth quintiles including the poorest, with the exception of those who are better off where progress was limited (see Figure 8.14). Cambodia's pattern of wealth inequity changed from top (those who are better off have a disproportionate advantage) to linear.[24]

Peru, with a DHS in 1996, 2000, and 2004, is a good example of a long-term, steady decline in the coverage gap caused by improvements in the coverage of all MCH interventions. The rate of decline in the coverage gap is just over 1 percentage point per year; by 2004, the coverage gap was below 20% (see Figure 8.14). There is no evidence of any negative effect on MCH intervention coverage of scaling up interventions against HIV/AIDS, but there are no data beyond 2004. Furthermore, HIV/AIDS is only 1% of the total health expenditure. Given the relatively small gap, a slowdown of the decline is probable, as has been observed in other countries.

Based on the available evidence, the coverage for key MCH interventions continues to improve at a steady pace in most countries; there is no clear evidence of a slowdown since 2004 that could conceivably be attributed to a diversion of resources to the three diseases. Comparing the level of scale up of the response to HIV/AIDS and the proportional shifts in the health resources toward HIV/AIDS with trends in coverage of MCH interventions, there does not appear to be a strong association. Rwanda is a notable case where HIV/AIDS has taken a large share of the national health budget, but coverage of MCH interventions improved rapidly during 2005-2007.

[24] Countdown 2008 Equity Analysis Group. 2008. Mind the gap: Equity and trends in coverage of maternal, newborn, and child health services in 54 Countdown countries. Lancet 371: 1259-1267.

EQUITY

Equitable distribution of services is an important goal of health services. There are several dimensions of equity, including urban-rural residence, sex, household wealth, and education. The DCA analysis has shown the situation within districts, as there are major differences between districts that go well beyond the well-established urban-rural inequities. The specific findings regarding equity for HIV/AIDS, TB, and malaria-related interventions were shown in the respective disease chapters and are summarized in Table 8.14. See Annex 8.1 to reference specific tables related to the summary.

Table 8.14: Equity in Coverage: Summary Results Comparing Coverage Levels for Selected HIV Interventions, Malaria Interventions, and MCH Interventions, by Sociodemographic Characteristics

	Education	Wealth	Residence	Sex
HIV interventions (1)	Strongly positive	Strongly positive	Strongly positive	na
	Women with higher education levels fare better than those with lower levels, in all countries.	Women from richer households fare better than those from poorer households, in all countries.	Women from urban areas fare better than those from rural areas, in all countries.	
Malaria interventions (2)	Mostly positive	Somewhat positive	Mostly positive	Weakly positive
	Education has a strongly positive association particularly in Burkina Faso (all indicators); the association is less strong in Haiti and negative for some indicators in Zambia.	Wealth has a positive association for seeking treatment for children or intermittent preventive treatment for pregnant women, but no association for sleeping under an insecticide-treated net (ITN) for children or pregnant women.	Urban residence has a positive effect on seeking advice and treatment (all countries), children sleeping under an ITN, and pregnant women taking prophylaxis (Burkina Faso and Zambia), but no association with pregnant women sleeping under ITN.	Boys are slightly favored for advice and treatment (all countries) and for sleeping under an ITN (Burkina Faso and Zambia).
MCH interventions (3)	Strongly positive	Mostly positive	Strongly positive	Mixed
	Women with higher education are more likely to have a delivery assisted by a professional and to seek care and treatment for a child, in all countries	Wealth is indicative of higher MCH coverage for delivery assistance (all countries) and for seeking care and treatment for a child, except in Zambia.	Urban residence is strongly associated with all MCH indicators, except for Zambia, where it is only positive for delivery assistance but not for seeking care and treatment for a child.	Boys have the advantage in advice and treatment seeking for ARI symptoms across all countries; for other indicators there is no clear advantage either for girls or boys.

(1) HIV intervention indicators include percentage of women with comprehensive knowledge of AIDS; percentage of women who received results from the last HIV test taken in the past 12 months; percentage of women who gave birth in the last two years who were counseled, were offered and accepted an HIV test, and who received results; and percentage of women age 15-24 who have been tested for HIV and received results in the past 12 months (see Annex 8.1, Tables 8.1.a-8.1.d).

(2) Malaria intervention indicators include the percentage of children who slept under an ITN last night; among children under age five with fever, the percentage for whom advice or treatment was sought from a health facility or provider; percentage of pregnant women age 15-49 who slept under an ITN last night; and percentage of pregnant women who took 2+ doses of SP/Fansidar (see Annex 8.1, Tables 8.1.e-8.1.h). Unlike Burkina Faso and Zambia, where almost the entire country is malaria endemic, mostly only the western border of Ethiopia is malaria endemic. Since only a small share of data collection occurred in the malaria endemic regions of Ethiopia (see Annex 8.1), results for this country are not compared with results for the others.

(3) MCH intervention indicators include the percentage of births delivered by a skilled provider; percentage of children age 12-23 months who received DPT3; among children under age five with symptoms of ARI, the percentage for whom advice or treatment was sought from a health facility or provider; and among children under age five with diarrhea, the percentage for whom advice or treatment was sought from a health facility or provider (see Annex 8.1, Tables 8.1.i-8.1.l).

A key question for the health systems related evaluation is whether the scale up against the three diseases has affected inequity patterns for other diseases or the health services. It can be hypothesized that because of the emphasis on specific programs other services suffer, and that disadvantaged groups suffer more than those who are more advantaged. The lack of evidence of negative effects on HIV coverage trends suggest that this is not occurring. However, it may be that the overall coverage figures mask a widening gap between the poorest and those who are better off. This was examined using the MCH coverage data by education and wealth quintiles from the DCA Household Surveys and other recent surveys in Burkina Faso, Haiti, Rwanda, and Zambia. There is no evidence of widening gaps.

8.5 Conclusions

- The Global Fund, PEPFAR, and other donors have caused significant increases and shifts in health funding, which are more pronounced in high-burden countries. Overall, health budgets have grown considerably, especially for HIV/AIDS, which is taking a much greater share of the overall budget than a few years ago. There is no evidence that this increase has been achieved at the expense of resources for other interventions. For instance, in most countries, resources for child health and for maternal and neonatal health have grown during 2003-2006, although not at the pace of HIV/AIDS resources in most countries.
- As discussed in Chapter 3, the scaling up has had some positive effects on health information systems, which are now receiving more attention than before. There are improvements, such as disease-specific Household and Facility Surveys, surveillance, and improvements in clinical reporting for some interventions, but much remains to be done, especially in a way that it strengthens health information systems and provides sustainable solutions. None of the major global efforts have done enough to facilitate this process.
- Health system changes may be good markers of the impact of the Global Fund, which should go beyond the three diseases. Supporting the development of a sound country information system that includes the building blocks of health systems and forms the basis for regular reviews of health system performance, including at the subnational level, should be systematically included in Global Fund grants as part of monitoring and evaluation.
- Assessment of the effects of the scale up on health workers will require prospective studies. The DCA shows the low density of health workers in districts, which remains a challenge, with an expanding quantity and intensity of interventions. Health workers' presence at work was satisfactory for the most part, with the exception of doctors in half of the five countries with data.
- Accelerated implementation of AIDS, TB, and malaria interventions is reflected in greater training intensity and availability of guidelines than it is for MCH and other programs, although the differences tend to be modest in most instances.
- Drug availability in health facilities is still inadequate in many districts. Drugs for chronic noncommunicable diseases are especially in poor supply, but many other basic essential drugs are not available in many facilities. It is not possible to say whether these drug stockouts are a consequence of scaling up the response against the three diseases, especially HIV/AIDS, although this is not likely. On the other hand, there is no evidence that the investments in HIV have strengthened the supply systems.

- Basic laboratory tests, infection control amenities, basic diagnostic aids, and infrastructure are still poor in many health facilities in all the DCA countries. In some cases the scale up may have further distorted the situation. For instance, in five countries with district assessments, an HIV test is now more commonly available than a hemoglobin test. However, the data show that large basic gaps exist and need to be addressed to provide basic quality services. Addressing those gaps may contribute significantly to the scope for increasing coverage of interventions—both for AIDS, TB, and malaria and for other conditions.
- The scaling up of HIV services has primarily occurred in districts with stronger health systems and higher levels of socioeconomic development. It is therefore likely that health system constraints will become increasingly important as services are rolled out to weaker districts.
- There is evidence of inequities in implementation of AIDS, TB, and malaria interventions, with the inequities particularly marked for rural compared with urban areas. Inequities are also apparent by socioeconomic status, but they were not any different from what is already observed for other interventions such as those for MCH.
- Trends in coverage of MCH interventions show little evidence of a negative change in trends, comparing data for 1995-2003 with data for 2004 and later. The most encouraging example is Rwanda, where HIV takes as much as 40% of the national health budget, but MCH intervention coverage has improved at an unprecedented rate between 2005 and 2007. Other positive examples are Burkina Faso, Cambodia, Malawi, and Zambia.
- The demand for impact data about such issues as child mortality has not been matched by investments in data sources, which would allow an assessment. It is therefore not possible to say whether the scale up against the three diseases has had an impact on mortality and whether it affects the burden caused by other diseases.

CHAPTER 8 ANNEX

ANNEX 8.1: EQUITY TABLES FOR HIV INTERVENTIONS, MALARIA INTERVENTIONS, AND MCH INTERVENTIONS

Table 8.1.a: Percentage of Women 15-49 with a Comprehensive Knowledge of AIDS, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women	9,133	7,457	6,024	na
Education				
No education	7.9	4.6	19.1	
Primary	24.1	13.6	24.3	
Secondary+	55.5	25.6	38.9	
Wealth index				
Lowest	5.3	3.8	18.5	
Second	10.4	5.3	22.1	
Middle	35.6	10.8	22.9	
Fourth	.	17.5	28.1	
Highest	.	21.9	36.1	
Residence				
Urban	28.4	17.7	33.3	
Rural	6.8	6.6	24.0	
Total	15.5	12.5	28.5	

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.b: Percentage of Women 15-49 who Received Results from Last HIV Test Taken in the Past 12 Months, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women	9,133	7,457	6,024	4,815
Education				
No education	3.6	7	8.1	21.8
Primary	14.3	15.1	14.3	27.4
Secondary+	25.1	27.5	24.5	32.6
Wealth index				
Lowest	2.3	4.2	6.2	26.7
Second	4.8	7.3	11.1	31.3
Middle	17.8	12.1	12.8	28.1
Fourth	.	22.1	20.0	31.9
Highest	.	23.8	20.1	26.9
Residence				
Urban	14.7	21.1	21.7	28.3
Rural	2.6	7.0	12.1	30.1
Total	7.5	14.4	16.7	29.4

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.c: Percentage of Women 15-49 who Gave Birth in the Last Two Years who Were Counseled, Were Offered and Accepted an HIV Test, and who Received Results, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women who gave birth in the last two years	3,117	1,450	1,678	1,599
Education				
No education	7.3	4.3	10.8	24.9
Primary	21.2	8.8	20.7	30.0
Secondary+	38.3	19.4	35.9	44.6
Wealth index				
Lowest	2.4	1.2	7.7	28.5
Second	7.5	2.6	16.9	33.4
Middle	35.9	5.3	16.7	30.6
Fourth	.	16.7	27.3	35.1
Highest	.	23.9	32.4	49.3
Residence				
Urban	27.4	16.8	28.3	32.3
Rural	3.4	2.0	18.4	36.2
Total	10.5	7.7	22.1	34.6

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.d: Percentage of Youth 15-24 who Have Been Tested for HIV and Received Results in the Past 12 Months, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of women	2,470	1,043	1,641	1,198
Education				
No education	5.3	8.3	5.9	18.3
Primary	15.1	18.0	17.7	35.7
Secondary+	29.2	37.2	30.4	46.4
Wealth index				
Lowest	3.3	3.6	13.4	37.2
Second	5.7	8.4	15.6	41.3
Middle	25.5	19	17.3	34
Fourth	.	26.9	28.5	42.4
Highest	.	37.7	24.2	37.6
Residence				
Urban	20.7	29.4	25.5	34.7
Rural	3.6	8.1	19.3	41.4
Total	10.5	17.8	22.6	38.7

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.e: Use of Mosquito Nets by Children under Five Years, Percentage who Slept under an ITN Last Night, by Country, 2008

	Burkina Faso	Ethiopia* (Low Malaria Endemicity in DCA Areas)	Haiti	Zambia
Number of children	7,463	4,375	3,815	3,934
Sex				
Male	3.6	2.9	1.9	39.3
Female	3.4	2.7	1.8	38.6
Mother's education				
No education	2.8	3.0	1.2	42.4
Primary	6.5	2.2	1.4	37.7
Secondary+	9.8	1.9	4.1	45.8
Missing	3.1	3.2	0.3	24.0
Wealth index				
Lowest	.	2.7	0.7	34.3
Second	.	3.7	1.2	29.6
Middle	1.8	2.5	1.6	41.7
Fourth	2.6	3.2	3.0	43.0
Highest	9.6	1.4	1.8	40.8
Missing		3.3		
Residence				
Urban	6.1	2.4	1.9	42.4
Rural	2.4	3.1	1.8	36.3
Total	3.5	2.8	1.8	39.0

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.f: Among Children under Age Five with Fever, the Percentage for whom Advice or Treatment Was Sought from a Health Facility or Provider, by Country, 2008

	Burkina Faso	Ethiopia* (Low Malaria Endemicity in DCA Areas)	Haiti	Zambia
Number of children	1,031	532	948	944
Sex				
Male	49.3	35.6	39.1	66.1
Female	45.9	35.2	40.5	64.7
Mother's education				
No education	44.7	29.9	25.0	71.2
Primary	61.4	38.2	42.1	65.5
Secondary+	67.3	53.8	51.4	62.7
Missing		53.3		
Wealth index				
Lowest	.	22.8	28.2	62.1
Second	.	24.6	35.8	70.9
Middle	38.5	37.7	26.7	61.9
Fourth	54.0	52.0	45.4	66.0
Highest	59.8	53.7	61.1	68.3
Missing		40.0		
Residence				
Urban	56.1	48.9	51.7	68.8
Rural	44.3	25.1	33.6	62.7
Total	47.8	35.3	39.8	65.4

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.g: Percentage of Pregnant Women Age 15-49 who Slept under an ITN Last Night, by Country, 2008

	Burkina Faso	Ethiopia* (Low Malaria Endemicity in DCA Areas)	Haiti	Zambia
Number of women	1,108	584	473	440
Mother's education				
No education	2.9	8.5	1.6	46.5
Primary	5.5	7.0	0.1	42.3
Secondary+	12.6	3.8	3.1	39.7
Missing		4.5		
Wealth index				
Lowest	.	5.9	0.0	51.3
Second	.	9.0	0.8	36.0
Middle	2.5	7.6	1.5	44.7
Fourth	2.5	4.7	2.1	43.6
Highest	9.5	8.6	0.6	30.8
Missing		14.3		
Residence				
Urban	5.8	4.1	0.3	44.5
Rural	2.8	9.0	1.8	39.2
Total	3.8	7.4	1.3	41.5

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.h: Percentage of Pregnant Women Age 15-49 who Took 2+ Doses of SP/Fansidar, by Country, 2008

	Burkina Faso	Ethiopia* (Low Malaria Endemicity in DCA Areas)	Haiti	Zambia
Number of women	3,116	1,443	1,678	1,599
Education				
No education	8.3	0.2	1.7	61.8
Primary	13.2	0.5	2.4	56.5
Secondary+	16.6	0.0	4.5	61.9
Missing		2.4		
Wealth index				
Lowest	.	0.3	0.9	48.1
Second	.	0.0	1.5	56.8
Middle	7.2	0.9	4.3	56.6
Fourth	9.4	0.4	2.6	66.7
Highest	14.2	0.0	2.9	58.6
Missing		0.0		
Residence				
Urban	11.9	0.5	2.3	66.0
Rural	8.2	0.2	3.0	54.0
Total	9.3	0.3	2.8	59.0

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.i: Percentage of Births in the Last Five Years Delivered by a Skilled Provider, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of births	7,403	3,830	3,923	3,834
Education				
No education	51.9	11.1	9.5	46.4
Primary	77.0	25.0	22.1	49.0
Secondary+	92.9	65.5	56.7	71.4
Missing		20.4		
Wealth index				
Lowest	.	7.3	4.9	32.3
Second	.	7.3	10.2	47.9
Middle	39.5	13.4	16.5	46.0
Fourth	61.8	40.9	27.3	71.7
Highest	88.8	73.7	60.0	75.2
Missing		20.0		
Residence				
Urban	77.5	44.1	46.0	45.2
Rural	47.7	7.9	15.0	64.7
Total	56.7	21.1	26.5	56.6

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.j: Percentage of Children Age 12-23 Months who Received DPT3, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of children	1,474	713	707	720
Sex				
Male	77.9	30.6	58.9	27.4
Female	80.7	33.5	57.9	25.0
Education				
No education	78.1	27.6	50.2	23.9
Primary	81.4	34.4	53.4	26.0
Secondary+	92.9	51.9	78.2	27.4
Wealth index				
Lowest	.	16.8	41.7	24.4
Second	.	30.1	55.6	23.0
Middle	72.0	36.9	51.3	36.1
Fourth	83.3	34.5	65.0	22.6
Highest	87.8	56.2	68.1	21.9
Residence				
Urban	83.4	39.5	65.1	25.3
Rural	77.5	27.8	54.3	26.9
Total	79.3	32.0	58.4	26.2

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.k: Among Children under Age Five with Symptoms of ARI, the Percentage for whom Advice or Treatment Was Sought from a Health Facility or Provider, by Country, 2008

	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of children	171	115	484	228
Sex				
Male	55.4	40.3	40.4	77.8
Female	32.6	29.2	36.3	57.5
Education				
No education	44.1	34.7	26.3	46.0
Primary	46.2	34.4	39.4	77.3
Secondary+	81.6	37.5	46.3	66.8
Missing		66.7		
Wealth index				
Lowest	.	26.9	25.8	59.2
Second	.	25.0	30.4	76.5
Middle	40.8	39.3	31.3	71.7
Fourth	43.3	57.9	38.5	71.6
Highest	72.4	60.0	56.9	69.8
Residence				
Urban	57.6	44.2	47.7	74.0
Rural	43.3	30.6	30.4	68.6
Total	46.7	35.7	38.2	70.5

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

Table 8.1.l: Among Children under Age Five with Diarrhea, the Percentage for whom Advice or Treatment Was Sought from a Health Facility or Provider, by Country, 2008

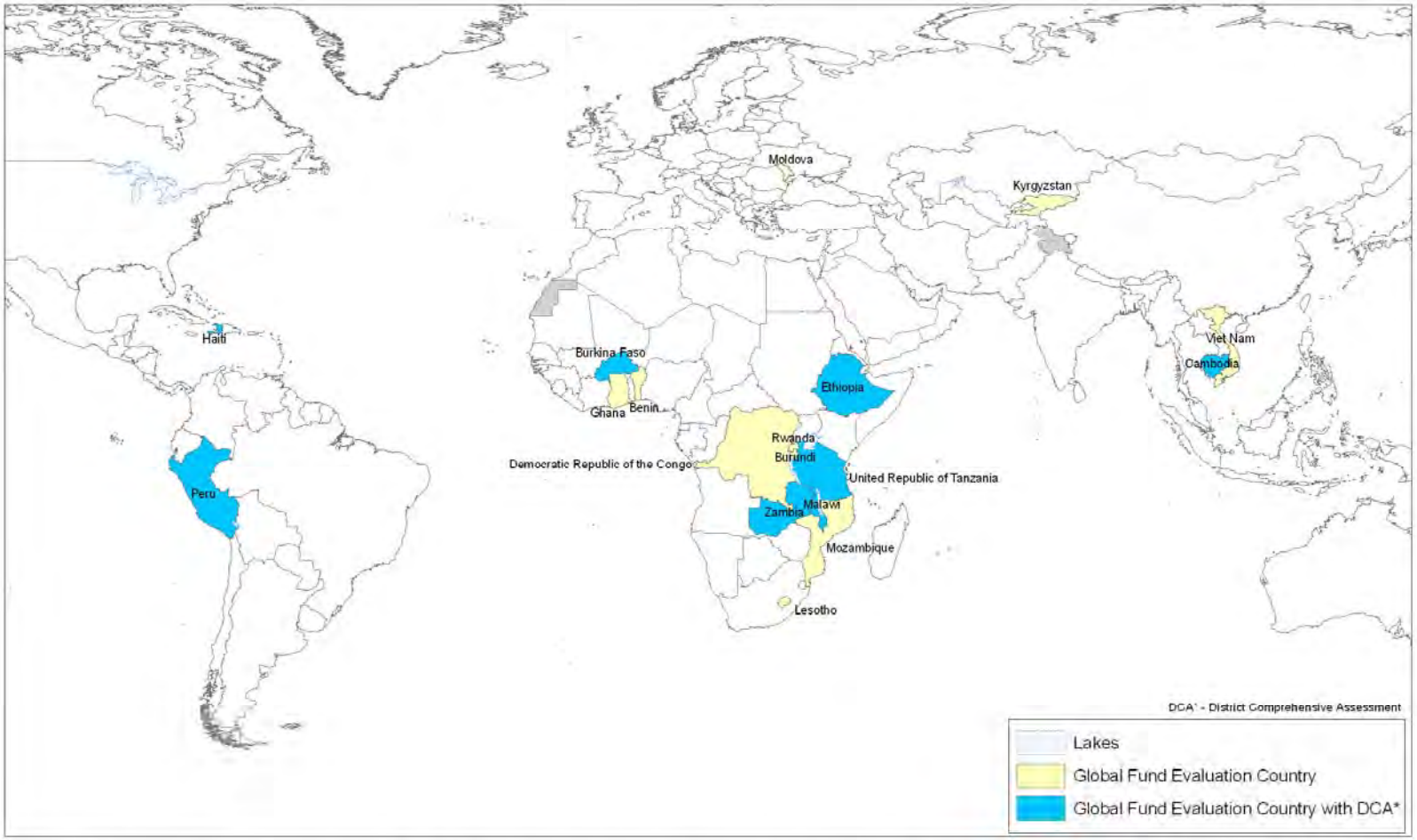
	Burkina Faso	Ethiopia*	Haiti	Zambia
Number of children with diarrhea	975	359	919	750
Sex				
Male	50.8	46.5	43.4	52.5
Female	45.2	43.5	45.9	66.8
Education				
No education	46.6	38.8	29.7	59.7
Primary	57.1	48.6	45.9	59.4
Secondary+	54.6	65.8	59.0	58.2
Wealth index				
Lowest	.	31.6	38.8	60.9
Second	.	36.6	34.5	59.3
Middle	43.1	53.7	40.1	58.1
Fourth	51.6	63.0	51.3	64.3
Highest	54.0	62.5	57.2	43.5
Residence				
Urban	51.0	58.9	55.4	70.0
Rural	47.0	36.2	38.9	52.2
Total	48.1	45.1	44.7	59.1

