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Abstract. The Global Fund to Fight AIDS, Tuberculosis, and Malaria was established in 2002 to fund substantial scaling-up coverage of proven and effective interventions to reduce infection, illness, and deaths in those communities most at risk. As of December 2006 the Global Fund has committed $2.6 billion over 5 years to support malaria prevention and control in 85 countries. The Global Fund has worked closely with Roll Back Malaria partners to develop consensus on a set of outcome and impact indicators that have been incorporated into malaria grant agreements. Although the Global Fund has recommended that 5–10% of grant funds be invested in improving the capacity of the national monitoring and evaluation systems, an average of only 3.9% is invested in these systems. Several countries are already demonstrating reductions in the malaria burden. To sustain the scale-up in funding to support malaria interventions, countries must ensure that resources are used now to show robust, systematic, and regular measurement of impact on the burden of malaria.

INTRODUCTION

The Global Fund to Fight AIDS, Tuberculosis, and Malaria was established in 2002 as the result of a global consensus that a new mechanism was needed to finance a massive and rapid international effort to prevent infection from the three diseases and provide treatment of those already infected. The Global Fund’s commitment to reducing the burden of the three diseases is clearly stated in the founding framework document: “The purpose of the Fund is to attract, manage, and disburse additional resources through a new public–private partnership that will make a sustainable and significant contribution to the reduction of infections, illness, and death, thereby mitigating the impact caused by HIV/AIDS, tuberculosis, and malaria in countries in need, and contributing to poverty reduction as part of the Millennium Development Goals”.

In addition to clearly underlining the importance of showing impact, the Global Fund has provided unprecedented financing for malaria prevention and control. As of December 2006, the Global Fund had already disbursed $865 million out of the $2.6 billion committed to support 126 malaria grants (including approved grants that are not yet signed) in 85 countries (Figure 1) over a 5-year period. Presently the Global Fund is the major source of external financing for malaria prevention and treatment globally, providing almost two thirds of the total amount.

The founding principles state that the Global Fund is “a financial entity, not an implementing instrument” and that in making funding decisions “the Fund will support proposals which . . . focus on performance by linking resources to clear, measurable, and sustainable results”. The Global Fund was thus set up to work through country and international partners, to refrain from being involved directly in program implementation, and to link funding decisions to evidence of program performance. The Global Fund’s reliance on effective partnerships supporting implementation at the country level demands close collaboration with established partner-

ship coordinating mechanisms for the 3 diseases, including the Roll Back Malaria (RBM) partnership.

A core part of the Global Fund architecture is the Technical Evaluation Reference Group (TERG), which provides independent advice to the Board and Secretariat on monitoring and evaluation approaches and practices. In regard to impact evaluation, the TERG has clearly stated that, in assessing reduction in the burden of malaria morbidity and mortality as a result of country efforts to scale up coverage of prevention and control, the Global Fund should not attempt to evaluate the efforts of its contributions alone, but rather focus on the joint contributions of all relevant partners. Therefore, in working toward malaria goals and targets stated by RBM, the United Nations, the African Heads of State at the Abuja meeting in 2000, and the World Health Organization (Box 1), the Global Fund supports measurement of the “collective impact” of the work of the national program and implementing partners. This article lays out the important elements of its evaluation framework, the performance-based funding model, approaches to measuring impact supported by the Global Fund, and opportunities for use of Global Fund grants to support these activities.

Evaluation framework of the Global Fund. The Global Fund has a 4-tiered implementation framework, spanning from the grant operation issues to measuring impact in terms of effects on disease-associated mortality and morbidity (Figure 2). The Global Fund evaluates the performance of its operational structures, such as the speed of disbursements, the grants it funds in terms of increasing people reached by services, and the effectiveness of country and partnership systems through which it implements (e.g., by measuring indicators for aid effectiveness). Ultimately the evaluation framework builds toward disease impact, including declining incidence and prevalence and mortality of HIV, TB, and malaria.

