

Annex 1. Methods for preparing the country profiles

This annex describes the methods used for preparing country profiles but which also apply to other sections.

A.1 Epidemiological profile

Population

The total population of each country is taken from the World population prospects, 2008 revision (1). The population of children < 5 years of age is also given, as this age group is particularly susceptible to malaria infection and disease.

Population by malaria endemicity

The country population is subdivided into three levels of malaria endemicity, as reported by the national malaria control programme:

1. Areas of high transmission, where the reported incidence of malaria due to all species was 1 or more per 1000 population per year in 2008
2. Areas of low transmission, where the reported malaria case incidence from all species was < 1 per 1000 population per year in 2008 but greater than 0. Transmission in these areas is generally highly seasonal, with or without epidemic peaks.
3. Malaria-free areas, where there is no continuing, local, mosquito-borne malaria transmission, and all reported malaria cases are imported (2). An area is designated malaria-free when no cases have occurred for several years. Areas may be malaria-free due to environmental factors or as a result of effective control efforts. In practice, malaria-free areas can be accurately designated by national programmes only after taking into account the local epidemiological situation and the results of entomological and biomarker investigations. If a national malaria control programme did not provide the number of people living in high- and low-risk areas, the numbers were inferred from subnational case incidence data provided by the programme.

Population at risk

The total population living in areas where malaria is endemic (low and high transmission), excluding the population living in malaria-free areas. The population at risk is often used as the denominator in calculating operational coverage of malaria interventions, and hence in assessing current and future needs, taking into account the population already covered.

Maps of malaria, country profiles

Epidemiological maps for each country are based on the malaria cases reported in 2008 at the first or lower administrative levels.

Four levels of endemicity are depicted:

- ≥ 100 cases per 1000 population per year;
- ≥ 1 cases per 1000 population per year and < 100 cases;

- < 1 case per 1000 population per year but > zero; and
- 0 recorded cases.

The first two categories correspond to the high-transmission category described above. It should be noted that case incidence rates for 2008 do not necessarily reflect the endemicity of areas in previous years. If subnational data on population or malaria cases were lacking, an administrative unit was labelled "no data" on the map. In some cases, the subnational data provided by a malaria control programme did not correspond to a mapping area known to WHO. This may be the result of modifications to administrative boundaries or the use of names not verifiable by WHO.

Vector and parasite profile

The species of mosquito responsible for malaria transmission in a county and the species of *Plasmodium* involved are listed according to information provided by WHO regional offices.

Reported malaria cases

Reported malaria cases = probable + confirmed.

Probable malaria cases = suspected cases not tested, but reported as malaria

In high transmission countries of the WHO African Region, where there is no adequate parasitological testing, probable cases are usually equal to suspected malaria cases.

Slide examination, case confirmation, *Plasmodium spp.*

A table in the epidemiological profile gives the reported number of slides examined, the number positive and the number with a *P. falciparum* infection (including mixed *P. falciparum* and *P. vivax*). The graph shows four indicators:

- **percentage of cases examined microscopically:** number of cases examined under a microscope or with a RDT in every 100 suspected malaria cases. It indicates the extent to which a programme can provide diagnostic services to patients attending health facilities.
- **percentage of cases confirmed:** number of confirmed malaria cases per 100 reported (probable and confirmed) malaria cases. This indicates the extent to which a country programme depends on confirmation of malaria cases for diagnosis, treatment and epidemiological assessment.
- **malaria test positivity rate:** number of parasitologically positive cases per 100 cases examined (by RDT or microscopically). This measures the prevalence of malaria parasites among people who seek care and are examined in health facilities.
- **percentage of cases with *P. falciparum* infection:** number of *P. falciparum* cases per 100 microscopically confirmed malaria cases.

