



Monitoring and Evaluation Reference Group (MERG) GUIDANCE NOTE

Assessing the Impact of Malaria Control Activities on Mortality among African Children Under 5 Years of Age

BACKGROUND

The Roll Back Malaria Monitoring and Evaluation Reference Group (MERG) was established in 2003 to advise the Partnership on key monitoring and evaluation issues, including guidance on monitoring progress toward malaria-specific international goals and commitments. A stated goal of the RBM Partnership is to halve the burden of malaria by 2010. Other major international goals, such as the Millennium Development Goals, also call for reducing the malaria burden.

It was previously proposed that malaria-specific mortality be the principal indicator for assessing malaria's burden, as it is the most important contributing factor to this burden, as measured in DALYs.¹ However, there are significant challenges to monitoring changes in malaria-specific mortality, especially in the areas of high-intensity malaria transmission in Africa south of the Sahara, where the greatest burden of malaria-specific mortality occurs, mainly among young children, and where vital registration and health information systems are weakest. In these countries no one source of information is available that provides robust and timely information for this mortality impact assessment. Table 1 provides an overview of the benefits/drawbacks of the various potential information sources for this assessment. A more detailed discussion is also available in Rowe et al (forthcoming).²

PURPOSE

The purpose of this technical note is to provide guidance on how best to assess the impact of malaria control activities on mortality among African children. This guidance note focuses on the mortality impact assessment for African children under five years of age, as this population bears the greatest burden of malaria-related mortality. A detailed discussion of the technical considerations for this recommendation is provided in Rowe et al (forthcoming).² Further work is still needed to determine the best approach for such an assessment among older children and adults in Africa and as well as in other geographic regions.

The RBM MERG recognizes that there are a number of limitations with each of the potential measurements of malaria's burden and changes in that burden. Thus, there is no perfect single or set of measurements to track burden and burden reduction. For example, the measurement of malaria-specific deaths is problematic. In most malarious areas, most deaths occur outside of any system of death registration linked with health facility and laboratory confirmation. Verbal autopsy methods can be used to categorize a death as caused by malaria, yet with imperfect specificity and sensitivity. And, it is widely recognized that malaria contributes to many deaths even though the ultimate cause may be categorized as due to another condition. Thus, we offer recommendations and guidance in this context of imperfect sensitivity and specificity of malaria-specific and malaria-associated mortality.

RECOMMENDATION

The RBM MERG recommendation first sets out the minimum needed by all countries to implement the malaria impact assessment, and then provides options for additional analyses, if needed. This ‘minimum standard’ approach intends to help ensure consistency across countries in the method used for this assessment. It is also based on the recognition that monitoring efforts in resource-poor settings should focus on collecting only those indicators that will be reliable and useful for decision-making purposes.

Therefore, at a minimum, the RBM MERG recommends that all countries south of the Sahara with high-intensity malaria transmission should:

- First, regularly monitor coverage of key malaria control interventions based on data derived from high quality and statistically-sound household surveys, such as the Multiple Indicator Cluster Surveys (MICS), the Demographic and Health Surveys (DHS) and the Malaria Indicator Surveys (MIS).
- Second, regularly monitor all-cause under-five mortality based on data from statistically-sound national-level household surveys, such as MICS and DHS. In addition, annual estimates of under-five mortality for all countries are produced by the Interagency Group for Mortality Estimation (UNICEF, WHO, World Bank and UN Population Division) which are available at www.childinfo.org.
- Third, use coverage estimates of key malaria control interventions as inputs to the child survival impact model, which has been developed by the Child Health Epidemiology Reference Group (CHERG). Based on these inputs, the model can predict the impact of malaria control programs on mortality among African children. (See ‘model-based approach’ section)

Additional data collection and analyses where there is better country capacity to conduct special studies:

- If complementary and robust data are available, such as from local research projects or sentinel surveillance sites, countries may decide to use this information for a more in-depth assessment of trends in malaria-specific mortality. In addition, if malaria morbidity data are available (e.g. anemia and parasite prevalence) this information may also be used by countries to further substantiate the predictions of the model. For example, if increases in malaria intervention coverage are accompanied by reductions in anemia and parasite prevalence, then it is likely that malaria-specific mortality has been reduced. Finally, verbal autopsies attached to household surveys may be able to provide information on malaria-specific mortality. However, operational research is needed to determine the validity of data collected using this tool before it can be recommended. A full discussion of these potential analyses is available in Rowe et al (forthcoming).²
- Review malaria data from health information and vital registration systems to better understand the gaps in these data sources, and to analyze the burden of malaria on the health system itself.