The Global Fund is fully responsible for its operational performance. However, as evaluation moves to the higher levels of the framework and builds over time toward impact, results are increasingly due to the collective effort of a number of partners and not solely those of the Global Fund. Although during the initial phase of the grant life cycle the focus is on operational performance and grant performance, over
Figure 1. Global Fund grants to support malaria prevention and control.

### Key Malaria Control Goals and Targets

**Global Roll Back Malaria Partnership Strategic Plan**

**By 2010**

- 80% of people at risk for malaria are protected, thanks to locally appropriate vector control methods such as insecticide-treated nets (ITNs) and, where appropriate, indoor residual spraying (IRS) and, in some settings, other environmental and biological methods
- 80% of malaria patients are diagnosed and treated with effective antimalarial medicines (e.g., artemisinin-based combination therapy (ACT) within one day of the onset of illness)
- In areas where transmission is stable, 80% of pregnant women receive intermittent preventive treatment (IPT)
- Malaria burden is reduced by 50% compared to 2000

**By 2015**

- Malaria morbidity and mortality are reduced by 75% in comparison with 2005, not only by national aggregate but particularly among the poorest groups across all affected countries
- Malaria-related MDGs are achieved, not only by national aggregate but also among the poorest groups across all affected countries
- Universal and equitable coverage with effective interventions

**United Nations Millennium Development Goals**

**Goal 6, Target 8:** to have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

**Indicator 21.** Prevalence and death rates associated with malaria

**Indicator 22.** Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures

**Abuja coverage targets (from the African Summit on Roll Back Malaria, April 2000)**

**By 2005:**

- At least 60% of those suffering from malaria should be able to access and use correct, affordable, and appropriate treatment within 24 hours of the onset of symptoms
- At least 60% of those at risk of malaria, particularly pregnant women and children under 5 years of age, should benefit from suitable personal and community protective measures such as ITNs
- At least 60% of all pregnant women who are at risk of malaria, especially those in their first pregnancies, should receive IPT

**World Health Assembly 2005**

- To establish national policies and operational plans to ensure that at least 80% of those at risk of, or suffering from malaria, benefit from major preventive and curative interventions by 2010 in accordance with WHO technical recommendations to ensure a reduction in the burden of malaria of at least 50% by 2010 and 75% by 2015
the longer term demonstrated scaling-up of coverage of prevention and treatment tools and subsequent evaluation of impact on the clinical burden of disease becomes increasingly important. The Global Fund recognizes that it is necessary to invest in improving the capacity of the national monitoring and evaluation systems in the early years of the grant life cycle to plan and conduct an adequate evaluation on the disease burden over the subsequent 2–5 years. Planning for impact evaluation begins in the initial phase of the grant life cycle because this requires investments both in collection of reliable baseline estimates of the malaria burden as well as in data collection at later time points to assess whether increased coverage of those most affected by malaria has resulted in a reduction in illness and deaths.

**Global Fund performance-based funding model.** In establishing the framework for its performance-based funding model, the Global Fund has committed to harmonizing country reporting, data standards, and reporting platforms in a single monitoring and evaluation system. The Global Fund has developed an effective system for receiving proposals and managing and monitoring grants based on principles of accountability, transparency, and country ownership. All information on performance of each grant, together with the original grant proposal and legal agreement, are available on the Global Fund website (www.theglobalfund.org). The Global Fund implements performance-based funding according to targets and indicators defined and agreed to in the initial grant agreement. Funds are disbursed based on reported evidence of progress in meeting these targets. The typical grant funding is approved for a period of 5 years. This period is divided into 2 phases: initially, funds are committed for the first 2 years (“Phase 1”) after which its performance is evaluated through an extensive review process. If performance in the first 2 years of the grant is considered adequate, additional funds are committed for the remaining 3 years (“Phase 2”).