A.2 Intervention policies and targets

This section of the profile shows the policies and strategies adopted by each country for malaria prevention, diagnosis and treatment. Policies may vary according to the epidemiological setting, socio-economic factors and the capacity of the national malaria programme or country health system. Adoption of policies does not necessarily imply immediate implementation, nor does it indicate full, continuous implementation nationwide. Policies and strategies are divided into those recommended by WHO and those that are optional. WHO-recommended policies and strategies include (see also Chapter 2):

- provision of free or highly-subsidized long-lasting insecticide-impregnated nets to persons in all age groups at risk for malaria (3);
- use of IRS, including with DDT (4);
- use of intermittent preventive treatment in highly endemic countries with comparatively low levels of resistance to sulfadoxine-pyrimethamine (5);
- parasitological confirmation for persons in all age groups;
- banning of oral artemisinin monotherapies; and
- provision of ACT, free or highly subsidized in the public sector, for malaria cases infected with *P. falciparum* (6).

Optional policies or strategies are those adopted by countries after taking local epidemiological and other circumstances into account. "Yes" implies that the policy or strategy is adopted regardless of the scale of implementation; "No" implies that the policy is not adopted; and "Not applicable" implies that the policy is irrelevant to the country situation. The year of adoption of a policy is that in which it was approved by a national malaria control programme. It does not take into account any change that may have occurred after the reports were received.

A.3 Implementing malaria control

Coverage with ITNs, from survey data

The percentage of households that own at least one mosquito net and the percentage of children under 5 years who slept under a net are taken from nationally representative household surveys, such as multiple indicator cluster surveys, demographic health surveys and malaria indicator surveys. Other available national surveys were also included. The results of subnational surveys undertaken to support local project implementation are difficult to interpret nationwide and hence are not presented in the profiles, although they can be useful for assessing progress locally. It should be noted that most multiple indicator cluster and demographic health surveys are conducted during the dry season, for logistical reasons, and the estimates may not reflect use during peak malaria transmission (when ITN use may be higher).

Coverage with IRS and ITNs from programme data

Because many countries do not have recent national survey data, the numbers of mosquito nets distributed and houses sprayed were derived from the national malaria control programme and used to estimate operational coverage with ITNs and IRS. "Administrative" or operational coverage with ITN was calculated as the number of ITNs

distributed, divided by the population at risk (sum of populations living in low- and high-transmission areas) divided by 2 (a ratio of one ITN for every two persons, following WHO recommendations) and multiplied by 100 (2). As, on average, long-lasting insecticidal nets are considered to have a useful lifespan of 3 years, the cumulative total of mosquito nets distributed over the past 3 years is taken as the numerator for any particular year. Other ITNs are considered to have an average lifespan of 1 year; some nets will be effective for longer if re-treated with insecticide. Therefore, the numerator for long-lasting insecticidal nets and ITNs is the sum of the cumulative long-lasting insecticidal nets of the latest 3 years and the number of ITNs during the latest year. Re-treatment is not taken into account in this report and is in any case becoming less frequent with the advent of the long-lasting insecticidal nets. Such operational estimates contain no information about the geographical distribution of ITNs or their distribution within households. ITNs may be clustered in certain subpopulations, thus depriving others at risk, and the number of ITNs delivered to a household may exceed or fall short of the recommended ratio of one net per two people.

Operational coverage with IRS is calculated as the number of people living in a household where IRS has been conducted during the preceding 12 months, divided by the population at risk (the sum of populations living in low- and high-transmission areas) multiplied by 100. Respondents were asked to convert, where necessary, records of the number of built structures sprayed to number of households, where the average household consists of more than one structure. The number of people protected by IRS, provided by national malaria control programmes, was taken as the numerator. Programme data are the most important source of information for estimating coverage, as household surveys do not generally include questions on IRS. In addition, IRS is often focalized, carried out on a limited geographical scale, for which nationally representative household surveys may not provide an adequate sample size for coverage to be measured accurately. The percentage of people protected by IRS is a measure of the extent to which IRS is implemented or the extent to which the population at risk benefits from IRS nationwide. The data show neither the quality of spraying nor the geographical distribution of IRS coverage in a country, which is typically focal.

