

Notes on data sources

Data on the progress in coverage with RBM interventions and on the burden of malaria at population level in Africa are increasing. This report drew information mainly from the following sources, which are described here with a focus on their quality, reliability, representativeness, and potential for future RBM monitoring.

Demographic and Health Surveys

Demographic and Health Surveys (DHS) are nationally representative household surveys that focus on reproductive and child health. They are organized by Macro International, Calverton, MD, USA and sponsored by the United States Agency for International Development (USAID) (1). Data are freely available on the Internet, at <http://www.measuredhs.com/>, approximately 1 year after completion of the fieldwork. Typically, DHS consist of interviews with between 4000 and 12000 women aged 15–49 years living in households that are sampled in a multiple-stage cluster design. Between 1990 and 2002, 10 African countries have had 1 DHS, 17 have had 2, and 4 have had 3 or more. The average interval between two DHS is 5–6 years. The questionnaire addresses, inter alia, household living conditions and assets, and child health through birth histories. Because questionnaire are standardized and structured and change little between surveys, DHS outcomes are comparable between countries and over time.

Malaria-relevant indicators include the reported treatment and care (whether antimalarials were given and facilities attended) to under-5s who had fever in the 2 weeks preceding the survey. Since 1998, some DHS have used specific questions on malaria prevention and treatment, including the type of antimalarial drugs given, timing and dosage, possession of mosquito nets and their use for under-5s and pregnant women, and the use of by pregnant women. Since 2001, most of these questions have been grouped in a standard malaria module, now to be used in all surveys conducted in malarious countries. The interpretation of DHS malaria modules must take into account that these surveys are (for logistical

reasons) mostly conducted in the dry, least malarious season.

DHS are additionally a primary source of information on under-5 all-cause mortality rates, obtained by the direct estimation technique, i.e. from birth histories. Recent DHS also measure the prevalence of anaemia by haemoglobin measurement in children under 5 and (pregnant) women; in future this may prove to be a very useful indicator of malaria burden and a proxy for malaria-related mortality.

Multiple Indicator Cluster Surveys

Between 1999 and 2001, Multiple Indicator Cluster Surveys (MICS) were conducted in 67 countries around the world with support from UNICEF. MICS are nationally representative and sampled through a two-stage cluster design, with an average sample size of around 6000 households. A household questionnaire covers living conditions and household assets, allowing the data to be stratified by such factors as place of residence, education of the mother, and wealth quintile of the household.

For 24 countries in Africa, the survey included a malaria module with questions related to the prevalence of fever in the previous 2 weeks, type of treatment received and place of treatment, as well as use of any nets and of insecticide-treated nets by children under 5. Relevant data were also collected on indicators such as all-cause mortality among children under 5 and coverage of antenatal care. Survey results and questionnaires are freely available on the Internet at <http://childinfo.org/>. As DHS most MICS were conducted outside of the peak malaria season.

The next round of MICS is planned for 2004–2005 and these will again include questions on malaria prevention and treatment, and possibly additional questions on household availability of nets, dosage and timing of antimalarial treatment, and IPT among pregnant women.

Demographic Surveillance Sites

Demographic surveillance sites (DSS) monitor births, deaths, and health in geographically

defined populations, continuously over time. They measure mortality due to specific causes, including malaria, by using verbal autopsies – interviews with surviving relatives on the symptoms that preceded death. Of all DSS sites, 29 from 16 African countries collaborate under the RBM-supported INDEPTH network (International Network of field sites with continuous Demographic Evaluation of Populations and Their Health in developing countries). Further information on the INDEPTH network is available at <http://www.indepth-network.net/>. INDEPTH aims to strengthen technical and research capacity, and to promote the use of standardized methodological tools (such as verbal autopsy questionnaires) and the application of information to policy and practice (3).

Although coverage is limited to about 0.2% (1.3/650 million) of the African population (3, 4), DSS are practically the only source of information on malaria-attributed mortality at a population level. Also, their prospective nature means that DSS-based estimates of all-cause under-5 mortality are typically more precise and more up-to-date than those from the retrospective DHS or MICS. Nevertheless, there are concerns about the representativeness. Large-scale phase III and phase IV community health intervention trials are often carried out at DSS (5, 6); if successful, the tested interventions are implemented on a large scale thereafter. Coverage with interventions, including ITNs, may therefore be higher than in the surrounding population, and the disease burden – in general or of the specific targeted disease – consequently lower.