Early in the grant cycle as program activities are just beginning to scale-up, the primary focus of reporting is on input, process, and output indicators. Disbursement of funds is related to the speed of implementation rather than to a fixed calendar. If activities supported by the grant are implemented more rapidly than expected, funding can be accelerated. On the other hand, if performance in Phase 1 is inadequate and it is likely that the slow pace of implementation will continue during Phase 2 of the grant, additional funds may be withdrawn and reallocated to other grants that have demonstrated better performance. Ultimately, the success of the Global Fund will be determined by the contribution its investments have made, in coordination with the contributions of other partners, on reducing morbidity and mortality due to the 3 diseases over the course of the 5-year funding cycle. To measure this impact across its portfolio, the Global Fund ensures that grants entering Phase 2 of funding include impact measurement among performance indicators on which the grant recipients are required to report before the end of the 5-year grant cycle.

At 24 months in the grant life cycle, the Global Fund Secretariat conducts a complete review of grant performance, taking into account both quantitative results in meeting targets as well as contextual information, to decide on whether to continue funding for the remaining 3 years of the grant life cycle. As of November 2006, a total of 53 malaria grants had been evaluated for Phase 2 funding. They provide an important window into the performance and challenges of Global Fund investments (individual grant performance information is available at www.theglobalfund.org). Overall, 15% of the performance on malaria grants were rated as excellent (compared with 23% for all grants for the 3 diseases), 55% were satisfactory, 23% were inadequate, and 8% were unacceptable (Figure 3). Performance of malaria grants was hindered in the early stages of program implementation by significant procurement delays for long-lasting insecticide treated mosquito nets (ITNs) and for artemisinin-based combination treatments (ACTs). These delays were in part due to global supply issues, as well as to the need for national procurement systems to be further streamlined for more rapid action. However, once procurement delays and other early challenges were overcome, there are many examples of malaria grant implementation picking up speed and overcoming the initial delays.

Ethiopia provides a good example of a malaria grant that can be slow to get started, but can then catch up rapidly once initial problems are solved. In June 2005, the Ministry of
Health (MOH) of Ethiopia, the Principal Recipient of the Global Fund grant, had not yet delivered a single grant-supported long-lasting ITN despite a target of 2 million ITNs for delivery by this date. This was largely due to in-country procurement bottlenecks, along with global supply-side problems. The Global Fund sent a clear message to the MOH that funding would be discontinued if the ITNs were not delivered before the next malaria season. The urgency of the conditions provided clear incentives for the country to identify innovative solutions for this slow program implementation. The MOH requested technical support from UNICEF, increased their procurement office capacity, and invested to remove delays in the national supply chain. As a result, 2 million long-lasting ITNs were distributed within 4 months before onset of the malaria season. During Phase 1 of the grant the MOH also was able to train 4,416 health workers on ITN use, train 5,222 health workers on malaria diagnosis and treatment, deliver 2 million ACT doses to targeted districts, and develop an epidemic preparedness plan for 50% of the epidemic-prone districts. Given this rapid improvement in performance, Global Fund grant disbursements for 2006 were accelerated to allow rapid scale-up of the response to achieve impact. The results demanded by performance-based funding provided major incentives to focus efforts in overcoming the implementation bottlenecks. The Ethiopia malaria grant is undergoing review for continued funding for an additional 6 years (11 years total) based on its performance and, critically, its potential for impact. This newly established “rolling continuation channel”\(^9\) provides strong incentives for grants to measure impact, which is a primary basis for consideration for continued funding.

**Global Fund support for impact evaluation.** The Global Fund recognizes that reaching a high level of coverage of populations most affected by malaria with effective prevention such as ITNs will result in demonstrable reductions in the malarial illness and deaths within a relatively short period of time.\(^1\) Countries such as Burundi, Eritrea, and Zanzibar have made major gains over the past 3–4 years in successfully scaling-up ITNs and access to more effective treatment with ACTs. These countries are already reporting dramatic impact on the malaria burden, with Burundi documenting a 39% reduction, Eritrea a 50% reduction, and Zanzibar a 34% reduction in malaria cases since 2000.\(^8\)

As an active member of the RBM Monitoring and Evaluation Reference Group (MERG, www.rollbackmalaria.org), the Global Fund works closely with WHO and other technical partners in developing consensus on a set of outcome and impact indicators that are consistent with RBM guidance and the Millennium Development Goals. The indicators and measures to show impact recommended by the MERG have been included as priority components of its multi-partner monitoring and evaluation toolkit\(^12\) (Table 1). Evaluation of impact on the disease burden focuses on reduction in malaria cases and deaths.