* Unweighted sample of households/women
Source: DCA Household Surveys 2008

ANNEX A
MAPS

LIST OF MAPS

Countries selected for the Global Fund Evaluation Study Area 3



World Health Organization

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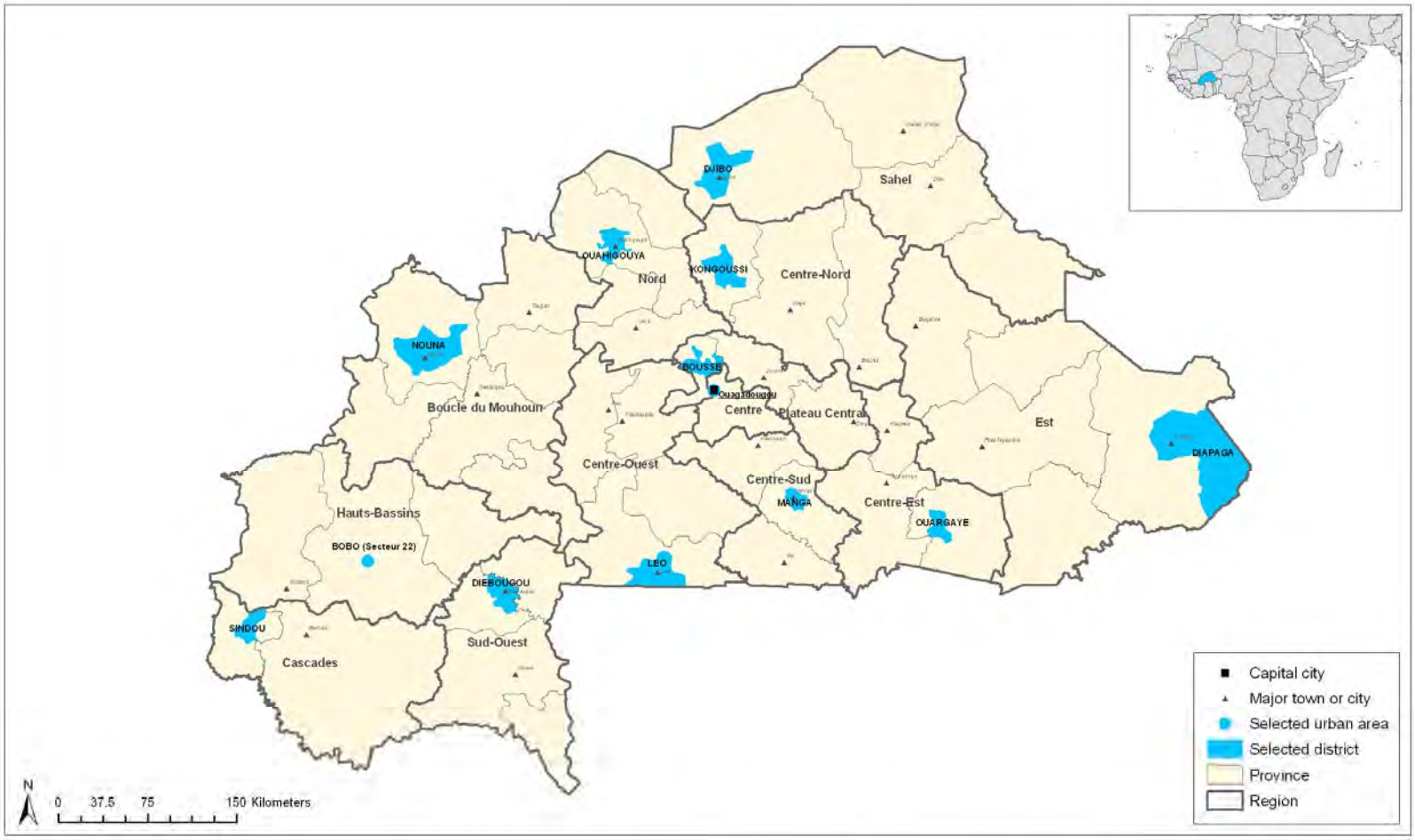
Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

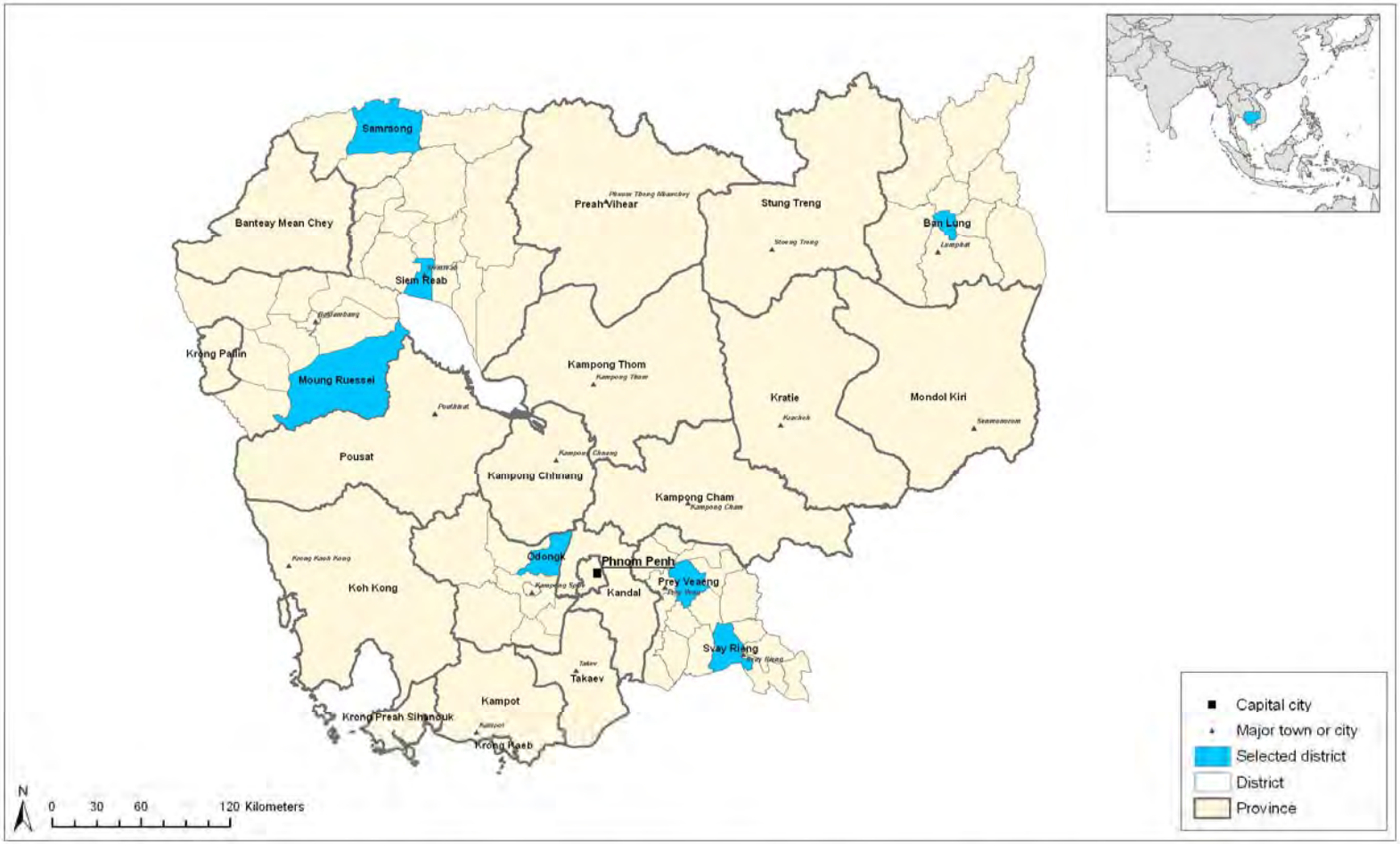
Burkina Faso: Districts or urban areas selected for the District Comprehensive Assessment



World Health Organization

Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

Cambodia: Districts selected for the District Comprehensive Assessment



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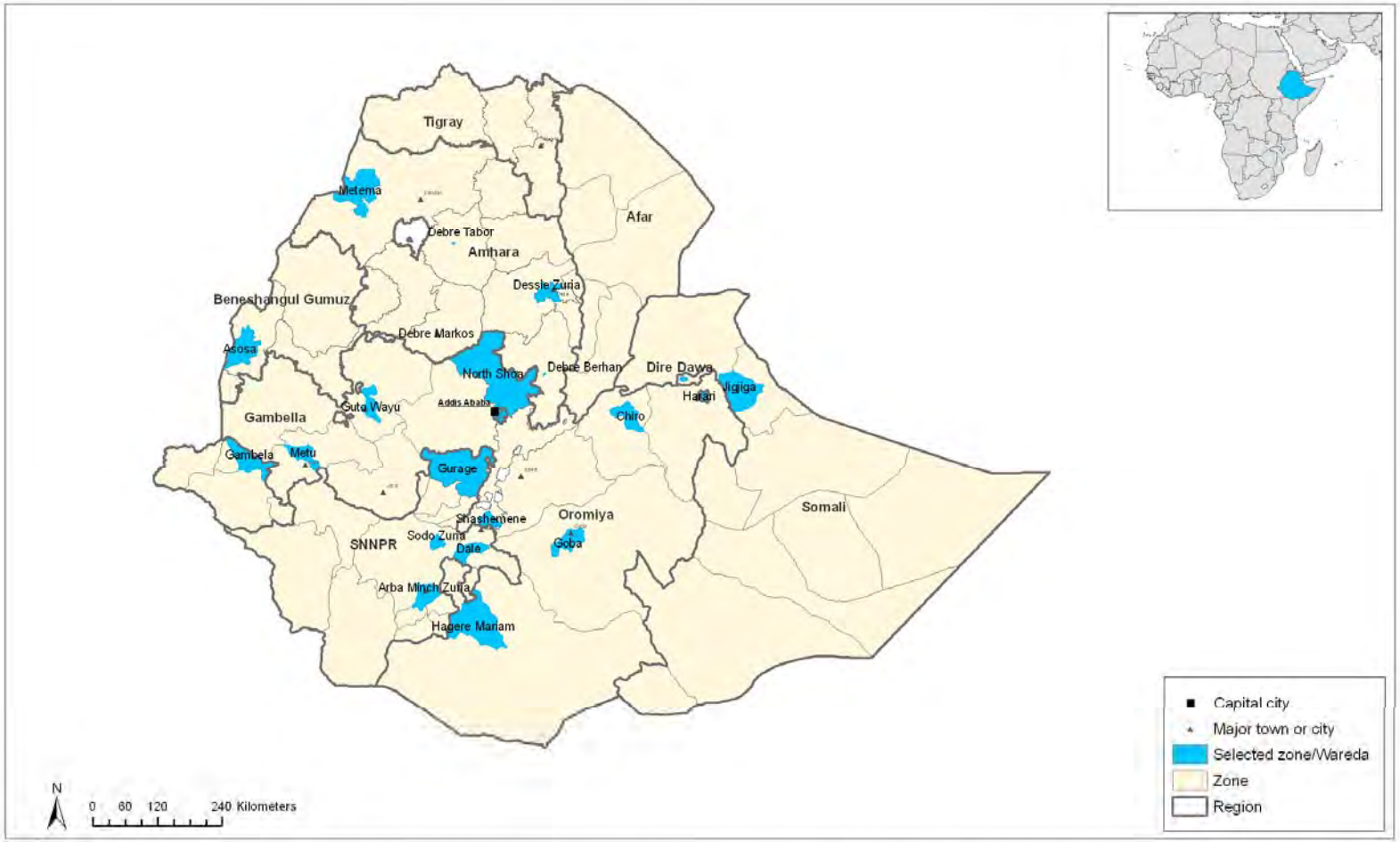
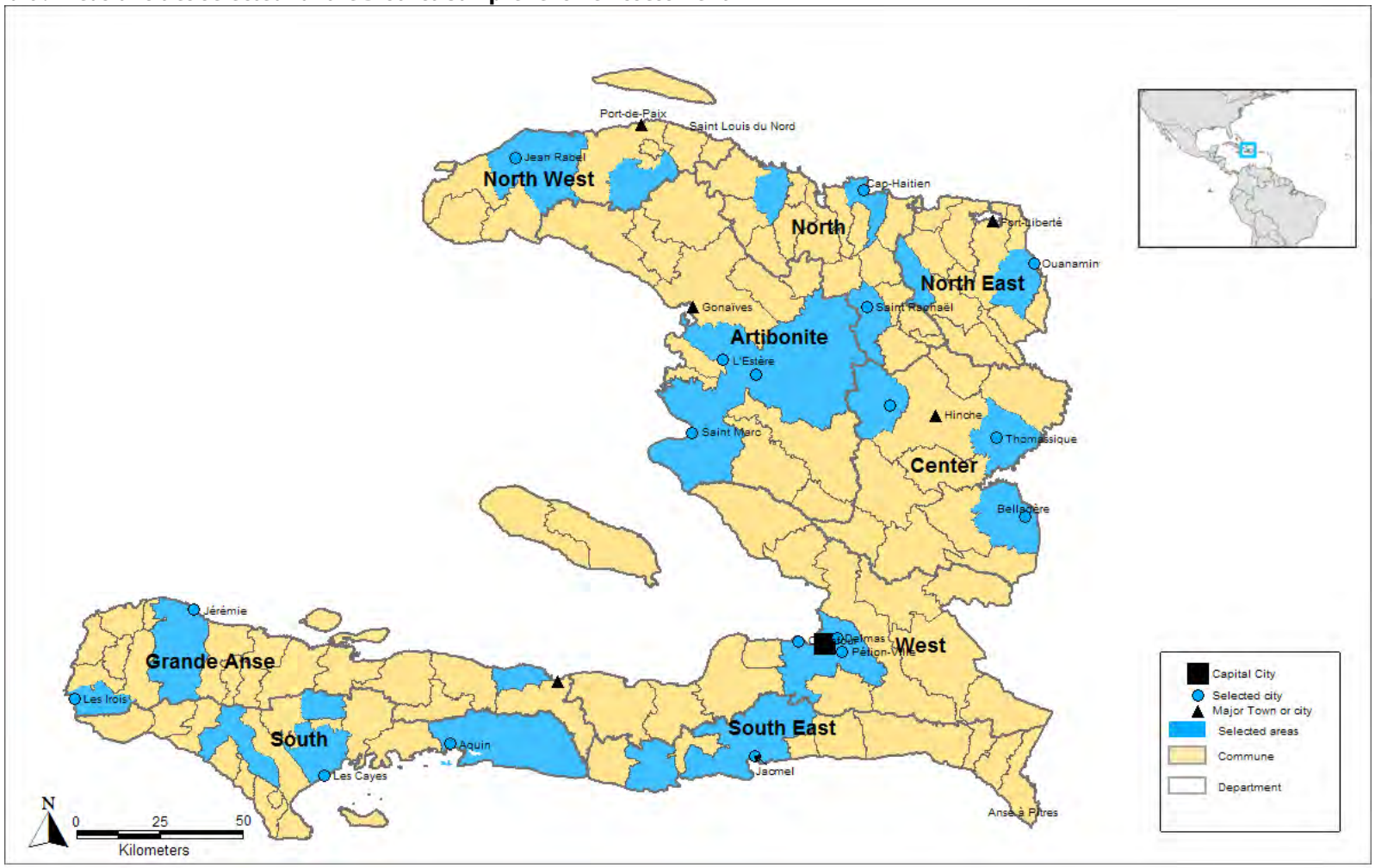
Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

Ethiopia: Zones or woredas selected for the District Comprehensive Assessment



Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

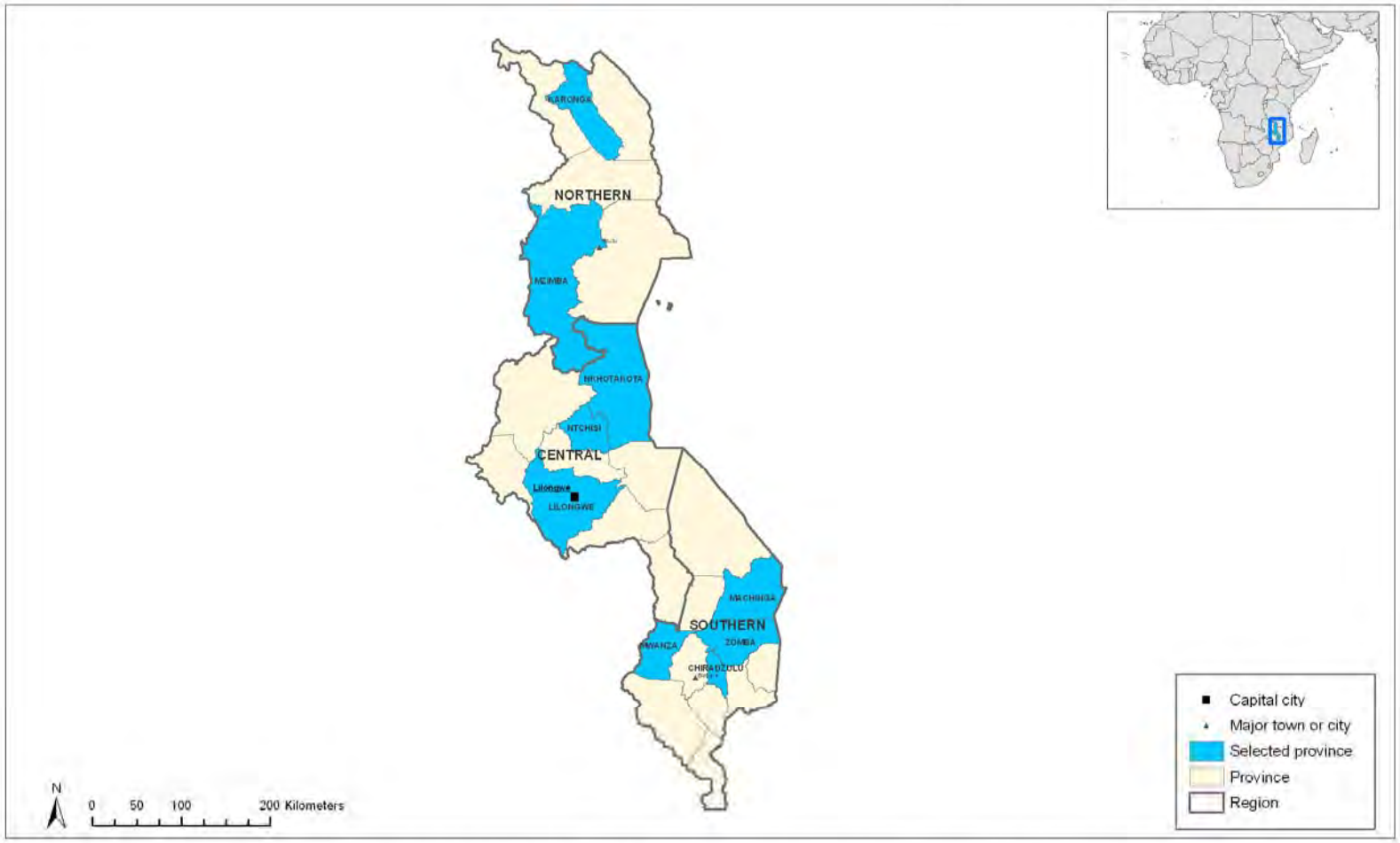
Haiti: Areas or cities selected for the District Comprehensive Assessment