Access by febrile children to effective treatment, from survey data

Estimates of the percentage of children under 5 years of age with fever who were treated with antimalarial medicines, together with the type of antimalarial medicine, were obtained from nationally representative household surveys such as multiple indicator cluster, demographic health and malaria indicator surveys. These estimates should be interpreted with the following provisos:

- Not all cases of fever are malaria, particularly in low-transmission areas, so 100% of febrile children cannot be expected to receive an antimalarial agent, particularly if they seek formal health care and laboratory diagnosis excludes malaria.
- Most multiple indicator cluster and demographic health surveys are conducted during the dry season, and the data may not reflect the year-round incidence of malarial disease or the provision of antimalarial treatment during the period of peak incidence.
- As it may be difficult to exclude some non-malarious areas from the analysis, the rates of antimalarial treatment relative to the estimated need may appear unduly low.

- Respondents to household surveys may not recall accurately the type of medicine given to children. The graph in the profile shows the use of any antimalarial agent and use of ACT. Access to ACT may also appear unduly low in countries where chloroquine is used to treat *P. vivax*, especially where *P. vivax* causes a high proportion of malaria cases. As ACT was introduced comparatively recently, surveys commonly report only on the use of any antimalarial agent.
- In the absence of diagnosis, care-givers and patients may consider other diseases as the cause of the fever and hence provide other medicines, such as paracetamol or antibiotics.

Access to effective treatment, from programme data

Access to effective treatment is estimated as the number of ACT treatment courses delivered by a national malaria control programme per 100 cases requiring treatment in a year. The number requiring treatment in a year depends not only on the incidence of malaria but also on the rate of case confirmation. In countries in which all cases are confirmed, the number requiring treatment will be the number of confirmed cases. In countries where cases are not confirmed, it will be the number of reported malaria cases.

A.4 Financing malaria control

Government and external financing

National malaria control programme budgets and expenditures may be used to assess the extent to which the programmes can maintain or scale up access to malaria prevention, diagnosis and treatment. The data shown are those reported by the programme. The first graph shows financial contributions by source or name of agency by year. The government contribution is usually the declared government expenditure for the year. When government expenditure was not reported by the programme, the government budget was used. External contributions are contributions allocated to the programme by external agencies, which may or may not be disbursed. Additional information about contributions from specific donors, as reported by the donors themselves, is given in Annex 5.

Breakdown of expenditure by intervention

The pie chart shows the proportion of all malaria funding, spent on different activities: ITNs, IRS, diagnosis, treatment and other programme-related expenses. All countries were requested to convert their local currencies into 2008 US\$. The quantities have not been adjusted for purchasing power parity. When annual plans are completed as anticipated, the amounts shown should be about the same as the total amount received by the programme. Some divergence may occur, however, due to unexpectedly slow or fast disbursement of donor contributions or implementation or to changes in plans, prices and other factors. There may also be differences in the completeness of data, and the expenditures on activities listed may not include all items of expenditure. Despite the various uncertainties associated with these data, the graphs highlight major changes in programme funding and expenditure.

A.5 Sources of information

The sources of data are shown at the end of each profile. The WHO Global Malaria Programme has created a database containing the information used in compiling this Report. The data, together with profiles for all 109 malaria endemic countries, are available from www.who.int/topics/malaria/en/.

References

1. *World population prospects*. New York, United Nations, United Nations Population Division, 2008.
2. *Malaria elimination: a field manual for low and moderate endemic countries*. Geneva, World Health Organization, 2007.
3. *WHO position statement on ITNs*. Geneva, World Health Organization, Global Malaria Programme, Global Malaria Programme, 2007.
4. *Use of indoor residual spraying for scaling up global malaria control and elimination*. Geneva, World Health Organization, 2006 (WHO/HTM/MAL/2006.1112).
5. *A strategic framework for malaria prevention and control during pregnancy in the African Region*. Brazzaville WHO Regional Office for Africa, 2004 (AFRO/MAL/04/01).
6. *Guidelines for the treatment of malaria*. Geneva, World Health Organization, Global Malaria Programme, 2006 (WHO/HTM/MAL/2006.1108).