The ability to track changes in malaria cases and deaths is affected by many factors, among the most important of which are access to health services and the ability of the health information system (HIS) to capture and report data on malaria cases and deaths in a consistent manner over time. The greatest burden of severe malarial illness and deaths occurs in rural areas of tropical Africa, where access to quality healthcare services is limited, HIS systems are weakest, and most deaths occur in young children at home and may not be included in HIS reports. Therefore, especially in malarious areas of Africa, data collected through the HIS should be supplemented with quality population-based surveys to collect data on both coverage of prevention and treatment in young children, in addition to all-cause child mortality.

All-cause under-5 mortality is best measured by nationally representative household surveys such as the Demographic and Health Surveys\(^13\) (DHS) and the UNICEF Multiple Indicator Cluster Surveys\(^14\) (MICS), in addition to national census data when available. Both the DHS and the MICS include standardized questions on use of prevention and treatment as well as all-cause mortality among children under 5 years of age. The sample framework and size for a typical nationally representative household survey such as DHS is adequate to assess reductions of 15% or greater in under-5 mortality.\(^15\) To supplement data on all-cause under-5 mortality, the prevalence of childhood anemia\(^16\) and parasitemia are potentially useful survey-based indicators; DHS includes an option of including fingerstick blood sampling for malaria parasitemia screening and hemoglobin measurement. Coverage indicators are also measured in DHS and MICS, as well as in the Malaria Indicator Survey (MIS).\(^17\) The time trends in all-cause child mortality and intervention coverage could be used together to model the trend in malaria-specific mortality (and morbidity) in children under 5 years of age.\(^18\) Despite the complexity and costs involved, more malaria-endemic countries are conducting population-based surveys to provide the necessary data. However, DHS and MICS are usually conducted at 5-year intervals, and further investments will be required for additional survey data to better inform the evaluation of impact within the 2010 and 2015 time frames required by the RBM and MDG initiatives.

In areas where the overall healthcare system is more developed, where the majority of patients access the formal healthcare system, and where malaria diagnosis is generally laboratory-confirmed, malaria cases and deaths reported in the HIS may provide a good indication of the time trend in malaria incidence and malaria-attributable deaths, provided that reporting completeness is stable over time. It is unlikely, however, that even in these areas the national HIS would capture the full burden of morbidity and mortality. Thus, these areas could also benefit from investment in assessment of completeness of reporting of malaria cases and deaths.
The Global Fund has recommended that 5–10% of grant funds should be targeted to strengthening capacity for monitoring and evaluation systems. Thus, the US $2.6 billion committed for malaria grants in the first 6 rounds of funding provides the potential for a combined US$ 130–260 million to strengthen malaria monitoring and evaluation systems during this same time period in recipient countries. However, by mid 2006, across the entire grant portfolio, an average of only 3.9% of funds was being invested in monitoring and evaluation activities; thus, there is a large reservoir of potential financial support for strengthening monitoring and evaluation systems that remains untapped. The Global Fund works closely with the Health Metrics Network (www.who.int/healthmetrics) in a common effort to direct disease-specific investments to assist with strengthening the overall country HIS. At the country level, the RBM partnership in support of the National Malaria Control Program may engage in a variety of activities to build toward impact evaluation. These activities may include regular assessment of the completeness of reported data through HIS to produce better estimates of cases and deaths, as well as promotion of intermittent population-based surveys. Global Fund grant funds targeted for monitoring and evaluation are quite flexible and can be used for a range of activities, from assessment of surveillance systems to support for surveys to addition of laboratory testing where needed (Table 2).