World Health Organization

Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

Malawi: Provinces selected for the District Comprehensive Assessment



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Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

Peru: Provinces or regions selected for the District Comprehensive Assessment

World Health Organization

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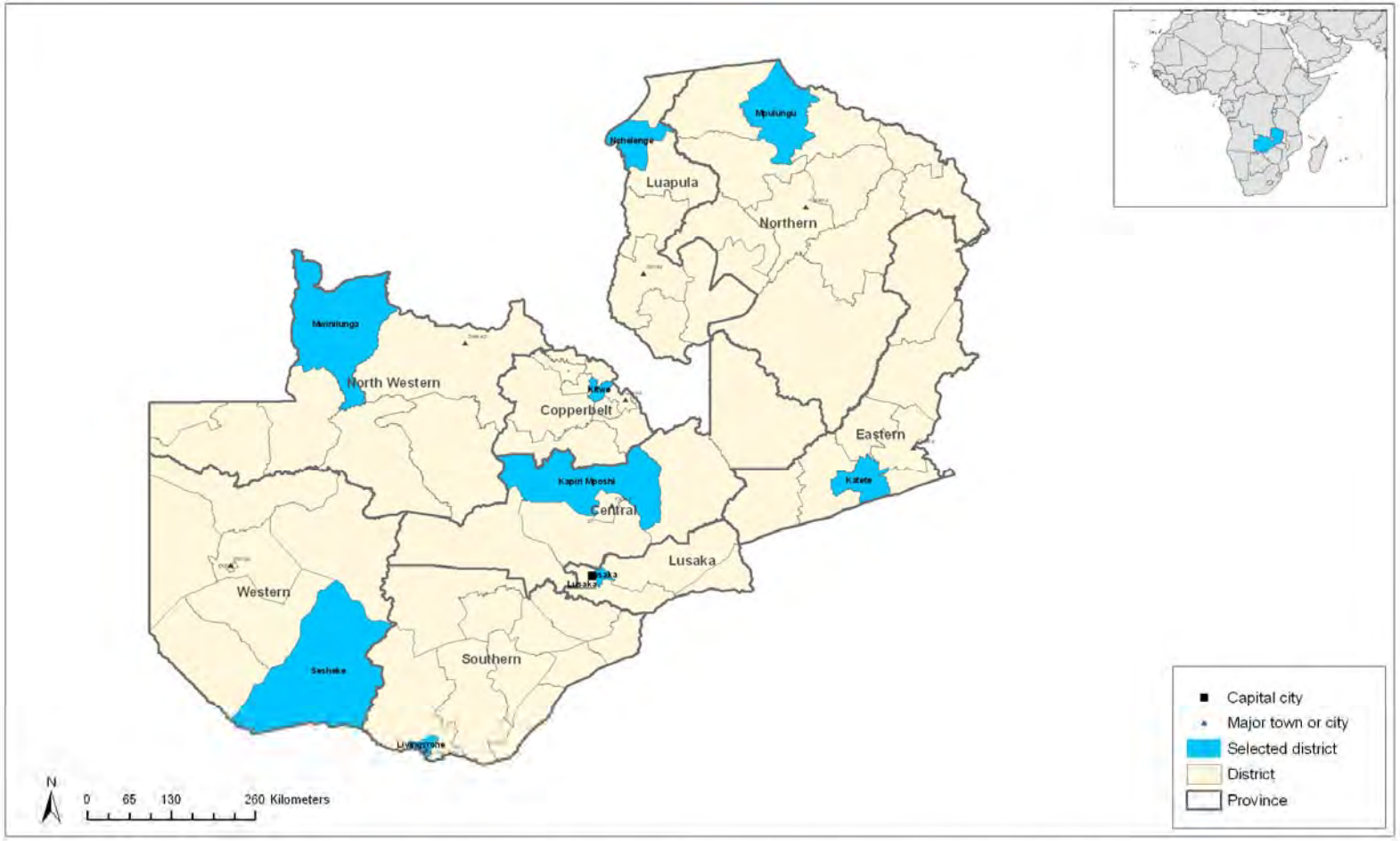
Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

Zambia: Districts selected for the District Comprehensive Assessment



World Health Organization

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Data Source: WHO/Global Fund
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

ANNEX B
DCA DATA COLLECTION METHODS

ANNEX B: DISTRICT COMPREHENSIVE ASSESSMENT (DCA) DATA COLLECTION METHODS

CONTENT OF THE HOUSEHOLD, INDIVIDUAL AND FACILITY SURVEYS

Both the individual and the facility questionnaires were primarily designed to collect data on HIV/AIDS, tuberculosis (TB), malaria, and some information on maternal and child health (MCH) indicators in order to permit comparison of progress in the three diseases with progress in MCH and to address potential systems effects. Typically, all major HIV/AIDS, malaria, and TB indicators were covered in the individual questionnaires.

The household questionnaire provides information on the following main topics:

- List of household members
- Survivorship/orphanhood
- Household possessions (wealth index)
- Spraying against mosquitoes
- Use of bednets
- Health expenditures on HIV, TB, and malaria
- Deaths in the past 24 months

The Individual questionnaire for women age 15-49 covers the following main areas:

- Background characteristics
- Birth history
- Antenatal/delivery care
- Immunization and diarrhea
- Fever and malaria
- Tuberculosis
- Marriage and sexual activity
- HIV/AIDS

The facility surveys collected information on equipment, supplies and drugs, services, and staffing relevant to the three diseases and MCH. The facility questionnaire covers the following main areas:

- Services available at the facility
- Availability of specific equipment
- Infection control
- Workforce
- Training/guidelines
- Availability of drugs and commodities
- Laboratory services
- Special section for services, drugs, etc., available at pharmacies

SAMPLING

In the countries where additional data collection activities were carried out, these activities were carried out in 7-15 districts only. The sampling of districts was purposive, not random. In all countries, the primary goal for the Country Impact Evaluation Task Forces was to obtain regional representation. The number of districts varied in each country, but in general, an attempt was made to include each major region in order to achieve a somewhat representative national-level sample. In addition, an attempt was made to classify districts on the basis of objective and subjective measures of scale-up intensity. As it turned out, there was not sufficient information available at the national level to make a selection based on scale-up intensity that was uniformly accepted. In the selected districts, household and facility surveys were carried out to permit the linking of services to coverage and the level of scale-up intensity.

Typically, within each district, households were randomly selected in 20-25 clusters (20-30 households per cluster) and were thus representative of the district. In general, the household size by district was expected to be around 500 households, but it varied by country. The overall sample of households may be representative of the country, as well, as long as the selected districts represent all the major areas in the country. However, potential bias may exist because of the purposive selection of a relatively small number of districts.

Sampling procedures differed from country to country, due to the variable number of districts selected and the level of national representation. Ethiopia followed its own sampling scheme, starting with the selection of hospitals and then selecting households and facilities around those hospitals, a catchment area approach. Detailed description of the household and individual samples can be found in the individual country reports. The results however indicate that the characteristics of households and respondents in the district surveys are comparable to those obtained in other recent national surveys. For the facility surveys, the basic premise was to enumerate all facilities in each selected district and to undertake a full census of all facilities (public and private), including pharmacies.

TRAINING

Training of interviewers and supervisors for the household and facility surveys was conducted in each country by the implementing organization. A supervisor's manual and an interviewer's manual were provided for the household survey, and an interviewer's manual for the facility survey. Training, including field practice, for the household and individual women surveys typically took about two weeks, and for the facility survey, one week.

Training typically covered topics such as—

- Proper interviewing techniques
- How to locate sampled households, individuals and facilities
- How to obtain the respondents' collaboration
- How to record responses
- Review and practice of the individual questions
- Field logistics and relationship between supervisors and interviewers
- Safeguarding the confidentiality of the information collected

- Data quality control.

Data Quality Assurance

Data quality criteria for the additional data collection activities revolved mainly around design of the survey instruments, training and supervision, and data editing. As most of the indicators in the DCA have been widely used, the questions to generate these indicators were taken from existing instruments that have a tried and proven record of performance. This enhances the degree of confidence in the resulting data. In addition, response rates turned out to be very high. The response rate to the household survey was 98.5% or above. For the woman's survey it was 89.2% in Ethiopia, and above 95% everywhere else. The response rate to the facility survey was more than 97% in all countries.

A survey is a confidential undertaking that requires safeguards for the privacy of the respondents and the confidentiality of the data. Training and supervision of the data collection staff are the main means through which data quality can be ensured. In addition, during the processing of the data, internal consistency and range checks were performed, and data were adjusted where necessary—although no imputation of missing information was undertaken.

Data collection was carried out using small teams of interviewers, each with its own supervisor, thus further enhancing data quality. During the analysis stage, data quality issues could come to light, which cannot be identified through the simple review of individual interviews.

Data Processing

SERPRO S.A., a data processing firm in Chile, was contracted by Macro to develop data entry programs for the household and facility surveys using CSPro. All countries received technical assistance from SERPRO for the installation of the data entry programs and data entry training. SERPRO cleaned the data and developed programs to produce standard tables as well as standard recode files which will facilitate greatly the archiving and the later use of the data generated during this exercise.

All the data processing programs will be archived; they should serve as a basis for future programs in order to maintain a high degree of comparability between two data collection activities and to facilitate the measurement of impact or change.

IMPLEMENTATION IN COUNTRIES

In addition to the household, individual, and facility surveys, several other activities were included in the DCA. These comprise national health accounts, district record reviews, and follow-up studies for HIV and TB. Not all activities were conducted in each country. Table Annex B.1 provides a listing of the specific activities for each country.

Table Annex B.1: Detail of Country District Comprehensive Assessment Activities

Data Collection		Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Peru	Tanzania	Zambia
1	District Household Survey	X		X	X	X		X	X
2	District Individual Woman Survey	X		X	X	X		X	X
3	District Facility Census	X	X	X	X	X	X	X	X
4	District Survey ; Community-Based Organizations	X	X		X	X	X	X	X
5	District Medical Officer Financial Survey	X			X	X			
6	Follow-up Study of ART Users	X			X	X	X	X	X
7	Follow-up Study of TB Patients	X	X		X	X	X	X	X
8	District Hospital Record Review	X			X	X		X	X
9	District Facility Record Review HIV/AIDS	X	X		X	X		X	X
10	District Facility Record Review TB	X	X		X	X		X	X
11	National Health Accounts	X			X	X		X	X

In general, the data gathering and collection process was fairly smooth, but there were a number of exceptions. While the household, individual and facility surveys could be carried out with relative ease in most countries, this was not the case with some of the other new data collection efforts.

The District Medical Officer Financial Survey was not completed in any country, due to the lack of adequate information at the intended source and the complexity of the information requested. It was just impossible to gather this information at the district facility level.

One important lesson from this is that—if ever there is further need to collect financial and other information at the facility level—systems to record the available information in a format that is conducive to respond to such data collection efforts should be put into place first. The system should be uniform across facilities and regions and in tune with what needs to be reported at the national level.

The follow-up studies of ART users and TB patients also proved to be challenging, as they constituted activities that needed specialized personnel and staff to carry them out successfully.

The district facility record review, conceived as a means to compile an up-to-date list of events at the source to be compared with centrally reported district data, was not successful. The many data gaps at the level of individual facilities made it impossible to use these data for validation of the routine data collected at the national level.

It should be noted that data collection for the household, individual, and facility surveys in Burkina Faso was done using mobile handheld electronic devices. Answers were entered directly in a PDA

(personal digital assistant) by the interviewer and were automatically checked for range and consistency by the system during the interview. The system generates largely clean data at the end of the interview period, as the majority of inconsistencies or range errors need to be addressed during the interview. A similar system is being followed in Tanzania. For future data collection activities, it will be possible to migrate relatively easily from the "paper" to the "electronic" interview, as all the developmental issues will already have been addressed.

ANNEX C
ADDITIONAL INFORMATION FROM DCA SURVEYS

LIST OF TABLES

Table C1.1: Types of Facilities Surveyed

Number of health facilities surveyed and percent distribution, by level of care; number of other facilities surveyed and percent distribution, by type, by country, 2008

	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Zambia
Health facilities, excluding pharmacies and other facilities						
Number	504	207	158	206	113	283
Percent distribution						
Tertiary care	0.0	1.0	2.5	1.9	0.9	1.1
Secondary care	2.0	49.8	91.8	51.9	94.7	58.7
Primary care	98.0	49.3	5.7	46.1	4.4	40.3
Pharmacies and other facilities						
Number	190	230	1	71	0	99
Percent distribution						
Standalone HIV testing and counseling	3.7	0.0	0.0	4.2	-	26.3
Pharmacies and drugstores	80.0	100.0	100.0	94.4	-	44.4
Other facilities, except standalone HIV testing and counseling	16.0	0.0	0.0	1.0	-	29.0
Total number of facilities	694	437	159	277	113	382

Source: DCA Facility Census or Facility Survey 2008

Table C1.2: Types of Services Provided

Total number of health facilities and stand-alone HIV testing and counseling sites and percentage of health facilities providing specific HIV services, TB services, and malaria services; percentage of services that are urban and publicly administered, by country, 2008

Type of services	Burkina Faso	Cambodia	Ethiopia	Haiti	Malawi	Zambia
Total number of health facilities	504	207	158	206	113	283
Urban facilities (%)	47.0	28.5	68.4	43.7	9.7	68.2
Public facilities (%)	71.2	60.4	99.4	30.6	70.8	61.5
HIV testing and counselling						
Health facilities providing HIV testing and counseling (%)	27.6	18.8	83.5	44.7	82.3	74.9
Total number of additional standalone HIV testing and counseling sites	7	0	0	3	0	26
Urban HIV testing and counseling (%)	95.2	100.0	100.0	74.7	100.0	89.1
Public HIV testing and counseling (%)	82.9	76.9	99.2	31.6	73.1	56.7
PMTCT						
Health facilities providing HIV-PMTCT services (%)	17.7	7.7	54.4	23.8	67.3	53.0
Urban HIV-PMTCT sites (%)	38.2	56.3	80.2	69.4	11.8	64.0
Public HIV-PMTCT sites (%)	92.1	75.0	93.0	38.8	71.1	74.0
ART						
Health facilities providing HIV-ART services (%)	10.5	6.8	51.3	17.0	64.6	41.3
Urban HIV-ART sites (%)	30.2	57.1	91.4	71.4	12.3	79.5
Public HIV-ART sites (%)	84.9	71.4	100.0	34.3	76.7	53.0
TB						
Health facilities providing TB services (%)	63.5	67.6	98.7	83.5	93.8	75.3
Urban TB sites (%)	25.9	19.3	67.9	46.5	9.4	65.3
Public TB sites (%)	90.0	82.9	99.4	31.4	74.5	65.7
Malaria						
Health facilities providing malaria services (%)	96.6	61.8	95.6	90.8	43.4	91.2
Urban malaria sites (%)	46.2	29.7	68.9	45.5	18.4	66.3
Public malaria sites (%)	73.3	60.2	99.3	28.9	59.2	64.3

Source: DCA Facility Census or Facility Survey 2008

Table C1.3: Characteristics of Households Surveyed

Average number of household members and percent distribution of households, by urban-rural location, by country, 2008

Household Characteristics	Burkina Faso	Ethiopia	Haiti	Zambia
Average number of household members	5.6	4.5	5.2	5.4
Residence				
Urban (%)	39.4	49.8	44.4	60.8
Rural (%)	60.6	50.2	55.6	39.2
Number of households	7,916	8,325	4,451	4,598

Source: DCA Household Survey 2008

Table C1.4: Characteristics of Women Surveyed

Number of women surveyed and percent distribution, by background characteristics, by country, 2008

Background Characteristics	Burkina Faso	Ethiopia	Haiti	Zambia
Age				
15-24	42.0	39.8	42.9	44.5
25-39	42.1	47.2	41.9	43.5
40+	15.9	12.9	15.2	12.1
Residence				
Urban	40	53	48	62
Rural	59.7	47.3	52.0	38.4
Education				
No education	75.1	42.9	20.7	6.9
Primary	12.4	29.0	43.3	47.3
Secondary and above	11.9	24.1	36.0	45.7
Wealth quintile				
Lowest	0.0	18.3	4.3	10.5
Second	0.0	18.5	14.2	11.7
Middle	38.5	18.5	20.6	19.0
Fourth	33.4	18.5	27.3	35.5
Highest	28.1	24.6	33.6	23.4
Number of women	9,133	7,457	6,024	4,815

Source: DCA Household Survey 2008

Table C2.1: Women's HIV-related Knowledge

Percentage of surveyed women age 15-49 who have certain HIV-related knowledge, by background characteristics, by country, 2008

HIV-related knowledge	Burkina Faso	Ethiopia	Haiti	Zambia
Have heard of AIDS	81.3	93.4	99.9	99.5
Have comprehensive knowledge about AIDS	15.5	12.5	28.5	43.5
Comprehensive knowledge about AIDS, by background characteristics				
Age				
15-24	7.4	60	12.7	15.3
25-49	8.1	6.5	15.7	21.9
Residence				
Urban	12.4	29.0	43.3	47.3
Rural	4.1	3.1	12.5	14.7
Education				
No education	5.9	2.0	4.0	1.1
Primary	3.0	3.9	10.5	13.3
Secondary	6.6	6.2	14.0	22.7
Wealth quintile				
Lowest	0.0	0.7	0.8	3.1
Highest	10.0	5.0	12.0	11.0
Number of women	9,133	7,457	6,024	4,815

Source: DCA Household Survey 2008

Table C2.2: Women's HIV-related Risk Behaviors

Percentage of surveyed women age 15-49 with certain HIV-related risk behaviors, by country, 2008

HIV-related risk behaviours	Burkina Faso	Ethiopia	Haiti	Zambia
Number of women who ever had sexual intercourse and new number of partners	7,980	5,163	5,141	4,072
Mean number of sexual partners in lifetime	1.6	1.5	2.0	2.1
Number of women who had sexual intercourse in the past 12 months	6,660	4,208	4,589	3,519
Percentage who had 2+ partners in the past 12 months	2.1	1.3	2.5	1.6
Percentage who had higher-risk intercourse in the past 12 months	10.3	5.3	27.3	19.1
Number of women who had 2+ partners in the past 12 months	143	55	116	55
Percentage of women with 2+ partners who reported using a condom during last sexual intercourse	44.2	34.5	41.5	52.9
Number of women who had higher-risk intercourse in the past 12 months	684	222	1,252	671
Percentage of women who had higher-risk intercourse who reported using a condom during last sexual intercourse	63	46	38	54

Source: DCA Household Survey 2008

Table C2.3: Young Women's HIV-related Risk Behaviors

Percentage of surveyed young women age 15-14 with certain HIV-related risk behaviors, by country, 2008

HIV-related risk behaviors	Burkina Faso	Ethiopia	Haiti	Zambia
Percentage who had sexual intercourse before age 15, by background characteristics	6.0	5.8	17.5	10.3
Residence				
Urban	3.8	3.7	17.4	8.9
Rural	7.9	8.6	17.5	12.7
Education				
No education	7.7	14.3	42.8	6.0
Primary	3.8	4.3	21.6	14.7
Secondary and above	2.3	1.5	10.0	7.2
Wealth quintile				
Lowest	0.0	10.7	31.0	14.5
Highest	2.3	2.0	12.6	6.3
Percentage of women who had sexual intercourse before age 18	56.5	28.0	59.5	49.8
Number of never married women age 15-24	1,523	1,768	1,449	1,247
Percentage of never married women age 15-24 who have never had sexual intercourse	66.0	93.3	53.6	55.3
Percentage of never married women age 15-24 who had sexual intercourse in the past 12 months	30.0	3.6	38.5	27.9
Percentage who used a condom at last sexual intercourse among never married women age 15-24 who have had sexual intercourse in the past 12 months	68.5	45.3	49.0	60.0
Number of women between age 15-24	3,834	2,971	2,584	2,142

Source: DCA Household Survey 2008

Table C2.4: Deaths in Past 24 Months and Extent of Free Support

Percentage of households with deaths in the past 24 months and among households with deaths; percentage that received specific types of external support free of charge, by country, 2008