MODEL-BASED APPROACH

Given the significant challenges to directly measuring changes in malaria-specific mortality, an innovative and useful model has been developed by the Child Health Epidemiology Reference Group (CHERG) that allows users to predict the impact of a range of child survival interventions (including those for malaria) on under-five mortality. The child survival impact model links coverage of key child survival interventions (including those for malaria) with an estimate of each intervention's efficacy. Based on these inputs, the model is able to predict the proportionate reduction in under-five mortality due to increasing coverage of key child survival interventions (including those for malaria) from a baseline value to a current level.

This model-based approach has been used by UNICEF to evaluate the impact of its Accelerated Child Survival and Development (ACSD) program.³ This approach is practical, cost-effective and provides immediate outputs. In addition, the model-based approach may be systematically and immediately implemented in all countries south of the Sahara with high-intensity malaria transmission that have conducted good quality household surveys.

In the coming months, the model will be developed into a user-friendly software package for use at the country level. The first version of this software package will become available in 2007. In addition, validation of the model will be carried out in 2007 to substantiate the accuracy of the model's predictions. Based on this assessment, the model's assumptions may then be adjusted to improve comparability between the model's predictions and observed mortality trends.

Table 1: Summary of the attributes of information sources for malaria-associated mortality

Attribute	Source of mortality information				
	National-level household surveys (e.g. DHS, MICS)	Sentinel surveillance sites (e.g. DSS)	Verbal autopsies attached to household surveys	Vital registration and health information systems	Model-based approach
Representativeness	Excellent	Not nationally representative	Excellent	Not nationally representative	Excellent
Validity of deaths attributed to malaria	Not applicable	Validity of verbal autopsies from DSSs is good at population level; individual deaths often misclassified	Operational research needed to determine validity of data collected	Fair (if no lab confirmation) to Excellent (if lab confirmed)	Uses intervention coverage estimates as inputs to derive estimate of mortality impact; validation of model to begin shortly
Relative costs	Expensive (but costs may be shared)	DSSs are expensive (but costs may be shared)	Expensive (but costs may be shared)	Inexpensive (but improving data collected through systems will be expensive)	Inexpensive
Timing	All cause under-five mortality estimates typically refer to 5-year period prior to data collection	Provides timely mortality data	Estimates typically refer to 5-year period prior to data collection	Provides timely mortality data	Provides timely mortality estimates
Overall Comment	MERG Recommendation Does not provide malaria-specific mortality; use for regular monitoring of malaria intervention coverage and under-five mortality (key inputs to model-based approach)	Not available in most countries; long time period required to set up new DSSs and for new sites to then collect and report relevant data; provide sub-national data where available; high cost and long time period needed to set up new DSSs	More operational research needed to determine robustness of this data source; long time period needed for operational research to be conducted	Currently available; data reporting from district to national level often slow and incomplete; need to provide an estimate of completeness of reporting which can be used for estimating cases	MERG Recommendation Use for malaria impact assessment; low cost; immediate outputs; validation to begin shortly

Source: Rowe et al, *Methods for evaluating the impact of malaria control efforts on mortality in Sub-Saharan Africa* (submitted for publication).

References

¹ Roll Back Malaria. Framework for Monitoring Progress and Evaluation Outcomes and Impact, 2000, Geneva: World Health Organization. Available at: http://rollbackmalaria.org/cmc_upload/0/000/012/168/m_e_en.pdf.

² Rowe, AK, RW Steketee, F Arnold, T Wardlaw, S Basu, N Bakayita, M Lama, CA Winston, M Lynch, B Nahlen for the Roll Back Malaria Monitoring and Evaluation Reference Group (MERG), Methods for evaluating the impact of malaria control efforts on mortality in sub-Saharan Africa (submitted for publication).

³ United Nations, "Report of the Executive Director: Results Achieved for Children in 2004 in Support of the Medium-Term Strategic Plan", 2005, Economic and Social Council, E/ICEF/2005/7. Available at: [http://www.unicef.org/about/execboard/files/05-6_ExecDrs_report2\(1\).pdf](http://www.unicef.org/about/execboard/files/05-6_ExecDrs_report2(1).pdf); and UNICEF, "Child Survival", 2006, Available at: http://www.unicef.org/health/index_childsurvival.html