Global Fund grant funds can be allocated to Monitoring and Evaluation (M&E) at any stage of the grant, and do not need to wait for new approved proposals. Funded programs should aim to take the following steps to fill gaps with partners using existing and new Global Fund grants:

1. Assess the portion of the grant spent on monitoring and evaluation, and justify if this is not in the 5–10% recommended range
2. With partners, carry out an assessment of the strengths and weaknesses and priority needs of the monitoring and evaluation system (a Monitoring and Evaluation Systems Strengthening Tool19 has been developed by the Global Fund with major partners to facilitate this process)
3. Define investments to strengthen the national HIS so that data is routinely reported at each level of the system with a known level of completeness
4. Use Global Fund money to support population-based surveys (e.g., DHS, MICS, MIS) as needed. These surveys should provide baselines and updates every 2–3 years
5. Ensure that analytical capacity is supported to analyze and report on the results of national data sets and surveys

### Table 1

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Highly* endemic malaria</th>
<th>Unstable* malaria</th>
<th>Measurement</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPACT</td>
<td></td>
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<tr>
<td>Malaria-attributed deaths (all-cause under-5 mortality rate in highly endemic areas)</td>
<td>√</td>
<td></td>
<td>Retrospective, ideally every 5 years using national household surveys (DHS, MICS, MIS)</td>
<td>Should be interpreted alongside trends in intervention coverage. It should be noted that demonstration of impact could lag up to 5 years because reported mortality reflects the average rate over the 5 years preceding surveys.</td>
</tr>
<tr>
<td>Anemia prevalence in children under 5 years of age</td>
<td>√</td>
<td></td>
<td>Household surveys every 2–3 years (DHS, MICS, MIS)</td>
<td>Useful measure of malarial morbidity in areas of stable malaria transmission. Anemia is defined as hemoglobin below 11 g/dl (mild) or 8 g/dl (moderate-to-severe).</td>
</tr>
<tr>
<td>Parasite prevalence rates</td>
<td>√</td>
<td>√</td>
<td>Cross-sectional, ideally measured every 2–3 years using household surveys (DHS, MICS, MIS)</td>
<td>In high-burden areas, parasite prevalence is best measured among children during the malaria transmission season; reductions in parasite prevalence are likely to be detectable within 1–2 years of achieving high-level coverage of ITNs or IRS.</td>
</tr>
<tr>
<td>Laboratory-confirmed malaria cases seen in health facilities</td>
<td>√</td>
<td></td>
<td>Continuous, using the Health Information System (HIS)</td>
<td>Trends in malaria cases and deaths through HIS surveillance reports require regularly updated estimates of HIS reporting completeness</td>
</tr>
<tr>
<td>Laboratory-confirmed malaria deaths seen in health facilities</td>
<td>√</td>
<td></td>
<td>Continuous and immediate</td>
<td>The observed trend might underestimate the actual impact on malarial deaths due to limited sensitivity and specificity of verbal autopsy data.</td>
</tr>
<tr>
<td>Malaria-attributed deaths in sentinel demographic surveillance sites</td>
<td>√</td>
<td>√</td>
<td>Continuous and immediate</td>
<td></td>
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### Table 2

<table>
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<tr>
<th>Required data</th>
<th>Possible Global Fund support</th>
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<tr>
<td>Completeness malaria case and death reports in HIS (low endemic areas)</td>
<td>Promote and finance regular HIS assessments as part of grant monitoring and evaluation plan</td>
</tr>
<tr>
<td>All-cause under-5 mortality (high endemic areas)</td>
<td>Promote and finance conduct of DHS or MICS surveys</td>
</tr>
<tr>
<td>Childhood anemia (high endemic areas)</td>
<td>Promote and finance anemia testing in DHS and MIS surveys</td>
</tr>
<tr>
<td>Parasite infection prevalence (all endemcities)</td>
<td>Promote and finance inclusion of parasite prevalence in MIS or other household surveys such as DHS</td>
</tr>
</tbody>
</table>
6. Provide funds to support operational research to ensure “learning by doing” as interventions scale-up toward impact.