Support services	Burkina Faso	Ethiopia	Haiti	Zambia
Percentage of household with at least one death in the past 24 months	12.9	6.4	4.9	13.0
Number of households with at least one death in the past 24 months	1,018	531	219	597
Percentage of households receiving support with medical care, supplies, or medicines	36.5	15.1	1.2	24.4
Percentage of households receiving emotional or psychological support	34.2	16.8	14.9	31.4
Percentage of households receiving material support	12.5	11.1	4.8	15.5
Percentage of households receiving social support	2.8	6.4	1.2	6.9
Percentage of households receiving support for schooling	32.4	7.3	1.2	9.7
Percentage of households receiving material, medical, or financial help	10.7	13.2	0.5	10.9
Number of households	7,916	8,325	4,451	4,598

Source: DCA Household Survey 2008

Table C2.5: Children's Living Arrangements and Orphanhood

Percent distribution of de jure children under 18 years of age, by living arrangements and survival status of parents; percentage of children not living with a biological parent; and percentage of children with one or both parents dead, by country, 2008

Children's living arrangements	Burkina Faso	Ethiopia	Haiti	Zambia
Living with both parents	80.8	64.6	53.8	59.2
Living with mother but not with father, with father alive	4.0	6.9	21.8	11.2
Living with mother but not with father, with father dead	2.1	7.7	5.0	6.2
Living with father but not with mother, with mother alive	2.5	1.5	2.6	2.5
Living with father but not with mother, with mother dead	1.5	2.4	1.1	0.6
Not living with either parent, with both parents alive	6.7	5.8	10.8	10.0
Not living with either parent, with only father alive	0.6	1.0	1.4	2.1
Not living with either parent, with only mother alive	1.2	1.6	1.7	3.0
Not living with either parent, with both parents dead	0.6	2.0	1.1	3.9
Percentage with one or both parents dead	6	15	10	16
Number of children	23,223	17,618	11,411	12,865

Source: DCA Household Survey 2008

Table C3.1: Coverage of Maternal Services

Percentage of women age 15-49 who had a live birth in the five years preceding the survey who received antenatal care (ANC) from a skilled provider for the most recent birth, by number of visits; percentage who delivered in a health facility; and percentage whose child was delivered by a skilled provider, by background characteristics, by country, 2008

Maternal services	Burkina Faso	Ethiopia	Haiti	Zambia
Antenatal care from a skilled provider	85.0	47.9	87.7	93.1
Age				
15-24	84.5	49.6	88.1	93.5
25-49	85.3	47.2	87.5	92.9
Residence				
Urban	93.4	67.2	90.6	94.9
Rural	81.1	35.5	85.8	90.5
Education				
No education	83.3	35.0	78.0	87.3
Primary	91.3	60.5	88.4	92.1
Secondary or higher	97.4	80.9	96.1	95.9
Wealth quintile				
Lowest	-	27.5	80.5	89.9
Highest	96.5	82.6	93.7	98.5
Number of ANC visits				
None	0.3	0.0	0.0	0.0
1	97.7	84.6	100.0	84.8
2-3	97.0	86.2	98.4	94.8
4+	95.4	93.3	98.9	95.1
Delivered in a health facility	59.3	22.3	23.4	62.8
Age				
15-24	62.6	24.7	23.7	62.6
25-49	57.6	21.4	23.3	63.0
Residence				
Urban	78.3	46.6	40.7	70.4
Rural	50.3	6.8	11.8	52.2
Education				
No education	54.3	10.7	8.6	43.4
Primary	78.6	26.5	18.2	56.9
Secondary or higher	92.7	65.4	48.0	75.9
Wealth quintile				
Lowest	-	5.5	4.4	39.8
Highest	90.1	73.8	51.1	77.9
Delivery by a skilled provider	58.5	24.4	29.6	58.6
Age				
15-24	61.8	27.5	30.2	59.6
25-49	56.8	23.3	29.3	58.0
Residence				
Urban	79.3	49.0	48.9	66.0
Rural	48.7	8.8	16.6	48.2
Education				
No education	53.3	12.7	10.1	42.4
Primary	78.8	28.6	24.9	52.3
Secondary or higher	93.8	68.4	57.6	71.4
Wealth quintile				
Lowest	-	7.5	4.9	34.2
Highest	89.7	76.5	62.1	75.2
Number of women with live births	5,344	2,754	2,761	2,649

Source: DCA Household Survey 2008

Table C3.2: Coverage of Child Health Services (Vaccination)

Percentage of children age 12-23 months who received no vaccinations; percentage who received all basic vaccinations at any time before the survey; and percentage vaccinated by 12 months of age, by mother's background characteristics, by country, 2008

Child health services	Burkina Faso	Ethiopia	Haiti	Zambia
Percentage of children who received no vaccines	5.0	27.1	9.6	4.4
Sex				
Male	5.4	28.3	9.5	4.2
Female	4.6	25.5	9.6	4.6
Residence				
Urban	2.9	23.4	4.7	4.3
Rural	5.8	29.1	12.5	4.4
Education				
No education	5.1	30.2	13.3	11.7
Primary	5.8	22.2	11.1	4.6
Secondary education or higher	1.8	17.3	2.0	0.4
Wealth quintile				
Lowest	-	42.2	17.9	9.9
Highest	2.0	15.1	5.3	0.9
Percentage of children who received all basic vaccinations	67.7	23.4	42.6	17.2
Sex				
Male	67.9	21.1	42.2	14.3
Female	67.7	26.4	43.0	21.5
Residence				
Urban	71.6	29.7	44.4	16.2
Rural	66.1	19.9	41.6	18.5
Education				
No education	66.1	18.3	43.8	22.0
Primary	75.4	28.0	38.6	17.2
Secondary education or higher	77.2	43.2	50.1	14.8
Wealth quintile				
Lowest	-	9.3	33.1	14.1
Highest	75.5	45.2	50.7	16.7
Percentage of children who received all basic vaccinations by 12 months of age	61.9	16.8	32.7	12.9
Number of children age 12-23 months	1,474	713	707	720

Source: DCA Household Survey 2008

ANNEX D
PERFORMANCE-BASED FUNDING

LIST OF TABLES AND FIGURES

THE GLOBAL FUND'S PERFORMANCE-BASED FUNDING SYSTEM: CASE STUDIES IN HAITI AND TANZANIA

PREFACE

The performance-based funding (PBF) system of the Global Fund was examined in countries participating in Study Area 2 and also at the institutional level of the Global Fund in Study Area 1. In the context of Study Area 3, case studies consisting of desk reviews of selected grants in Haiti and Tanzania offer another perspective of this system.

The approach of the Haiti and Tanzania case studies is slightly different. While the Haiti case study presents results for several selected indicators for HIV, tuberculosis (TB), and malaria grants, the Tanzania case study presents results for an HIV grant in its entirety. Nevertheless, the interpretation and insights gained show many common patterns and challenges that are no doubt applicable to monitoring any grant.

PBF is a laudable undertaking on the part of both the Global Fund and the countries that receive grants. These bold efforts should be applauded; nascent financial and program reporting mechanisms are in place where they were not before. Still, the case studies point out and raise questions about numerous potential weaknesses in the system that should not be overlooked. Some of these weaknesses will be overcome as reporting systems in countries continue to improve. Other weaknesses are inherent, indicative of a reality that is difficult to predict and is sometimes challenging to accurately quantify.

Performance-based monitoring is a valuable management tool, and the spirit as well as other aspects of this system should be retained. At the same time, the Global Fund has now accumulated much experience and can judge, for itself and on behalf of other donors inclined to use this system, the practicality of using the system as the main criteria for disbursing large sums of money.

HAITI PERFORMANCE-BASED FUNDING: A CASE STUDY ON RESULTS OF SELECTED HIV, TB, AND MALARIA INDICATORS

INTRODUCTION

The SA2 review of the partnership program in Haiti, including a large number of interviews with local stakeholders, indicated that the Haiti organizations involved with the Global Fund generally are in favor of PBF.

Some of the issues that were raised most often were the fact that there frequently are no baselines, that disbursements from the principal recipient (PR) are invariably late, and that the Global Fund PBF system is not a true performance-based system because it does not provide incentives for good performance over and above what is agreed to in the grant. There also are problems with how the PR takes into account local constraints facing the sub-recipients (SRs) and the absence of adequate accounting systems in some of the SRs. A lack of quarterly meetings with the PR were often seen as a problem, and some SRs mentioned that certain activities and their targets were imposed on them, which they felt greatly impeded their projects. One SR summed this up by saying: "The real objectives may not be reached."[1] While these comments may well reflect the views of selective individuals, taken together they provide an important inside view of issues related to the PBF system. Monthly reporting is another problem for many SRs, especially those that have projects in remote areas, and much time is devoted to data collection and verification. However, overall, the SRs rate the quality of the data very high, with an average score of 4 out of 5; and the PR regularly performs data verification. In this review of procedures and indicators, PBF will be assessed mostly in terms of its effectiveness and the burden imposed by the system. The review will concentrate on three grants made by the Global Fund, one for HIV/AIDS (Grant HTI-102-G01-H-00), one for malaria (Grant HTI-304-G03-M), and one for TB (Grant HTI-304-G04-T).[2]

A. THE HIV GRANT

The updated grant information on the Global Fund website of October 6, 2008, indicates that the lifetime budget for this grant is $66,905,477 and that the Phase 1 and Phase 2 grants together sum $78,187,783. The grant is considerably larger than the lifetime budget. Also, it is reported that $71,251,917 has already been disbursed, which is also considerably higher than the total lifetime budget. We have no explanations for this difference of the grants with the budget. The latest grant rating was A.

The original grant proposal document, revised in July 2002, was for a total amount of $66,905,477.

1. Grant Performance Monitoring

Monitoring of grant performance was to be established through statistics that each of the participating institutions would provide on a monthly basis to the *Institut Haitien de l'Enfance*

[1] From SA2 team notes.
[2] Information obtained from http://the globalfund.org/programs/.

(IHE), which was charged with the collation of the data from the different partners as well as with data quality control and completeness.

Further important monitoring and evaluation information was to come from three sexual behavior surveys, one after three months and thereafter in years 3 and 5. HIV prevalence surveys were planned for years 1 and 5.

The indicators to be used for grant performance were divided in three groups, related to the following:

- **Reduction of the risk of HIV infection:** In collaboration with subgrantees PSI, Konesans Fanmi, FOSREF, CPFO, VDH and POZ, Cornell GHESKIO, Albert Schweitzer Hospital, PIH, CARE, AOPS, and the Red Cross

- **Reduction of vulnerability (youth):** In collaboration with subgrantees FOSREF, the Ministry of Education, VDH, Congress of Protestant churches in Haiti, and World Relief

- **Comprehensive community-based services, including prevention, mitigation, and treatment**: In collaboration with subgrantees CARE, Albert Schweitzer Hospital, MARCH, and PIH/ZL.

Typically indicators are divided into the following four types:

- Process or input indicators

- Output indicators

- Outcome indicators

- Impact indicators.

These indicators are successively more difficult to measure. The first two can typically be obtained from administrative records of activities and plans of action. Outcome indicators need a defined population in order to assess the effects of the inputs and outputs (e.g., on behavior change such as condom use during risky sex). Impact indicators are the most difficult to measure, and only three are proposed: the HIV prevalence rate, percentage of infected children born from infected mothers, and percent of adults and children surviving a certain time (1, 2, 3, 5 years) after initiation of antiretroviral therapy.

In the original proposal, there were 13 indicators to be used for the reduction of risk assessment; only two of them made it into the indicators formally established for grant performance in this area. All the proposed indicators were to be measured on an annual basis, and all are outcome indicators.

There were six indicators to be used for the reduction of vulnerability in the original proposal, one of which made it into the list of formal annual indicators (condom use at last high-risk sex). However, in the final indicator sexes were combined (the original indicator was proposed by sex).

There were fix indicators for community-based services in the original proposal, two of which made it into the list of formal annual indicators.

The types of indicators proposed in the grant application were all annual outcome indicators. It would be difficult to relate the result of these indicators directly and exclusively to the grant because the population basis for the calculation of the indicators would be impossible to calculate for only people who were subject to the grant activities. Thus, results measured through these indicators will measure the effect of the combined efforts that are being carried out for each activity by different donors and stakeholders, not just for the Global Fund grant.

All the indicators in the proposal were to be tracked on an annual basis. The Grant Performance Report, however, indicates that only a few indicators in the grant proposal document are actually tracked on an annual basis. These include the following:

IMPACT INDICATORS

- Percentage of infants born to HIV-infected mothers who are infected—There were no targets or results for this indicator.

- Percentage of HIV seroprevalence among adults—This indicator was strongly affected by the change in methodology for measuring HIV prevalence, rather than a decline in actual prevalence.

- Percentage of adults and children with HIV still alive 12 months after initiation of antiretroviral therapy (ART) (extend to 2, 3, 5 years as program matures)—No results were available for this variable.

OUTCOME INDICATORS

- Percentage of female sex workers reporting the use of a condom with every client in the last month—For years 4 and 5, targets of respectively 50% and 60% were set, and results of 90% were reported for each of those years.

- Percentage of young people age 15-24 reporting the consistent use of a condom with non-regular sexual partners in the last year—For years 4 and 5, targets of 50% and 60%, respectively, were reported, and results of 31% were reported for each of those years.

- Percentage of men reporting the use of a condom the last time they had anal sex with a male partner in the last six months—A target of 74% was set for year 5, and a result of 72.8% was reported.

- Percentage of people expressing accepting attitudes towards people living with HIV/AIDS (PLWHA), of all people surveyed age 15-49—Targets for years 4 and 5 were 50% and 60%, respectively, and results were reported as 52% for each year.

2. Use of Baselines

For the final grant performance indicators, there are many references to baselines. These often seem arbitrary or appear with no reference year, so it is not clear how they can be used. In fact, there are no reference years for baseline indicators for any of the annual indicators.

Other baseline indicators in the grant performance report pertain to output indicators that need to be reported on a quarterly basis. For most of these baselines, there are notes that they were updated.

For the quarterly reporting of numbers achieved for a certain activity (output indicators), the grant report uses cumulative figures by quarter for phase 1 and phase 2. Therefore, the baseline figures are meaningless for these indicators because it is unlikely that appropriate record keeping was in place to develop a reliable baseline. For instance, the baseline in December 2004 for number of condoms sold is slightly more than 20 million, while the number actually sold in December 2004 is also reported as 20 million. However, for condoms distributed to high-risk groups, the baseline in December 2004 is more than 3 million, while the number reported as distributed for the same date is slightly more than 1.6 million and there is no record of an earlier number that comes close to 3 million.

The use of baselines for output indicators is also not particularly useful. Measuring the output in each quarter and comparing it with the target for the same quarter should be the primary focus.

3. Data Availability

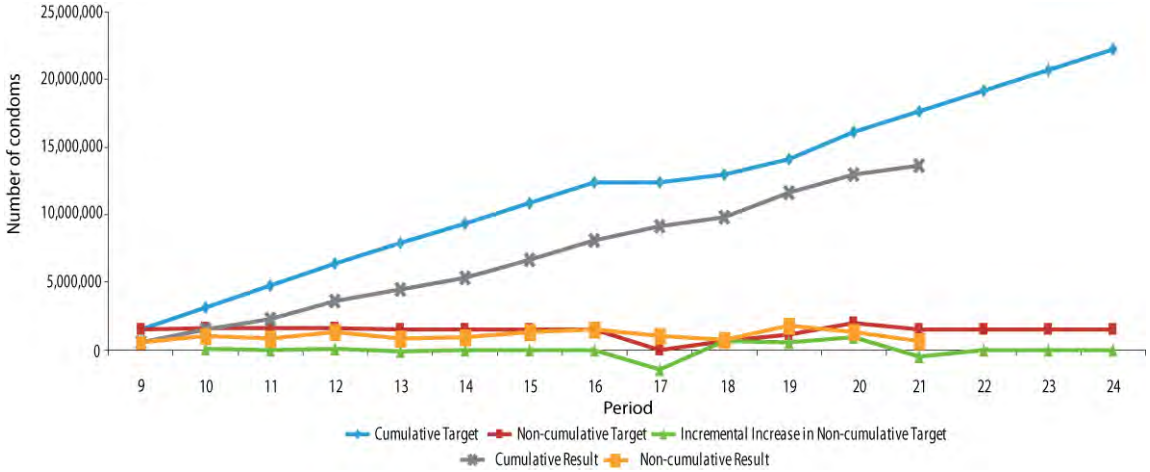
Data on outcome (coverage) indicators generally are only available from the results of periodic surveys and typically cannot be related only to the intervention population. These data provide a general view of progress in the country, without the possibility of assigning the result to a specific donor or activity. This is also the case with impact indicators.

Output indicators, however, are collected during grant implementation from each of the SRs and should provide an accurate picture of what was achieved during project implementation, if the record keeping is accurate. The output indicators are to be tracked on a quarterly basis, generally in a cumulative fashion. However, most indicator targets are only cumulated for the period from January 1, 2003, to December 31, 2004, after which a new target is established for the period January to March 2005, which is then cumulated from thereon.

4. Target Setting

Indeed, the cumulating of indicators across quarters somewhat obscures the picture. For instance, in terms of condom sales, the targets for nearly all quarters in the period January 1, 2003 to December 31, 2008 was about 1,500,000 additional condoms per quarter. This is further illustrated in Figure 1.

Figure 1
Number of condoms sold (Indicator 1.3), by period, Haiti



Source: http://the globalfund.org/programs

The cumulative target for Indicator 1.3 (number of condoms sold [in millions]) increases at a similar rate as the cumulative results; however, the cumulative target is consistently higher than the cumulative results by between approximately one and 3 million condoms. The noncumulative target shows no pattern. It remains relatively stable but dips in periods 17, 18, and 19. The incremental increase in the noncumulative target does not increase over time and also decreases during periods 17, 18, and 19.

The number of additional condoms sold fluctuates each period. In period 9, it is approximately half a million, and in period 19, it reaches a high of approximately 1.8 million and then declines to approximately 600,000 in period 21. Once more, the cumulative reporting masked this program performance issue.

A similar situation can be observed for the number of HIV positive women receiving a complete course of antiretroviral (ARV) prophylaxis to reduce the risk of mother-to-child transmission. During 2007-2008, the target for this indicator is typically 230-250 additional cases per quarter. Again, no substantial improvement over time is built into the targets, and there are unexplained changes for the different reporting periods.

Of the 24 output indicators that form part of the grant performance report, the worst rating (average achieved/average targeted per quarter) is for the number of sites where safe blood is stored, with only 20% achievement, followed by the number of youths reached through school and youth club awareness activities and the number of sex workers receiving information on HIV prevention (68% achieved for each).

The highest achievement was in the area of number of radio and TV spots aired (more than 14 times the targeted number) and the number of active support groups for PLWHA (more than 11 times the targeted number). These figures clearly indicate some problems between target setting and the definition of achievement of the indicator. It would not be surprising if simple definition problems were primarily the cause for these extreme differences. A similar problem exists with the number of HIV/AIDS programs developed for radio and TV, which is nearly three times as large as the target number (2.6).

5. The Official Monitoring Process

The grant report provides numerical ratings for only 16 variables for the period up to March 2008. Overall, the achievement of targets for the 16 indicators included in the grant performance report was high. The lowest achievement rate was for the sale of condoms, which rated only 71%, compared with the cumulative target, and the best performance was for the number of persons receiving ARVs (107% of the target).

A peculiarity of the rating system shown in the report is that the achievement in the last available quarter is related to the target of the next quarter to calculate the percentage achievement rate. For example, the achievement for period 21 is related to the target for period 22 for the score calculation. It would seem more logical if the last achievement was compared with the last target. If this were done, Haiti's performance would increase further, because the denominator for all values would typically be lower. This is illustrated by the following example: The score for Indicator 1.3, the number of condoms sold, is calculated as 71% by taking the number of condoms sold by the end of period 21 (13,597.165) and dividing this by the target by the end of period 22 (19,181,338). However, comparing the achieved number for period 21 with the targeted number for period 21 would give a rating of 13,597,165/17,666,338 = 77%. Thus, most of the indicators in the grant performance report are slightly underrated.

The overall performance of Haiti was quite good. One of the issues that are not readily apparent in the reporting system is that progress can be uneven across quarters. Knowing this can help improve performance and, therefore, figures should probably be presented by quarter in both total cumulative quarterly and additional number of cases.

Some of the indicators can be compared with other data that are available to get a better idea of how good the reported data are. For instance—

Indicator 1.6: Number of HIV-positive women receiving a complete course of anti retroviral prophylaxis to reduce risk of mother to child transmission

For 2007, the number reported for Indicator 1.6 in the grant documents is 970. The MESI database in June 2008 gives a total of 1,103 for 2007[3].