RBM baseline surveys

In 2000 and 2001, 17 countries in Africa south of the Sahara conducted surveys to determine their baseline situations with respect to rolling back malaria. The surveys included a facility component and a community (household) component. Default questionnaires were adapted for local use, and outcomes vary in comparability between countries. Most countries followed the sampling guideline, which specified that three or four districts of different malaria endemicity were to be chosen. In each district, the highest-level health facility (usually a hospital), two health centres and three clinics were randomly selected; for each sampled facility, the nearest and the farthest

communities in its catchment area were sampled, bringing the total to around 15 facilities, 30 communities, and 1000 households. Outcomes are not nationally representative but provide indications of disease status of malaria and control implementation in the districts most affected by malaria and most targeted by the national malaria control programme (NMCP).

The household component addresses net possession and use and treatment-seeking for fever. For some core RBM indicators (drug stock-outs, correct clinical management of malaria patients, and availability of diagnostic services), the health facility component of the RBM baseline surveys the main or only current source of data. When coverage estimates from the RBM baseline surveys are compared with national estimates from DHS or MICS, the baseline surveys typically give higher rates, as expected from their focus on targeted areas of the NMCP.

Routine Health Information Systems

Routine Health Information Systems (HIS) are the source of national data on malaria cases and deaths seen in health facilities. In principle, these data are national, but in practice not all facilities and districts report. The numbers of cases and deaths reported are therefore less than the actual clinical burden. More importantly, the clinical burden represents only a fraction of the total burden in the population, since most malaria patients either do not seek treatment or are treated outside the formal health sector (7). To add to the uncertainty, case loads are based largely on clinical, rather than parasitological diagnosis. To reduce the consequent bias, this report focuses not on absolute numbers of recorded malaria cases and deaths, but on the proportion of the burden of recorded events (outpatient clinic visits, hospital admissions, deaths in hospitals) accounted for by malaria.

Table 1. Data availability by source, for indicators used in this report, as of February 2003

	DHS	MICS	RBM baseline surveys, component:			DSS	Routine HIS
			community	health facility	NMCP		
Burden / Impact							
All-cause under-5 mortality (in population)	✓	✓				✓	
Malaria-attributed mortality (in population)						✓	
Malaria as % of outpatient visits							✓
Malaria as % of hospital admissions							✓
Malaria as % of hospital deaths							✓
ITNs							
Household possession of nets/ITNs	✓		✓				
% of under-5s sleeping under net/ITN	✓	✓	✓				
Antimalarial treatment							
% of febrile under-5s treated with antimalarial	✓	✓					
% of clinical cases correctly managed				✓			
Drug stock-outs in clinics				✓			
Malaria control in pregnancy							
% of pregnant women attending ANC	✓	✓					
% of pregnant women taking IPT	✓						
% of pregnant women sleeping under net/ITN	✓						
Epidemic response					✓		✓
Data quality							
Nationwide	Yes	Yes	No	No	n.a.	No	Yes
Sample size (households)	8000	6000	1000	15 (facilities)		15 000	n.a.

Table 2. Sources of data for monitoring malaria burden and control

Source	Type, interval, countries	General	Data availability and (dis-)advantages		
			Morbidity	Mortality	Control implementation
Demographic and Health Surveys (DHS)	Population-based, large, representative at national/provincial but not district level; increasing subset of developing countries, expensive, every 5–8 years. Data available on Internet within 1 year of end of fieldwork	Retrospective (recall bias) can be adjusted for co-collected socioeconomic and general health variables	Under-5s and (pregnant) women, mainly reported fevers i.e. non-specific.	All-cause under-5 mortality	Under default malaria module ^a , possession and use of (insecticide-treated) nets and of antimalarial treatment for under-5s and pregnant women, IPT for pregnant women
Multiple Indicator Cluster Survey (MICS)	Population-based, large, representative at national/provincial but not district level; increasing number of developing countries, every 5 years. Main tables available on Internet within 1 year of end of fieldwork.	Retrospective, can be adjusted for co-collected socioeconomic general health variables	Reported fevers in under-5s i.e. non-specific	All-cause under-5 mortality	Use of (insecticide-treated) nets and antimalarial treatment for under-5s
Demographic Surveillance Sites (DSS)	Community-based, longitudinal, small and non-representative sentinel populations, long reporting delay	Continuous	Variable	Verbal autopsy on deaths, particularly for under-5s	Variable
Routine HIS (clinic-based)	Clinic-based, generally least functional in countries most affected by malaria (south of the Sahara).	Continuous, limited to subgroup of clinic attendees, which is – especially for children – a small, selected and variable fraction.	Clinical and/or parasitological diagnosis, all ages aggregated and/or under-5s separately.	Parasitologically confirmed diagnosis, all ages and/or under-5s separately	No, or only at level of clinic attendees

^a: As of April 2003, the DHS malaria module, has been conducted in Benin (2001), Eritrea (2002), Malawi (2000), Mauritania (2000/01), Rwanda (2000), Uganda (2000/01), Zambia (2001–2002) and ongoing in Kenya (2003), Mali (2003), and Nigeria (2003).