**Five-year evaluation of the Global Fund.** In approving the Monitoring and Evaluation (M&E) Strategy in 2003, the Board of the Global Fund called for “a first major evaluation of the Fund’s overall performance against its goals and principles after at least one full grant funding cycle has been completed”. At its 14th meeting in early November 2006, the Global Fund Board approved a framework document on the scale and scope of the Five-Year Evaluation. One of three study areas for this ambitious evaluation addresses the overarching question: “What is the overall reduction of the burden of AIDS, tuberculosis, and malaria and what is the Global Fund’s contribution to that reduction?”

The impact evaluation component will involve a comprehensive assessment, focused on at least 20 selected countries, of the collective scale-up of prevention and treatment programs, and the reduction in overall disease burden of HIV/AIDS, tuberculosis, and malaria. Where possible, the share of Global Fund contributions relative to overall investments, and to other major contributors, will be mapped. The evaluation is not, however, focused on attribution of impact to any particular donor. Rather, the intention of this ambitious undertaking is to assess the overall impact of national programs, showing the contribution of all major sources of financial support, including the Global Fund as well as national and other international partners. Again, a major challenge to this is the fact that in many countries where large investments by the funding partners correspond with heavy malaria disease burden, the health infrastructure tends to be weak and reliable data are seldom readily available. Because most national malaria control programs in these high-burden countries have only recently received major financial support to scale-up activities, baseline data on the malaria burden may be non-existent or outdated. Thus, without investment in collection of relevant, good-quality baseline and follow-up data, the accurate quantification of significant malaria disease trends—the very foundation of an impact evaluation—will be difficult.

In at least 8 of the 20 selected countries there will be significant new investments to fill targeted data and information gaps through primary data collection in 2007. A major objective of the impact evaluation is to strengthen country capacity and systems for ongoing impact measurement. Thus, in addition to the existing grant monitoring and evaluation budgets in these countries, at least 75% of the impact evaluation budget will be made available for country-level investments in capacity strengthening. The final report on the impact evaluation will be presented to the Board in November 2008. The Global Fund intends for these collaborative efforts over the next 2 years to create an impetus for a sustained focus on impact evaluation that will extend beyond the initial group of countries and well into the next decade.

**CONCLUSION**

The Global Fund shares the goals of its partners to work collectively towards decreasing illness and deaths due to malaria, in line with the efforts of Roll Back Malaria partners and the Millennium Development Goals. In addition, the Global Fund is making unprecedented financial resources available to strengthen systems for surveillance, monitoring and impact evaluation. Global Fund grants in support of national programs should contribute to the intervention and impact measurement efforts defined by key partners and agreed to by countries. In all countries that are recipients of Global Fund grants there will be ongoing efforts to build more robust systems to capture trends in the coverage of malaria prevention and treatment tolls and subsequent decreases in the burden of malaria.

Countries urgently need the support of Roll Back Malaria technical partners in line with guidance from the MERG to define the key impact measurement tools, to prioritize areas for strengthening monitoring and evaluation systems, and to provide budgeted impact evaluation plans into which a portion of the 5–10% of Global Fund program resources can be invested.

Countries also must embrace the importance of measuring impact and ensuring that baselines and surveys are in place as soon as possible. Substantial investments in scaling-up coverage of interventions should be accompanied by similar commitment and ambition to scale-up malaria impact evaluation efforts. Impact evaluation also provides critical information on how to better manage scaling-up of activities that still require evidence of effectiveness on a wider, national scale. In addition, the recent major increases in funding for malaria prevention and control are likely to be sustained only if trends toward significantly fewer cases of malarial illness and death are demonstrable in at least a few countries within the next 2–3 years. The performance-based funding system of the Global Fund has strong incentives to promote flexibility in implementation, as long as countries continually prove the results and the impact of these investments. To sustain the scale-up in funding to support malaria interventions, partners and countries must ensure that resources are used now to show robust, systematic, and regular measurement of impact.

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