[3] MESI. 2008. Reports and Analysis. Available at http://www.mesi.ht/mesi/PresentationLayer/RapportsAnalyses/wbfrm_RapportAnalyseTableaux.aspx?S=TRUE&activeTab=tab_rapports_analyses.

A comparison of the data on voluntary counseling and testing (VCT) sites from the grant report and the country report is shown in Table 1.

Table 1: Indicator 2.1 Number of functioning VCT sites, according to reporting source, by year, Haiti

	Grant report	Country report
2003	4	20
2004	27	34
2005	79	69
2006	90	96
2007	118	105

Source: http://the globalfund.org/programs; Haiti DCA Country Report

This comparison shows reasonable agreement in the figures, except for 2003 and 2004. Year 2005 also seems to be a bit of an anomaly, but overall the difference is just 13 sites at the beginning of 2007. This can easily be related to definitional problems and the extent to which a site actually provides continuous VCT services (we are using here the definitions used in the grant report, so therefore we are using VCT and not HIV counseling and testing).

Many of the indicators in the original grant proposal required extensive special data collection to obtain reliable results. These indicators were proposed on a yearly basis and were eliminated from the indicators that were included in the grant document. Examples of these indicators include higher risk sex by men and women, commercial sex in the last year, and higher-risk male-to-male sex. While many of these indicators are valuable, they cannot reasonably be made available every year or every quarter.

The grant document contains information on quarterly targets and achievements for 24 indicators. In October 2008, only 16 indicators are given an actual score comparing targets with achievements.

As noted above, the overall achievements in Haiti are reasonable, and it is therefore not surprising that many in Haiti viewed PBF as a favorable funding mechanism. The main question is whether the targets are such that the funding that is provided is actually needed to reach those targets and that they are not set too low. A good example is the sale of condoms. If the target number for additional condoms is the same every quarter over the entire six-year period, this would imply that activities geared towards behavior change may not have an incremental effect.

While cumulative data (old plus new cases) may show good correspondence between targets and achievements, it is necessary to also present quarterly data that are not cumulative so that it is immediately clear when and where there have been problems or great achievements and where quality control activities might best be focused.

Finally, the quarterly data that are available show unexplained variation between quarters, which in many ways should not be surprising. All the SRs are reporting on their activities and need to have in place the adequate mechanisms to deal with the need for continuous and accurate information. This is no small challenge. Then data are sent to IHE, where they are consolidated and potential duplications identified. The cumulative data are then communicated to the principal recipient for reporting to the Global Fund.

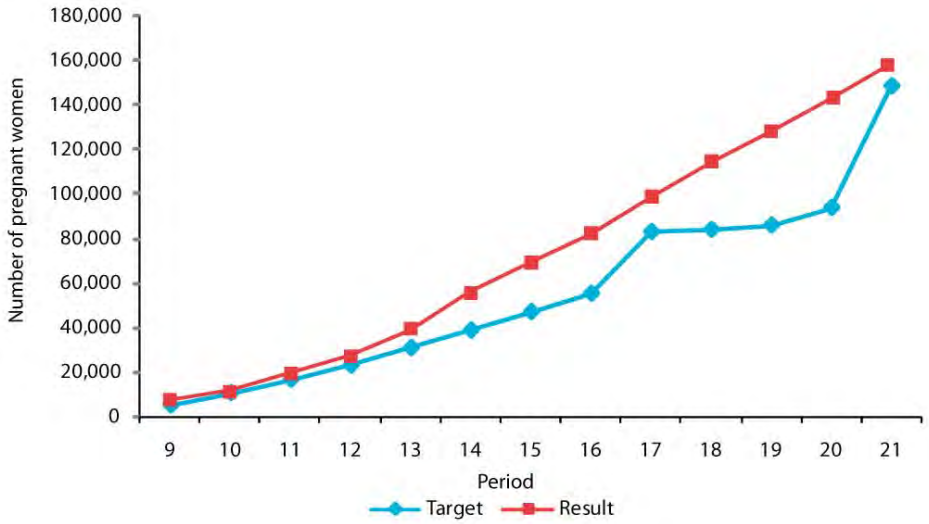
The main issue that potentially affects this system is that some of the reports do not reflect reality. Maybe some of that is evident in the over-achievement of goals in the number of radio and TV spots and the number of active support groups for PLWHA, as seen earlier. Double-counting seems a likely culprit. Conversely, if it is a good thing to have these high achievements, why were the targets set so low?

To be as simple and cost effective as possible, the indicators to be used for PBF should be measurable by each of the SRs, be clearly defined, and be limited to numbers. Percentages are often difficult due to the absence of a well-defined denominator, particularly if subpopulations are involved. Certain indicators that can only be gathered at the national level through special data collection operations, such as surveys, should be defined in advance, and their reporting should be the responsibility of the PR.

Figures 2-5 show some of the issues with targets and results.

Figure 2 shows that the targets for counseling and testing of pregnant women were adjusted at least twice to come closer to the results, which were consistently higher than the targets from period 11 onward (each period is a quarter and corresponds to the time that targets and results refer to, and periods run from January 2005—period 9—to March 2008—period 21).

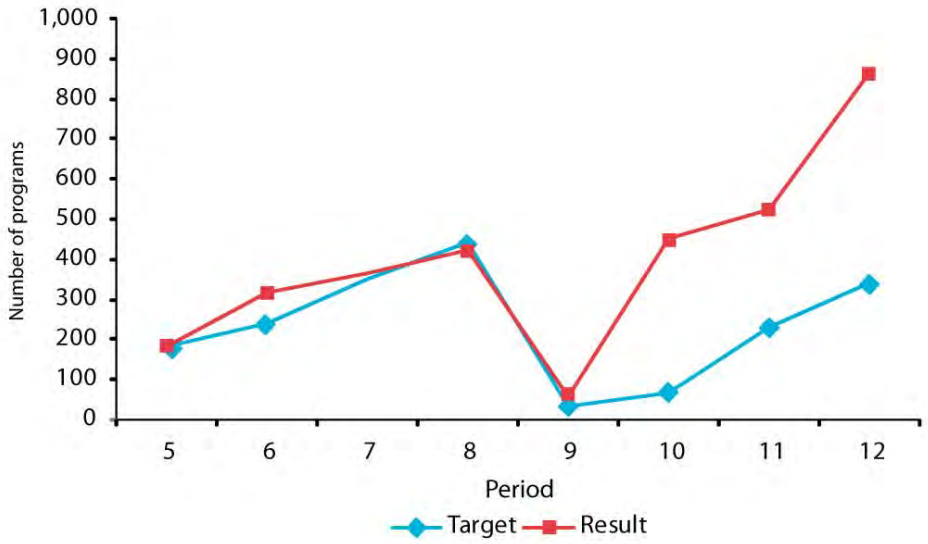
Figure 2
Number of pregnant women receiving counseling and testing for HIV, by period, Haiti



Source: http://the globalfund.org/programs

Figure 3 shows the number of TV programs produced. The results for the last four periods so far outweigh the targets that the latter become relatively meaningless.

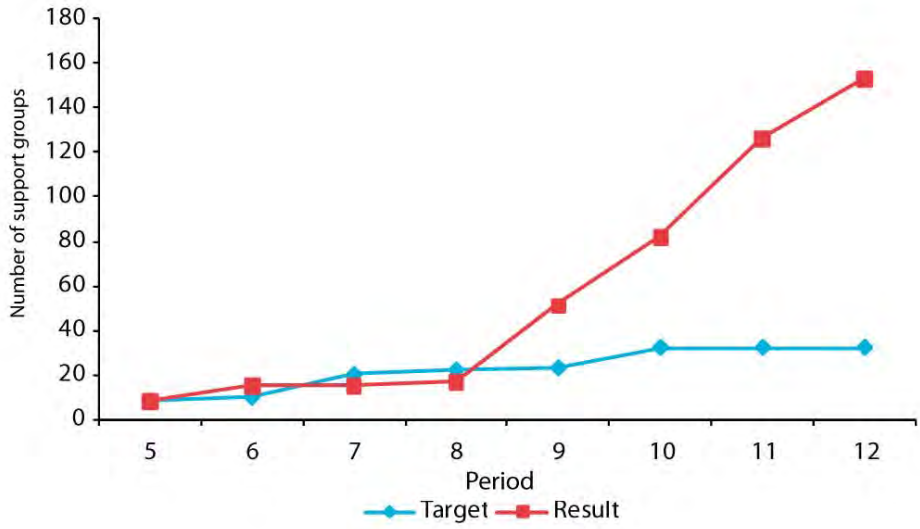
Figure 3
Number of HIV/AIDS radio and TV programs produced, by period, Haiti



Source: http://the globalfund.org/programs

Figure 4 shows the number of active support groups for PLWHA. Again, the results so far outweigh the targets that the latter have become relatively meaningless from period 9 onward.

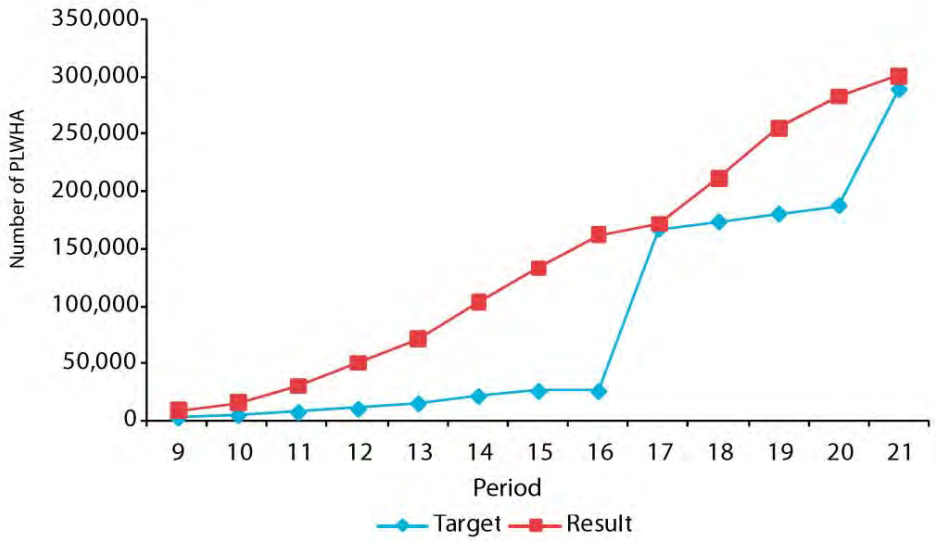
Figure 4
Number of active support groups for PLWHA, by period, Haiti



Source: http://the globalfund.org/programs

Figure 5 shows the number of PLWHA receiving medical care and treatment. Again, it is clear that the targets were adjusted twice, but that nonetheless the results typically are better than the targets. Data such as these should be considered with caution because of the potential reporting errors.

Figure 5
Number of PLWHA receiving medical care and treatment for opportunistic infections, by period, Haiti



Source: http://the globalfund.org/programs

B. MALARIA

The following observations pertain to the malaria grant for Haiti (HTI-304-G03-M). This grant has a lifetime budget of US$14,431,557, divided in two nearly equally funded phases, Phase 1, from August 1, 2004 to July 31, 2006, and Phase 2, from August 1, 2006 to July 31, 2009.

1. Grant Performance

The original grant proposal contained 57 indicators, all to be measured on a yearly basis. Of these, 20 are outcome or impact indicators, that is, indicators that are difficult to measure because of potential problems related to defining the appropriate denominators.

The proposal mentions that the main mechanisms for obtaining the necessary tracking information would be monthly reports from 50 health facilities, program records, sales reports, and knowledge, attitudes, and practice surveys in the first and the last year of the grant.

The grant performance report dated January 22, 2009 includes a number of outcome and impact indicators, although no results are presented for these indicators for any of the years. This concerns the following indicators:

- Annual blood examination rate
- Case fatality rate
- Percentage of households with at least one insecticide-treated net (ITN)
- Percentage of pregnant women sleeping under an ITN

- Prevalence of parasite infection
- Annual parasite index.

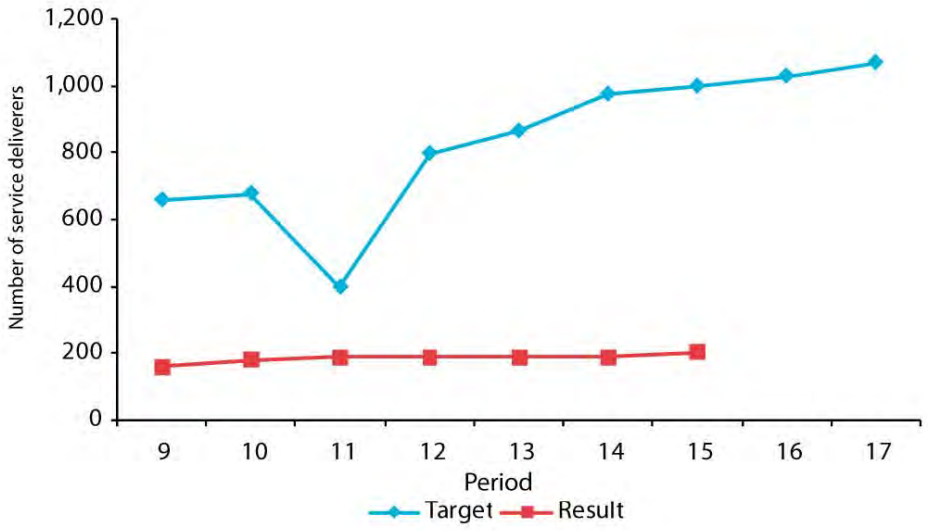
However, none of these indicators is used to rate the performance of the program. The performance rating is restricted to 10 indicators, all of which are output indicators and none of which is rated as top ten malaria indicators.

As was mentioned regarding the HIV grant, grant performance is calculated by comparing the result for a period with the target for the next period, which dilutes the performance result. The rating received for the period was B1, Adequate. Training in management information systems had the worst rating with only 20%, followed by sales/distribution points for insecticide treated bednets and curtains with 54%. The highest rating was for the number of planned studies carried out with 200% (it increased from 1 to 2).

Some of the issues regarding the targets and results approach are illustrated for this grant in Figures 6-8.

Figure 6 shows the number of service deliverers trained in management information systems. The targets are out of line with the results for at least seven periods. Whether that is due to erroneous target setting or weak implementation needs to be assessed. The performance report mentions that SRs did not have sufficient funds to organize training.

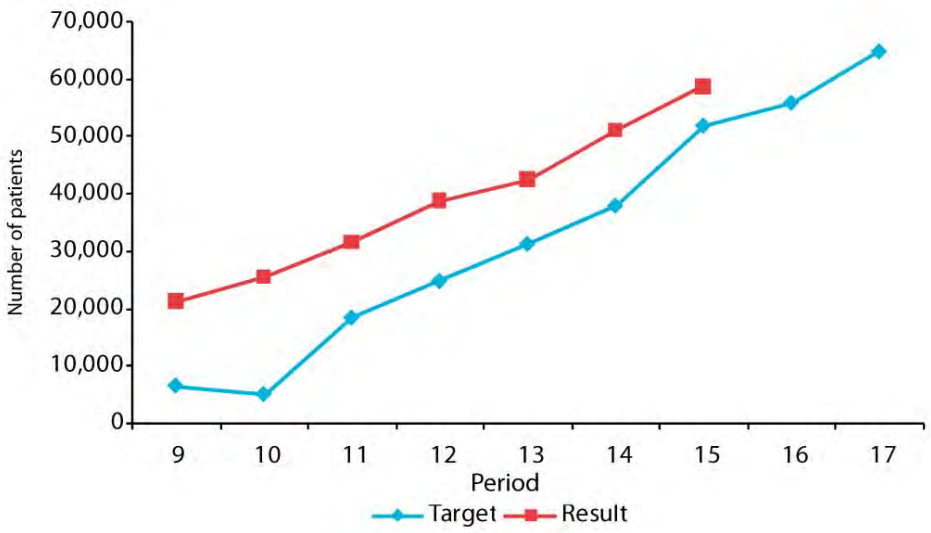
Figure 6
Number of service deliverers trained in MIS, by period, Haiti



Source: http://the globalfund.org/programs

Figure 7 shows the number of malaria patients receiving appropriate treatment. In this case, the results consistently supersede the targets by a large amount. Again, the issue is whether this is due to weak target setting or potential over-reporting of treatment.

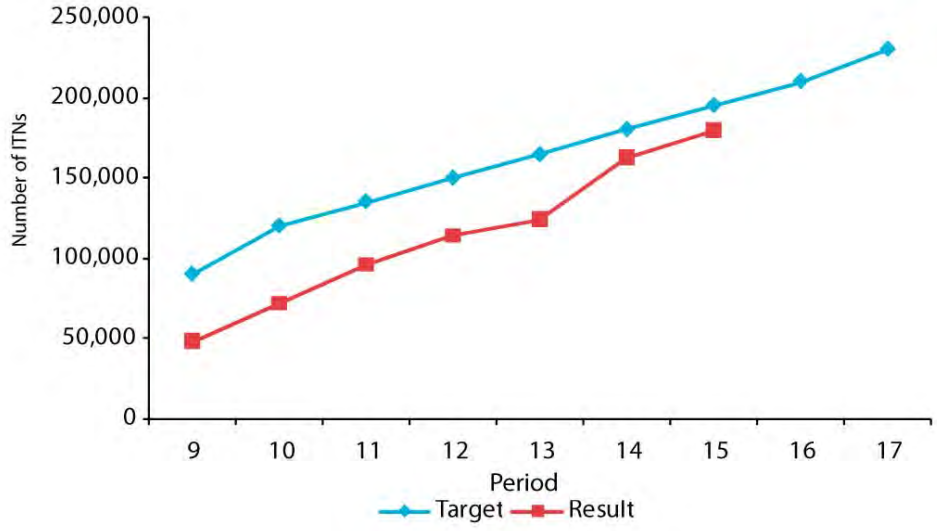
Figure 7
Number of patients with uncomplicated and severe malaria receiving diagnosis and treatment, according to an agreed case management protocol, by period, Haiti



Source: http://the globalfund.org/programs

Figure 8 shows the number of ITNs sold and distributed. While targets are generally higher than results, especially the last two periods with data, the correspondence between the two figures is quite good, although results remain somewhat below targets.

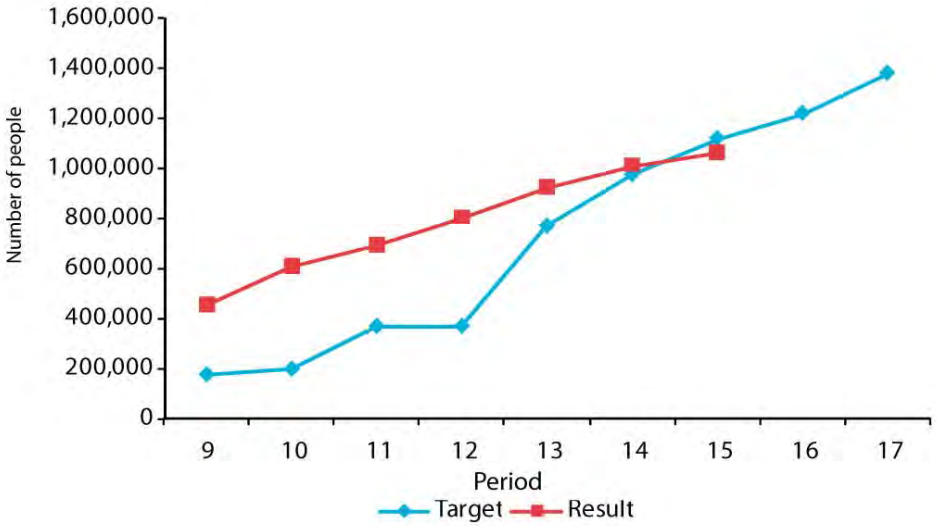
Figure 8
Number of ITNs sold and distributed, by period, Haiti



Source: http://the globalfund.org/programs

Figure 9 shows the results of behavior change communication (BCC) campaigns. Not surprisingly, there are large differences between the targets and results for most of the periods, and the targets seem to have been adjusted at least once.

Figure 9
Number of people reached by BCC campaigns, by period, Haiti



Source: http://the globalfund.org/programs

C. TB

The following observations pertain to the TB grant for Haiti (HTI-304-G04-T). This grant has a lifetime budget of US$14,034,665, consisting of one phase of US$8,131,836 and another phase divided into Phase 1 of US$5,902,829, from August 1, 2004 to July 31, 2006, and Phase 2 from August 1, 2006 to July 31, 2009.

1. Grant Performance

The proposal presented 19 indicators, 12 of which were outcome or impact indicators.

The grant performance report dated January 22, 2009 included a number of outcome and impact indicators, although no results are presented for these indicators for any of the years. This concerns the following indicators:

- Treatment success rate among new smear positives
- Treatment success rate (among all forms)
- Default rate
- Case detection rate
- Percentage of the population living in Directly Observed Treatment, Short Course (DOTS) areas
- Incidence rate of tuberculosis of all forms
- Incidence rate of pulmonary tuberculosis smear positive
- TB case fatality rate.

The ratings for TB are based on 11 indicators, one outcome indicator and 10 output indicators. However, none of these indicators is used to rate the performance of the program. Performance rating is restricted to 10 indicators, all of which are output indicators and none of which is rated as top 10 indicators.

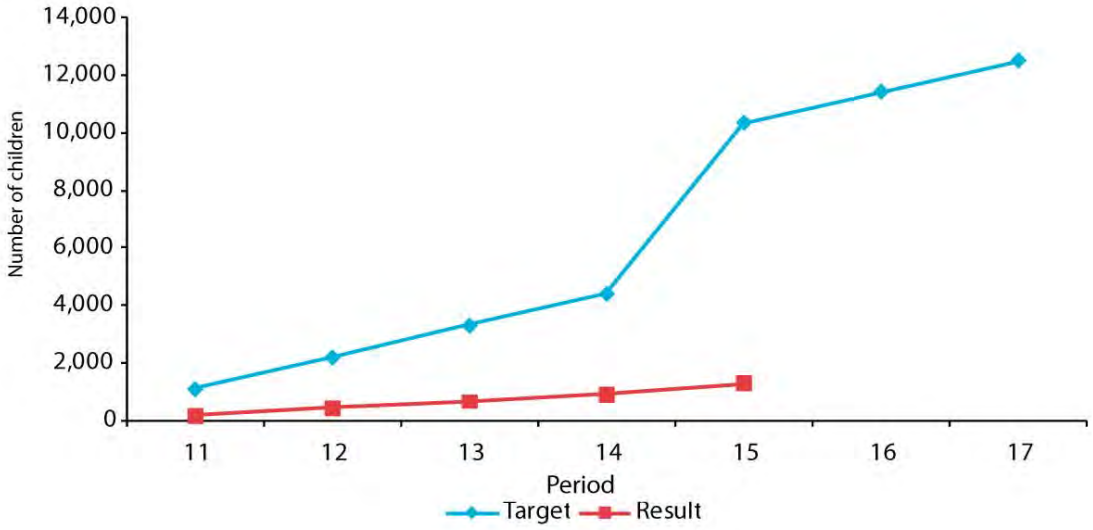
For period 15, the worst rating was received for Indicator 1.8, the number of children under six years of age receiving TB treatment, at only 12% of the target, followed by Indicator 1.11, the number of treatment cases enrolled for multidrug-resistant treatment with 56%. The highest rating went to Indicator 1.12, the number of SS+ patients with HIV co-infection receiving treatment. The rating for period 15 was B2, Inadequate but potential demonstrated. For TB, the rating is derived by dividing the result by the target numbers for the period in question, unlike for HIV and malaria in which the results for an earlier period are compared with the targets for the next period to derive the score. This means that TB indicators will be relatively higher than those for the other two diseases because of the calculation method.

It should also be noted that the TB information for the different periods is variable. For some indicators, information is available since period 1, August 2004, and for others only since period 11, January 2007.

Figures 10-12 provide some visual insight on targets and results.

Figure 10 shows that the targets for children under 6 receiving TB treatment are vastly different from the results. It is not clear why the targets were more than doubled between periods 14 and 15 when the results were flat.

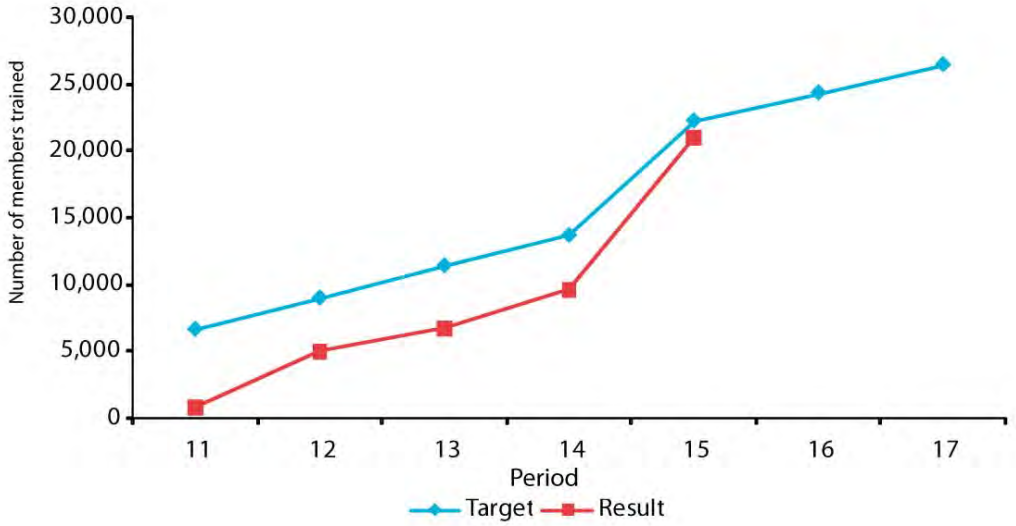
Figure 10
Number of children under six years old receiving TB treatment, by period, Haiti



Source: http://the globalfund.org/programs

Figure 11 shows the number of community members trained in DOTS. The increase in results between periods 14 and 15 is remarkable, bringing the results in line with the targets.

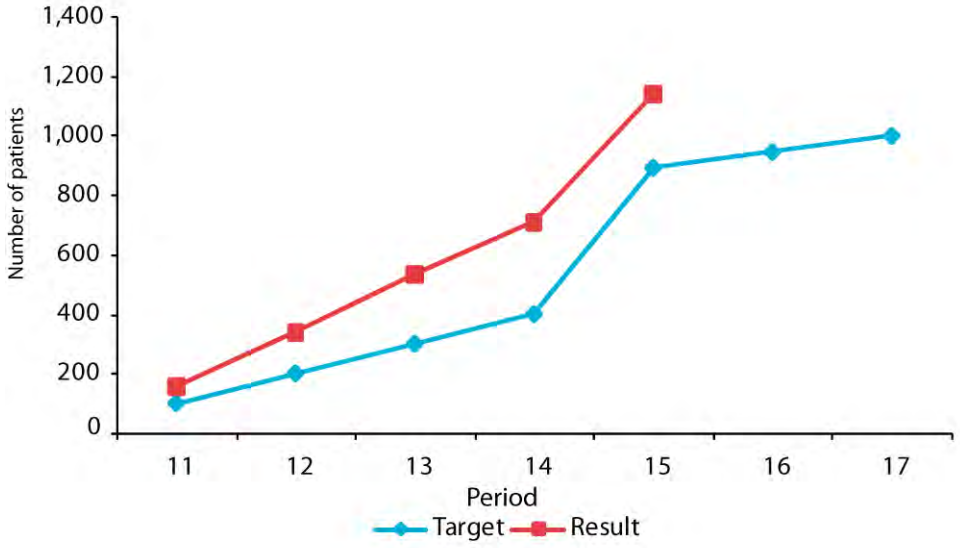
Figure 11
Number of community members trained in DOTS, by period, Haiti



Source: http://the globalfund.org/programs

Figure 12 shows the number of SS+ patients with co-infection receiving TB treatment. Results are consistently over target and rising, while the target seems to be decreasing.

Figure 12
Number of SS+ patients with HIV co-infection receiving TB treatment, by period, Haiti



Source: http://the globalfund.org/programs

D. SOME IMPLICATIONS

Given that the situation regarding HIV/AIDS, TB, and malaria is different in every country, the Global Fund should develop two to three indicator scenarios for each disease depending on the level of prevalence of the disease and the likely intervention activities that are being planned. This would help countries establish their PBF platform.

It is clear that there are many potential challenges to PBF. Few organizations want to lose the funding that they are requesting and claim that is needed. Therefore, oversight is key; periodic audits of data recording at the level of the SR and PR should be acceptable and should be handled by independent entities.

Data generated by the system should also be used to improve the situation at the local level, even more than serving as a means to rate a country, so that permanent improvements can be made. This seems to be happening to some extent but could possibly be strengthened.

On the other hand, there also are issues relating to how long and with what intensity certain efforts are most cost effective. This would apply especially to information, education, and communication (IEC) and advocacy activities. Although this is an important area for many grants, some reflection may be necessary on the scope and length of such activities, guided by available information regarding knowledge and behavior. That is, PBF plans do not need to be static. Rather, they should be dynamic and potentially subject to change during the grant period, due to the achievements.

Some indicators are too difficult to measure to even consider in the context of PBF. At the same time, just reporting on numbers is not valuable and probably not reliable. For instance, indicators such as the number of orphans receiving support are probably difficult to measure and it will be difficult to interpret what the numbers mean in terms of helping as many orphans as possible. On the other hand, targets for reaching large audiences are nebulous and probably not worth measuring through counting individuals due to uncertainty in the process and the likely prevalence of guesstimates rather than good estimates.

TANZANIA PERFORMANCE-BASED FUNDING: A CASE STUDY ON INDICATOR REPORTING FOR AN HIV GRANT

INTRODUCTION

Tanzania had HIV grants in Round 1 and Round 4, with disbursements starting in 2003 and lasting to the present time. The case study focuses on the Round 4 HIV grant (TNZ-405-G04-H), because it represents the largest commitment to date with ongoing disbursements. The project title is "Filling Critical Gaps for Mainland Tanzania in the National Response to HIV/AIDS in Impact Mitigation for Orphans & Vulnerable Children, Condom Procurement, Care & Treatment, Monitoring and Evaluation, and National Coordination."

This grant intends to scale up the activities piloted in Round 1. The PR is the Ministry of Finance. Table 2 shows that the total funds committed are US$184,228,749, with a total of four disbursements to date of US$135 million (Phase 1—US$79 million, Phase 2—US$104 million). The start date was September 2005; the total grant duration is 60 months. Ratings are three B2s (inadequate by potential demonstrated) and one B1 (adequate).

Table 2: Total funds committed to the Round 4 HIV grant in Tanzania (US$)[4]

Disbursement date	Grant amount	Disbursed	Not disbursed yet	TGF Rating (Progress Update period)
	$184,228,749			
August 2005		$34 million		na
December 2006		$13 million		B2 (Sep 05-Mar 06)
July 2007		$28 million		B2 (Sep 05-Mar 06)
June 2008		$60 million		B2 (Apr 06-Sep 06)
None requested		None requested		B1 (Oct 06-Mar 07)
			$49 million	

METHODOLOGY

A review of the standard grant documents was carried out, and information on indicators and targets for this case study was gathered from the documents.[4]

First, the final indicators to be monitored in the Grant Performance Report (GPR) were compared with the original indicators proposed in the original proposal (OP).

The indicators defined in the GPR comprise a small subset of the indicators and targets in the OP, which further adds some new indicators and revised targets. Table 3 presents the sum of all possible indicators defined for this grant, including those in the original proposal and new ones in the GPR (73 total). While 62 indicators were originally defined with targets in the OP, a total of 26 were

[4] The standard documents online include Summary of proposal; Original Proposal; Program Grant Agreement; Amended and Restated Program Grant Agreement—Phase 2; Grant Performance Report; Grant Score Card; Disbursement Requests; Grant Score Card; and Disbursement requests. Available at http://www.theglobalfund.org/programs/.

defined with targets in the GPR, including 15 original indicators plus 11 new ones. Therefore, 76% of indicators (47) from the OP are not monitored in the GPR.

Table 3: Source of PBM indicators, Tanzania

	Final indicators in GPR	In OP, but not in GPR	Total
Indicators in OP	15	47	62
Not in OP	11		12
Total	26	47	73

Source: http://the globalfund.org/programs

The negotiating process with the country in selecting the final subset of the indicators from the original proposal to be monitored in the GPR and adding new indicators to the GPR is not described in the documents available online.

Second, a profile of the final set of 26 indicators in the GPR is examined. Over the life of the grant, results for targets set on these indicators are reported on a prescheduled basis. The 23 programmatic indicators are reported on three-month reporting periods for an agreed period of two or five years (8 are reported over two years, and 15 are reported through four years). The four impact indicators are reported for predefined years, as follows:[5]

- Percentage of adults and children with HIV still alive 12 months after initiation of antiretroviral baseline therapy (extended to 2, 3, 5 years as program matures) [Targets to be determined in years 3, 4, and 5]
- Reduction in mortality rate for TB patients from 10% to 8% by the end of 2009 [From 10% to 8% in year 5]
- Percentage of adults age 15-49 who are HIV-infected [No information on target setting]
- Percentage of infants born to HIV-infected mothers [Targets to be determined in years 4 and 5]

Table 4 presents the final indicators, by type and availability of baseline data. Most of the indicator targets are based on information from facility records, with about half of the records having existing baseline information and 20% starting from scratch. The training indicators represent about one-fourth of all final indicators; about half build on preexisting baseline data, while the other half starts from scratch. Indicators whose targets rely on population-based assessments are a small proportion, as are those based on other sources.

[5] Impact is defined strictly by changes in incidence, prevalence, and mortality. It requires evidence in the form of a country or partner evaluation (Operational Policy Note: Grant Performance Rating and Disbursement Decision, Global Fund Operational Policy Committee Meeting, 18 December 2008).

Table 4: Type of information required by the final indicator targets monitored in the GPR, by type of baseline information, Tanzania

Status of baseline information	Training of service deliverers or group formations	Population-based/ Situation analysis	Facility service records	Other source (report, database)	Percentage distribution of baseline information	Row N
Available	33.3	100.0	43.8	0.0	42.3	11
Baseline = 0	66.7	0.0	18.8	100.0	34.6	9
Not available	0.0	0.0	37.5	0.0	23.1	6
Column total	100.0	100.0	100.0	100.0	100.0	
Column N	6	2	16	2		26
Percent distribution	23.1	7.7	61.5	7.7	100.0	

Source: http://the globalfund.org/programs

Regular results for the set of 26 indicators are challenging to report because the source for more than 60% of indicators (16) come from facility service records; in many countries such aggregated administrative data notoriously lack accuracy, completeness, and timeliness in reporting. On the other hand, if there is a regular validation process built-in, then this type of reporting represents an opportunity for facilities to keep vigilant patient records, as well as ensuring correctly aggregated data at various levels. Sufficient time and resources must be planned to implement regular internal and periodic external validation procedures.

In addition to obtaining accurate data to report results, there needs to be long-term vision about what phenomena are being monitored. About half of the indicators associated with this HIV grant are "process indicators" and the other half are "output indicators." While these indicators provide crucial information on establishing necessary program foundations during the early-scale phase (the number of staff trained and clients reached, for example), they do not ultimately reveal progress in terms of intervention coverage and impact—two proximate determinants of program achievement in reducing disease burden.

Thirteen of the final subset of 26 indicators represent Global Fund's top 10 indicators; five represent Global Fund training indicators.

In addition to 11 new indicators—which clearly came with new sets of targets—targets for the original 15 indicators were also revised in the GPR. Of the 15 original indicators, there is no clear trend in which direction they are revised in the GPR (Table 5).

Table 5: Revision of original targets in GPR, Tanzania

New indicator	11
Target made numerical instead of being expressed as percentage	3
Revised down	4
Revised up	3
Revised up, and 5 years tracking instead of 2	2
Tracking period decreased to 2 years	1
TBD instead of % in OP	2
Total	26

Source: http://the globalfund.org/programs

Third, while the original grant proposal defined five objectives, it later expanded to include a total of seven objectives for purposes of monitoring. They are as follows:

1. Implement national policies and programs to promote and protect the rights of orphans and vulnerable children.

2. 2. ensure quality standards.

3. Reduce the transmission of HIV in Tanzania through linking prevention and care services.

4. Decrease HIV-related morbidity and mortality among persons living with HIV infections in Tanzania (with London School of Health & Tropical Medicine's technical support).

5. Strengthen the capacity of the ministry of health (MOH) and partner institutions to coordinate, plan, monitor, and evaluate the scale up of comprehensive care in Tanzania.

6. Conduct operational research: Kisesa Cohort—develop a system for monitoring ART in Tanzania.

7. Provide coordination for multisectoral country programs.

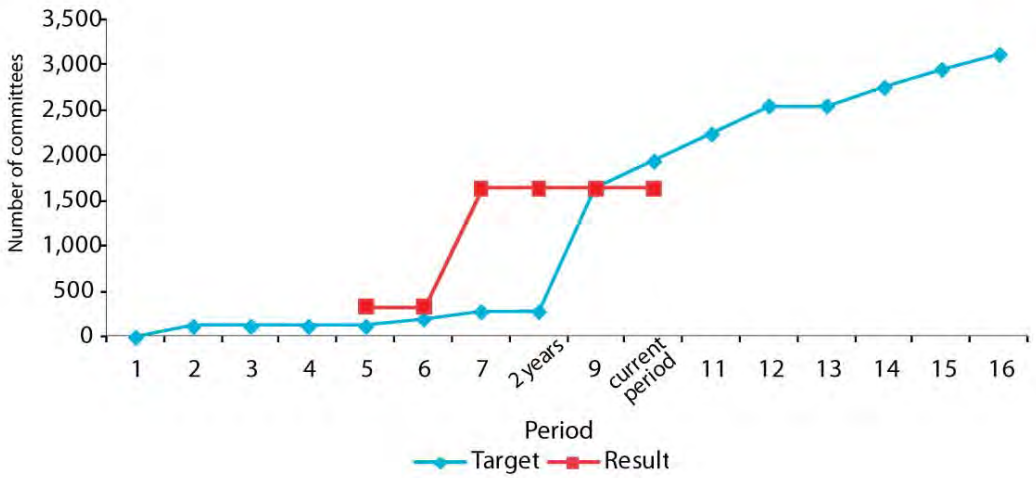
ANALYSIS

Objective 1. Implement national policies and programs to promote and protect the rights of orphans and vulnerable children

Tanzania's 2001 National Policy on HIV/AIDS defined an orphan as a child age 0-14 who has lost both parents. There are 1,100,000 AIDS orphans in Tanzania (2005); they make up 2.9% of the Tanzanian population.[6] The two process indicators selected to monitor this objective are the number of vulnerable children committees formed and functioning at the village level, and the number of community justice facilitators trained. The latter is defined in the GPR as a Global Fund top 10 and training indicator.

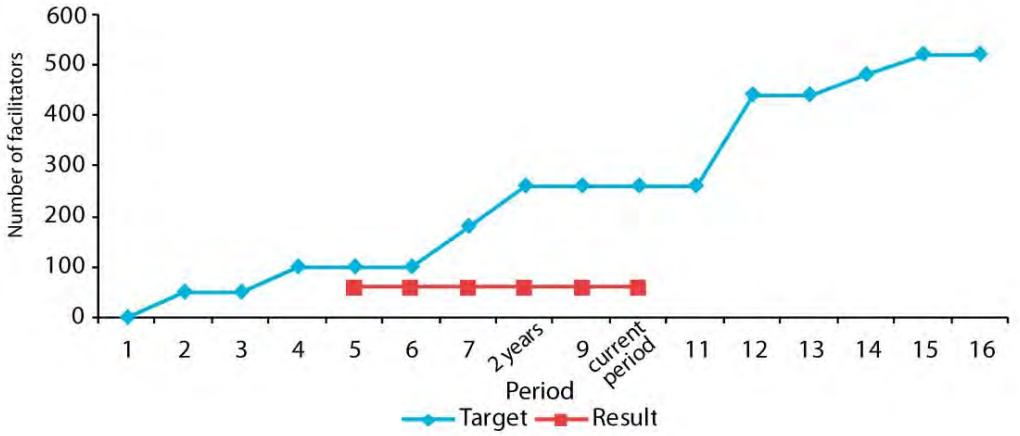
[6] UNAIDS, *2006 Report on the Global AIDS Epidemic*, Chapter 4: The impact of AIDS on people and societies.

Figure 13
Indicator 1.1 Number of vulnerable children committees formed and functioning at the village level, by period, Tanzania



Source: http://the globalfund.org/programs

Figure 14
Indicator 1.2 Number of community justice facilitators trained, by period, Tanzania



Source: http://the globalfund.org/programs

Observations: The first results reported for Indicator 1.1 came only in the fifth period; then they quickly exceeded the target in the seventh period (Figure 13). The target was then adjusted up almost sixfold, and results have since remained flat. It is assumed that targets are cumulative; so the flat results line, beginning from the seventh line, occurs because no new committees are being formed, despite expectations that there would be incremental growth over each reporting period. What exactly does a "formed and functioning" committee entail, and how are these committees tracked? Do children committees cease to function? Tracking and reporting on 1,646 committees requires substantial follow-up; how is this accomplished? Is there a "saturation point" when the number of committees is sufficient and no new ones need to be formed?

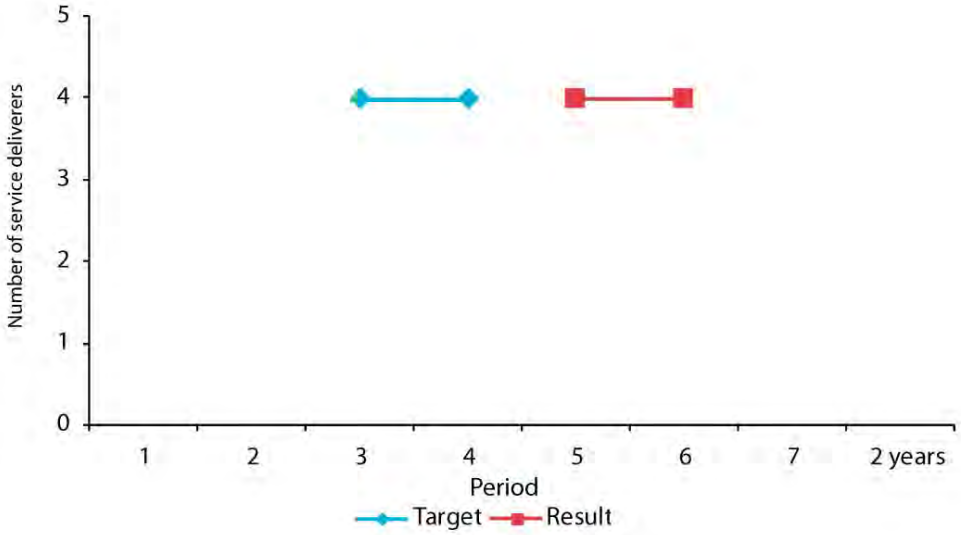
Results for Indicator 2.2 (Figure 16) have remained at just one number (60 community justice facilitators trained) for every reporting period. If targets represent cumulative numbers, then the same queries apply as for the previous indicator. Because of the lack of reported progress, what is the future of this target? Will it be readjusted (downward)? Will an attempt still be made to overcome

obstacles to progress, thus get "back on track?" Will the lack of progress affect disbursement timing or amount?

Objective 2. Secure an uninterrupted supply of condoms for the public and social marketing sector; ensure quality standards

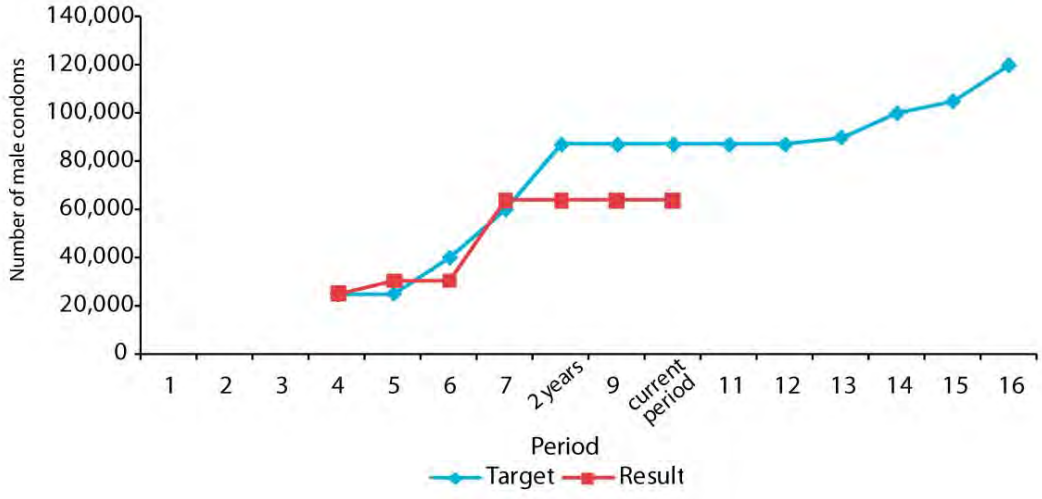
Two process indicators are defined to track this objective: First, to train staff persons at the PSI medical store to evaluate condoms tender and product quality—this is to be done jointly with PSI, the Tanzania Bureau of Standard, and other partners; second, to track the number of condoms distributed through the public sector.

Figure 15
Indicator 2.1 Number of service deliverers trained in condom distribution, by period, Tanzania



Source: http://the globalfund.org/programs

Figure 16
Indicator 2.2 Number of male condoms distributed through the public sector



Source: http://the globalfund.org/programs

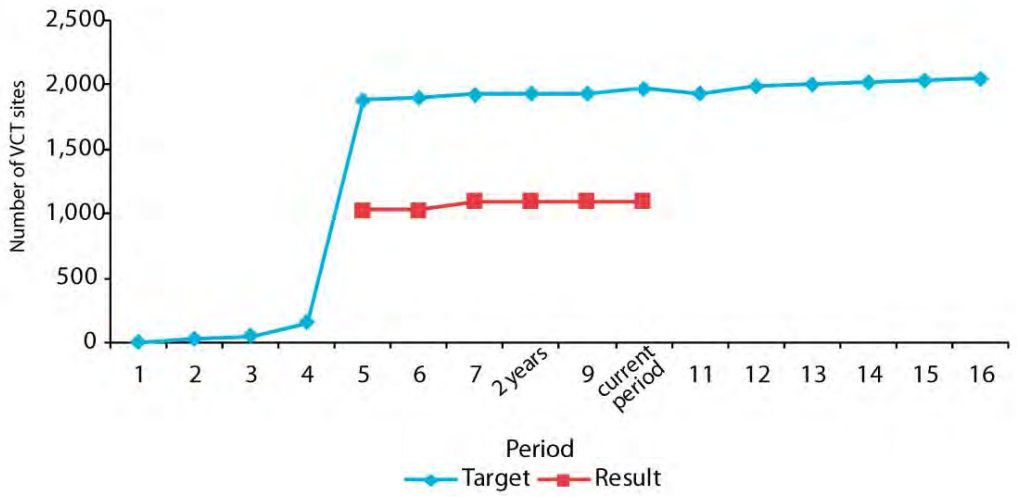
Observations: Indicator 2.1 appears to have been achieved in the fifth and sixth reporting period (Figure 15). In line with other indicators that appear to be cumulative, it is assumed that the number of staff persons targeted for training totals 4 persons; this was achieved in reporting period 5 (and again in period 6).

Perhaps associated with this training achievement in period 5, Indicator 2.2 shows that the number of condoms distributed rose sharply from period 6 to 7, from less than 40 million to more than 60 million (Figure 16). Results then stagnated for one year. Is this a reporting problem, or were no condoms further distributed for a year? Perhaps this is due to bottlenecks at distribution sites and stocked condoms not being distributed to individuals at the expected rate? If this is the case, is there a lack of demand or a lack of activity on the part of distribution sites? Is there a competing source of condoms that is fulfilling demand? If there is a justification, then targets may need to be revised.

Objective 3. Reduce the transmission of HIV in Tanzania through linking prevention and care services

The two service delivery areas monitored for this objective include HIV testing and counseling, and prevention of mother-to-child transmission (PMTCT). Two output and process indicators (number of VCT sites and number of VCT counselors trained) and a coverage indicator (the number of persons counseled and tested) are defined to track progress towards the first service delivery area, the number of HIV testing and counseling sites.

Figure 17
Indicator 3.1 Number of VCT sites per population, by period, ,Tanzania

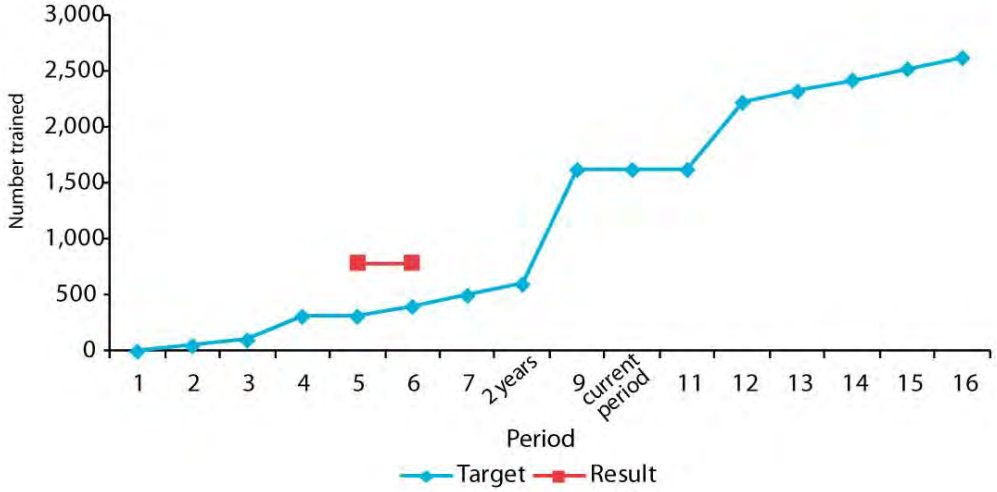


Source: http://the globalfund.org/programs

Observations: Regarding Indicator 3.1, the Country Evaluation report (2008) reported 575 HIV testing and counseling sites in 2005 (MOH 2005, the most recent year available), while more than 1,000 were reported in the fifth through the tenth period of Global Fund reporting (this is not "per population" as per the title of the indicator) (Figure 17). This is a big discrepancy in reporting, which raises questions about why the evaluation team did not report more current numbers. Is updated information on the number of sites not available at the central level? (MOH?) A comparison of the following two data sources—Global Fund reporting and the Tanzania Impact

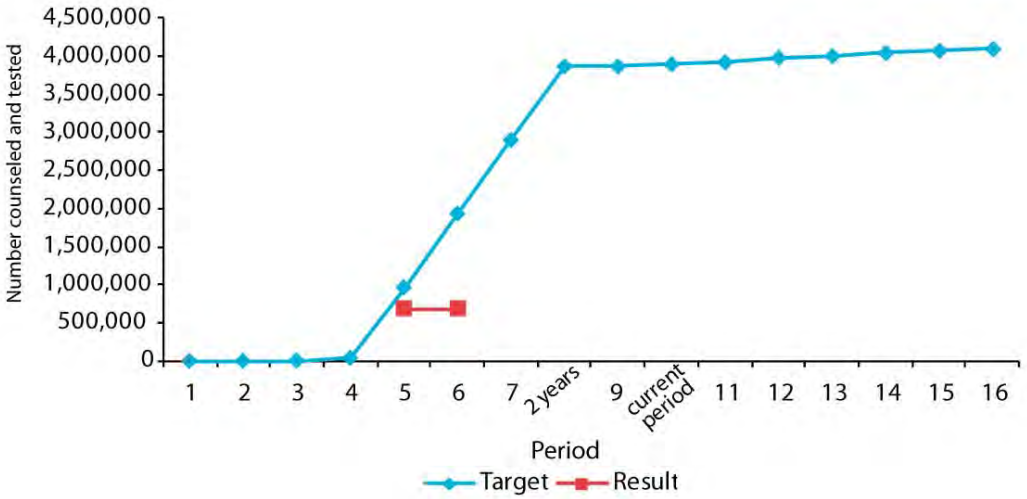
Evaluation Report—clearly shows a significant discrepancy of information regarding basic information on the number of VCT sites.

Figure 18
Indicator 3.2 Number of VCT service deliverers trained, by period, Tanzania



Source: http://the globalfund.org/programs

Figure 19
Indicator 3.3 Number of persons who were counseled and tested for HIV, by period, Tanzania

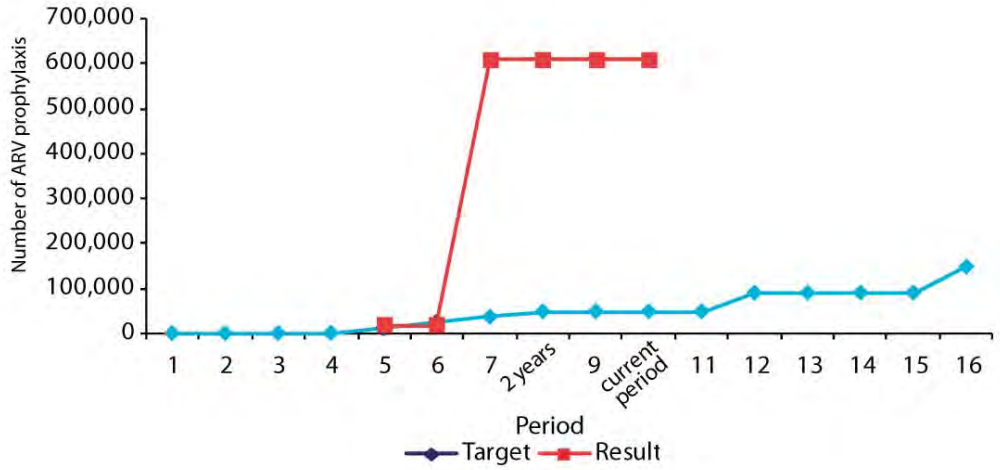


Source: http://the globalfund.org/programs

For Indicators 3.2 and 3.3 (Figures 18 and 19), several reporting periods have passed since the results on the number of counselors trained and the number of clients reached has been reported. Is the reason known? The Tanzania UNGASS report (2008) reported that the total number of clients tested and counseled by the end of December 2007 was 3.2 million, corresponding to Global Fund reporting periods 9-10, which have a target of approximately 1 million more for the remainder of the reporting periods. With only two reporting periods showing results, it seems that there is not yet the ability to routinely report on this indicator.

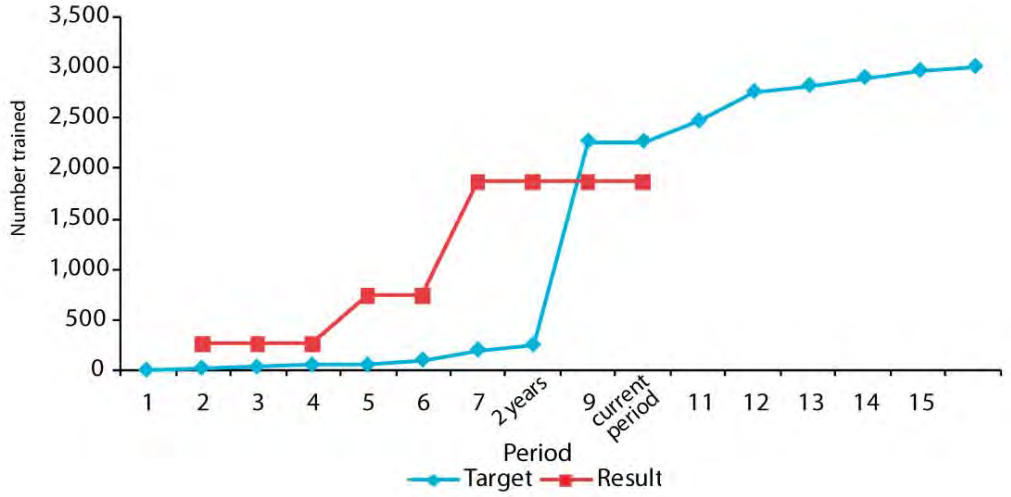
Indicators and targets tracked for the second service delivery area includes the number of HIV-positive pregnant women receiving ARV prophylaxis (Indicator 3.4), and the number of ANC trained in PMTCT (Indicator 3.5) (Figures 20 and 21).

Figure 20
Indicator 3.4 Number of HIV-positive pregnant women receiving a complete course of ARV prophylaxis to reduce the risk of MTCT (top 10), by period, Tanzania



Source: http://the globalfund.org/programs

Figure 21
Indicator 3.5 Number of ANC clinic providers trained in PMTCT treatment (top 10), by period, Tanzania



Source: http://the globalfund.org/programs

Observations: Indicator 3.4 shows that approximately 60,000 pregnant women received ARV prophylaxis. The huge increase over just one reporting period, from about 100 to at least 60,000, probably is not a real increase but a reporting anomaly. The flat line of 60,000 women for the past year is also worrisome, and the interpretation of the data available is not clear. Why would the same exact number be reported each period? Either the programs have failed and no new women are being put on treatment, or new women are being put on treatment but are not being reported. If the latter case is correct—and since Indicator 3.5 shows an increase in the number of service providers trained, it seems that the number of women receiving prophylaxis would increase. Thus, it seems better to leave the results blank; otherwise they are misleadingly low.

On the other hand, it is quite likely a data quality issue; the UNAIDS Epidemiological Fact Sheet (2008) reports only 31,863 pregnant women on ARV in 2007 (corresponding to periods 9-10).

This is only about half the estimate of the Global Fund results. Note the quote from the Country Evaluation report (2008) concerning the "shaky" quality of PMTCT routine data in the following:

Tanzania Country Evaluation Report (2008)

PMTCT Data

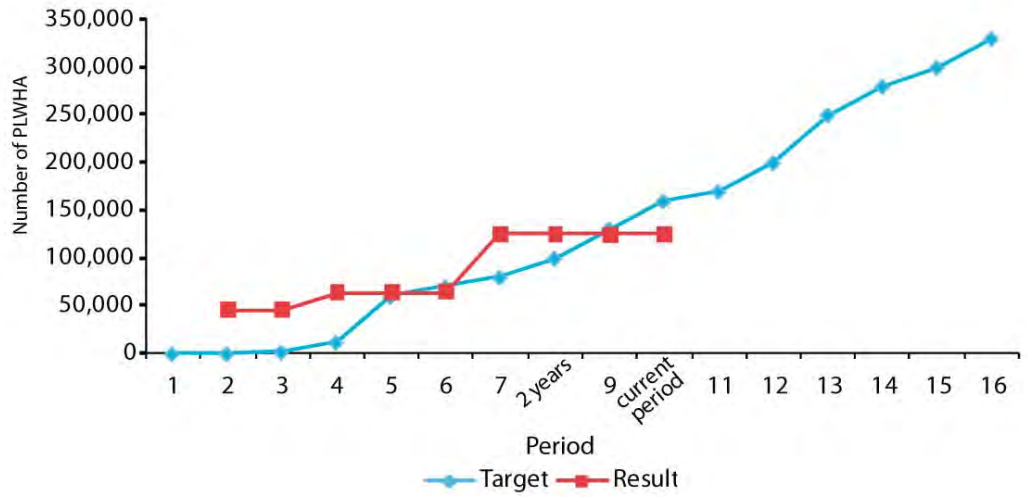
"Facilities make their facility specific summaries and send them to their respective DMOs monthly. The DMOs prepare their own district summary and send them to the respective RMO who in turn makes a regional summary and sends it to NACP.

…With this kind of flow, certainly the quality of [PMTCT] data at the final destination (NACP) is a bit shaky, as it entirely depends on the quality of the data and data handling process at every intermediate level (*p. 19-20*)."

Objective 4. Decrease HIV-related morbidity and mortality among persons living with HIV infections in Tanzania (with LSHTM technical support)

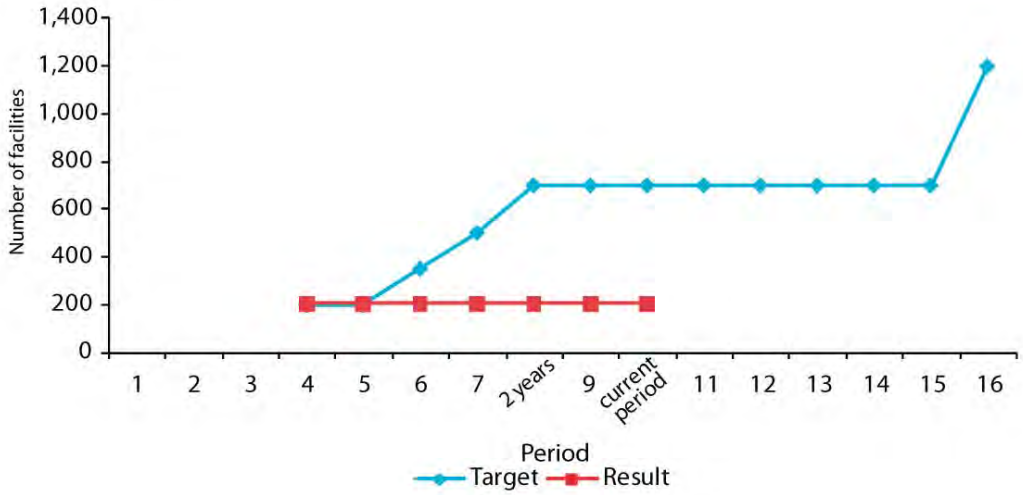
This objective comprises several service delivery areas, including monitoring patients on ART, potential patients with TB/HIV, and patients receiving care and support. The number of people in need of ART and receiving treatment (Indicator 4.1) and the number of ART sites (Indicator 4.4) are the two indicators tracked for the first service delivery area. According to the Tanzania Epidemiological Fact Sheet (2008), in 2007 there were an estimated 440,000 people needing ART, and the coverage was 31%. This translates into about 140,000 people on treatment (Periods 9-10). Also, 204 ART sites were reported for the same period.

Figure 22
Indicator 4.1 Number of PLWHA receiving ARV combination therapy (top 10), by period, Tanzania



Source: http://the globalfund.org/programs

Figure 23
Indicator 4.4 Number of health care facilities that have the capacity and conditions to provide advanced-level HIV care and support services, including ART, by period, Tanzania

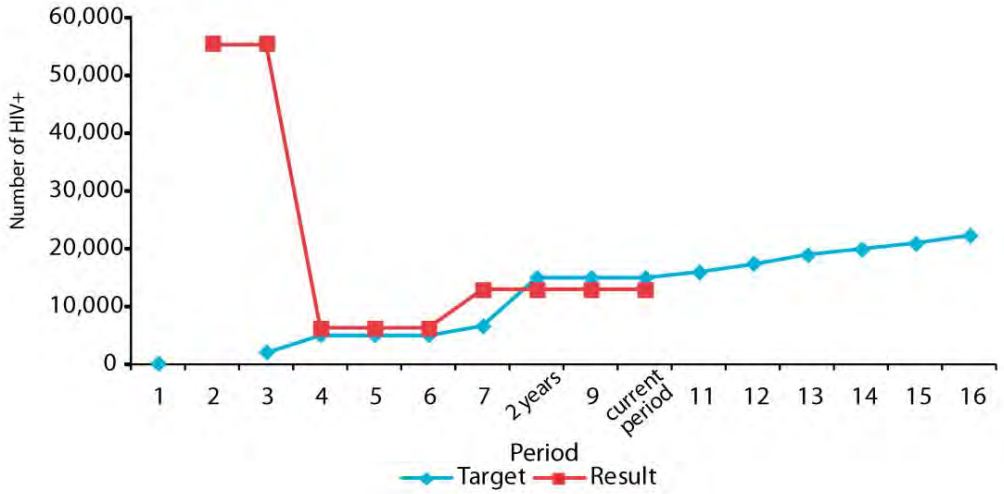


Source: http://the globalfund.org/programs

Observations: Results on the number of sites and people on treatment reported to the Global Fund correspond to the official annual country estimates reported to UNAIDS in 2007; however, this reporting has been stagnant for a year or longer. In fact, there is no information readily available on the current number of sites, or on the uptake of new people needing treatment. This is indicative of the lack of a dynamic routine reporting system. Although this does not appear to be reflected in the targets, the reporting scenario of people on ART becomes more complicated when donors, including the Global Fund and the US President's Emergency Plan for AIDS Relief, require unique or combined attribution for patients.

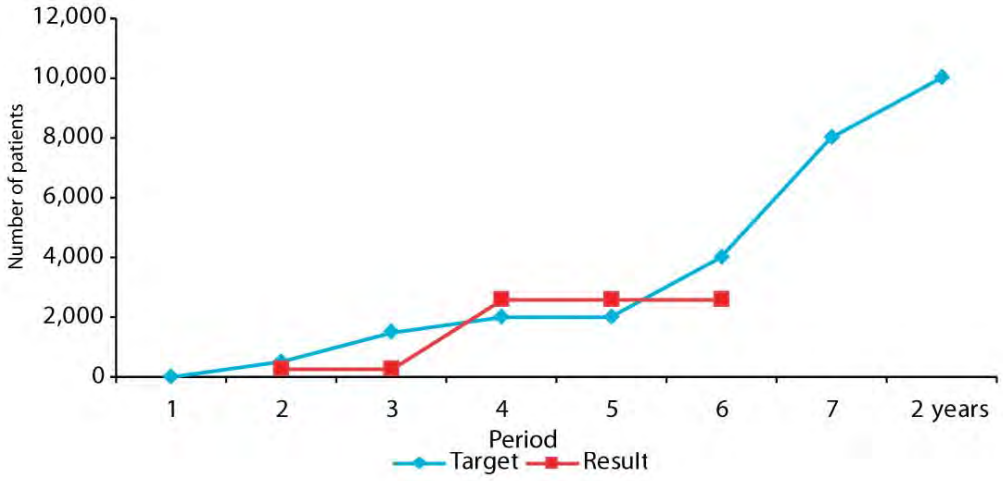
The second service delivery area for this objective concerns HIV patients on prophylaxis for TB, screened for TB, or on DOTS treatment (Indicators 4.5, 4.6, and 4.7 and Figures 24-26).

Figure 24
Indicator 4.5 Number of HIV-positive people on co-trimoxazole preventive therapy (top 10), by period, Tanzania



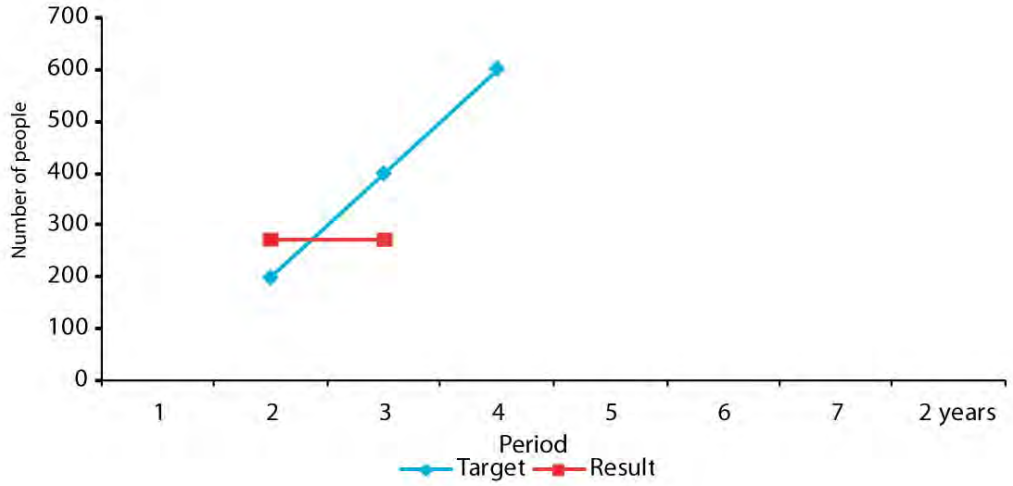
Source: http://the globalfund.org/programs

Figure 25
Indicator 4.6 Number of patients with HIV screened for TB, by period, Tanzania



Source: http://the globalfund.org/programs

Figure 26
Indicator 4.7 Number of people with HIV referred to DOTS, by period, Tanzania



Source: http://the globalfund.org/programs

Observations: Tracking these indicators would require close collaboration with the TB DOTS program. Thus, the question: Is this monitoring system in place for HIV patients? It seems that since results remained static for several recent reporting periods, the system may not be able to handle quarterly reporting.

Care and support for the chronically ill is the last service delivery area to be monitored (data not shown). For both indicators including the number of patients receiving nutritional support (top 10) and the number of home-based care providers trained according to national guidelines (top 10), the results are considerably lagging behind the target value. Again, the results reported have remained unchanged for several reporting periods—380 home-based providers were reportedly trained for each of the 7 reporting periods. It is assumed that the targets are cumulative; therefore, this number represents the same 380 that "remained trained" over the periods.

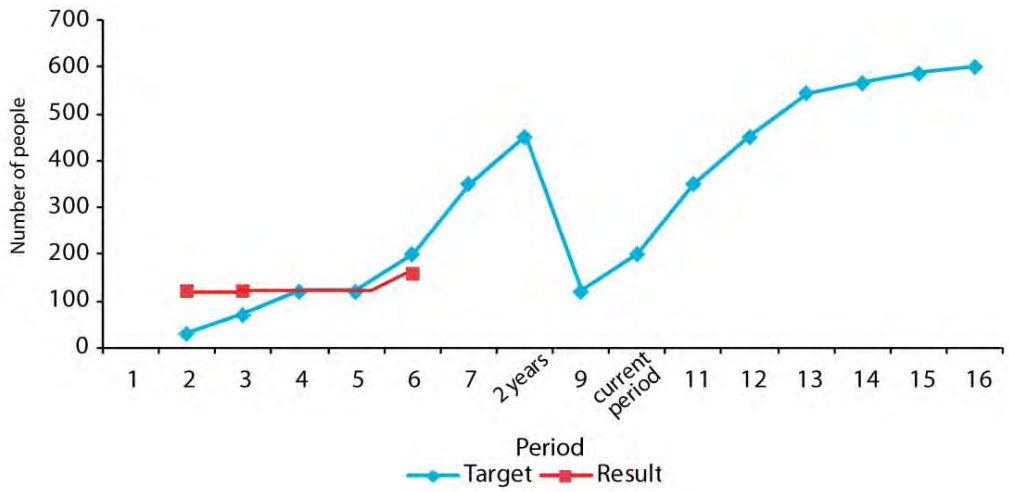
Objective 5. Strengthen the capacity of the MOH and partner institutions to coordinate, plan, monitor and evaluate the scale up of comprehensive care in Tanzania

Observation: (The targets and results are not shown for Objective 5.) Indicator 5.1 shows the number of VCT and ART sites reporting monthly. The results are reported only for periods 2 and 3; the data report 115 for both periods—is this the sum of VCT and ART sites? Indicator 4.4 shows a total of 204 ART sites across all periods, and Indicator 5.2 reports that 100% of them report monthly as of the fifth reporting period. Recall, however, that Indicator 4.1 shows periods 7-10 with exactly the same number of people on ART—despite the 100% reporting. It is unlikely, with monthly reporting, that the number would be exactly the same over 7-10 quarters. A similar observation is made for Indicator 5.3, showing monthly reporting for most of the VCT sites while the number tested and counseled does not vary at all across reporting periods. There are evidently problems with the three indicators defined to monitor progress towards the objective.

Objective 6. Conduct operational research: Kisesa Cohort—develop a system for monitoring ART in Tanzania

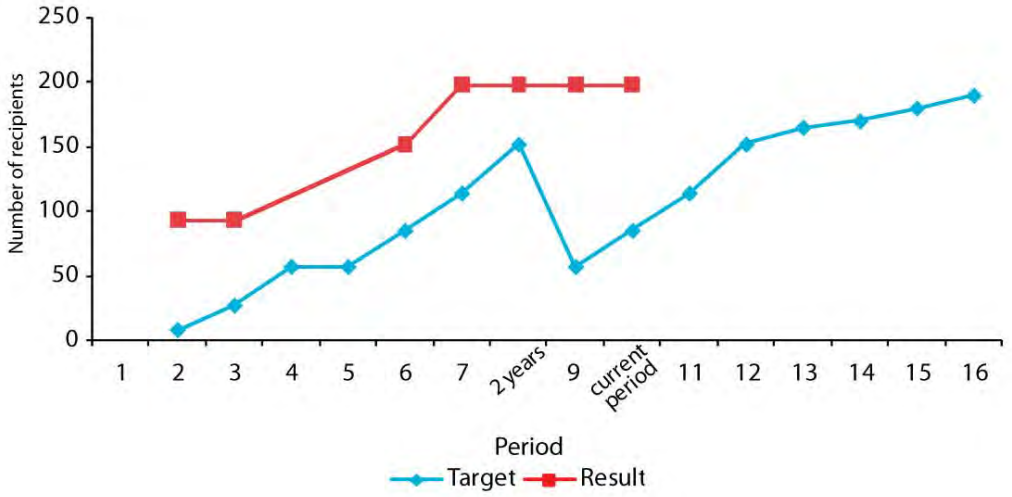
These operational research indicators, 6.1 and 6.2, are specific to the Kisesa project at Bugando Medical Center (Figures 27 and 28).

Figure 27
Indicator 6.1 Number of people from Kisesa ward identified by VCT who complete post-testing at Bugando Medical Center, by period, Tanzania



Source: http://the globalfund.org/programs

Figure 28
Indicator 6.2 Number of ART recipients being monitored by NIMR for changes in health status and vital statistics, by period, Tanzania



Source: http://the globalfund.org/programs

Observations: Further enquiries are needed to determine why reporting results on Indicator 6.1 "People identified at VCT" dropped off after the third and sixth periods. A possible reason is that new reports were not received, in which case further investigation is needed. The number of ART recipients, Indicator 6.2, was 205 for four straight reporting periods. The assumption, as before, is that this indicates the cumulative number; so it is not known how many ART recipients are actually being monitored in the current period. Therefore, for this indicator, it seems more important to track the number of people monitored at the end of every reporting period than to track the people ever-monitored. It would furthermore be important to learn if and how information on these patients is fed into the national health management information system (HMIS).

Objective 7. Provide coordination for multisectoral country programs

Indicator 7.1: Number of Civil Society Organizations included in Global Fund Country Coordinating Mechanism and National projects. The results for this indicator have exceeded the targets set for period 2 (38 vs. 0) and period 3 (38 vs. 15).

SUMMARY OF RESULTS, TANZANIA CASE STUDY

- ***Selection of final indicators in the GPR.*** Three-fourths of indicators in the original proposal were not selected for tracking, and a number of new indicators were introduced, as well as modifying the target levels of several original indicators either up or down. Such a difference between the originally proposed and the finally selected indicators and targets raises the following questions: On what bases are indicators defined and targets set? How is the negotiating process conducted between HQ and the PR (and SRs) to arrive at the final set of indicators and target levels? Is there consensus or at least a sharing of expectations with SRs so they are aware of the targets that their program is expected to meet?

- ***Measurement tools.*** More than half of the indicators selected are measured using routine administrative data such as patient records. The 2007-2008 Health Impact Evaluation revealed that there are significant data quality issues regarding the completeness of facility-based records, which are subsequently amplified at the central level, because of the aggregations of incomplete data. Therefore, for grant targets that are national, such as the Tanzania HIV grant, there should be in place a regular quality assurance mechanism to ensure that the results are accurate and complete (or if not, to what degree) so that adjustment may be made. Several indicators in this case study suggest that quarterly reporting is not dynamic.

- ***Type of indicator.*** About half of the indicators associated with the Tanzania HIV grant are "process indicators" and the other half are "output indicators." While these indicators provide important information on establishing necessary program foundations during the early-scale phase (the number of staff trained and clients reached, for example), they do not ultimately reveal progress in terms of intervention coverage and impact—two proximate determinants of program achievement in reducing disease burden. Therefore a long-term plan to address which outcome and impact indicators are desired to measure, and how and when they will be measured. In addition, since there are a multitude of potential determinants in these more advanced measurements, it may not be clear how much change may be attributed to the Global Fund-supported program and how this affects disbursement decisions.

- ***Indicator definition.*** Many or most of the indicators appear cumulative. It seems that for some indicators, it would be more informative to monitor the number of people in that quarter who initiated treatment or received a service—such as people on treatment, screening, nutritional support, etc. For cumulative indicators, it is suggested to change the definition of the indicator to read "ever on treatment," "ever received a service," etc.

- ***Integration of results into national HMIS.*** One of the main functions of a national HMIS is to collect a set of core internationally agreed-upon indicators, defined by country. Do data for these indicators—collected by the Global Fund—feed into the national HMIS, to strengthen that process? This exercise revealed some discrepancies in the process; for example, the number of VCT sites reported to the Global Fund appears quite different from the number reported in the same period for the Global Fund Impact Evaluation. Data from civil society organization-supported programs may be the most difficult to integrate into the HMIS reporting stream.

- ***Large shortcomings or gross overachievements for indicators are often observed.*** Targets for some indicators may be reliably set for the near future, but it is difficult to set meaningful targets for years in advance, even with the best data to inform the process. Without good information on which to set a target—transparently—the levels may represent either wildly optimistic guesses or overly easy benchmarks. Initial targets are hard to set because they are based on conjecture, not on experience; future targets are difficult to set because the changing landscape cannot be predicted. For example, if another provider steps in to serve the same target population—or the estimated number of people in need is actually much less/much more than anticipated—this results in either 1) moving targets, 2) inaccurate reporting of results to appear to meet targets, or 3) potential incentives extended or even coercion to recruit clients so that targets are met.

- ***Flat-lining, i.e., the exact same results reported over several periods.*** Several indicators—if not most—showed a flat line for four or more recent reporting periods (one year or more). Since these targets are usually cumulative, it is likely to be interpreted as that there are no new clients, or that no more condoms are distributed, etc. This indicates a program problem. On the other hand, a flat line may be that the same result is reported (e.g., number of clients, condoms distributed, etc.) but has not taken into account new clients/condoms, in which case there is a reporting problem.

- ***Achieving the objective.*** For most programs and activities, whether it is training people, forming new committees, or recruiting new clients, there should eventually be a point when the expected number levels off; i.e., the objective is achieved. For many indicators in the HIV grant, one sees a leveling off towards the latter part of the five-year period. For targets that do not level off in the defined reporting cycle (up to five years), it may be informative to project when this leveling off might happen.

- ***Target adjustment.*** Targets often appear to be adjusted up substantially if results had greatly exceeded them. On the other hand, countries report that it almost impossible to reduce targets even when there are justified reasons for the lag presented by the implementing bodies. Thus, the implementers will constantly underachieve on an indicator that was perhaps overestimated in the design stage, when in actuality this isn't the case. Would it be possible to set target ranges, instead of target points, thus acknowledging imperfect information (baseline or future information) available for setting targets?

- ***Quality of the indicator results.*** For example, in the number of people trained, nothing is reported or verified on the quality of training. The number of people trained keeps increasing, but whether the training has had any sustainable impact on the community seems hard to assess. The Global Fund is currently working on a measurement framework to quantify the quality of service.

IMPLICATIONS FROM THE HAITI PBF CASE STUDY

Given that the situation regarding HIV/AIDS, TB, and malaria is different in every country, the Global Fund should develop 2-3 indicator scenarios for each disease, depending on the level of prevalence of the disease and the likely intervention activities that are being planned. This would help countries establish their PBF platform.

It is clear that there are potentially many pitfalls to PBF. Few organizations will like to lose the funding that they are requesting and claim is needed. Therefore, oversight is key, and periodic audits of data recording at the SR and PR levels should be acceptable. They should be handled by independent entities.

Data generated by the system should be used as well to improve the situation at the local level, even more than serving as a means to rate a country, so that permanent improvements can be made. This seems to be happening to some extent but could possibly be strengthened.

On the other hand, there are also issues relating to how long and with what intensity certain efforts are most cost-effective. This would apply especially to IEC and advocacy activities. While this is

typically an important area for many grants, some reflection may be necessary on the scope and length of such activities, guided by available information regarding knowledge and behavior. That is, PBF plans do not need to be static. Rather, they should be dynamic and potentially subject to change during the grant period because of the achievements.

Some indicators are just too difficult to measure to even consider in the context of PBF. At the same time, just reporting on Ns is not so valuable and probably not reliable. For instance, indicators such as the number of orphans receiving support are probably very difficult to measure, or at least it will be difficult to interpret what the numbers mean in terms of really helping as many orphans as possible. On the other hand, targets for reaching large audiences are very nebulous and are probably not worth measuring through counting individuals, because of uncertainty in the process and the likely prevalence of guesstimates rather than good estimates.

Discussion

In addition to plotting results against targets and assigning a rating, the Grant Performance Review provides detailed contextual information about the grant implementation progress. These notes show that reasonable decisions were made about resulting ratings, disbursement timing, and disbursement amounts. However, an examination of the meaning of the results—beyond a quantitative assessment about where they were vis-à-vis the targets—reveals a shaky foundation for decisions on disbursements in the tens of millions of dollars. First, data sources and reporting systems are frequently inadequate to obtain reliable results on most indicators. Second, although target setting is a valuable tool for planning and management decisions, it is not ideal for long-term performance monitoring because the playing field changes. Third, the "sum of projects" does not result in an effective national program as a whole. That is, reporting for Global Fund programs should be seen as a means to strengthen the national HMIS, as well as to provide program monitoring data. Finally, an unbalanced focus on targets creates the risk of overlooking other non-quantifiable achievements such as transmission of knowledge, creativity, quality of care, and collaboration opportunities.

On a positive note, the experience gained so far on reporting practices would be extremely valuable to build upon, to improve record keeping and data collection at the facility level, and to reinforce the appreciation and use of data at the local level for management, as well as aggregating to feed into a central data repository.

ANNEX E
ACKNOWLEDGMENT OF COUNTRY TEAM MEMBERS

This report brings together the work of 18 country evaluation study teams. Below follows a list of the subcontractors involved in the country data collection and report writing.

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GREFSaD (Groupe de Recherche, d'Expertise et de Formation en Santé pour le Développement)
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CITF (Country Impact Task Force)
SRP (Siem Riep Provincial Health Department)
CENAT (National Center for TB and Leprosy Control)
NCHADS (National Center for HIV/AIDS, Dermatology and STD)
NIPH (National Institute of Public Health)
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EHNRI (Ethiopian Health and Nutrition Research Institute)

Ghana:
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MOH (Ministry of Health)
MUHAS (Muhimbily University of Health and Allied Sciences)

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CSO (Central Statistical Office)
Kumbutso Dzekedzeke (Coordinator)