

Methods for preparing the country profiles

This section describes the methods used for preparing country profiles.

Epidemiological profile

Population The total population of each country is taken from the *World population prospects, 2010 revision (1)*. The country population is subdivided into three levels of malaria endemicity, as reported by the NMCP:

1. Areas of high transmission, where the reported annual incidence of malaria due to all species was ≥ 1 per 1000 population in 2010.
2. Areas of low transmission, where the reported annual malaria case incidence from all species was < 1 per 1000 population in 2010 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 become 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 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. The population at risk is the total population living in areas of low and high transmission. The population at risk is used as the denominator in calculating operational coverage of malaria preventive interventions and case incidence. For countries in the pre-elimination and elimination stages, population at risk is defined by the countries based on the resident populations in foci where active malaria transmission occurs.

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

Maps of malaria

Maps are based on the number of cases per 1000 population in 2010. For countries in the African Region, and for Sudan in the Eastern Mediterranean Region and Papua New Guinea in the Western Pacific Region, the total of the probable and confirmed cases was used as numerator because relatively small proportions of cases are confirmed. In other countries the number of confirmed malaria cases was used as numerator. Six levels of endemicity are shown:

- > 100 cases per 1000 population per year;
- > 50 cases per 1000 population per year and ≤ 100 cases;
- > 10 cases per 1000 population per year but ≤ 50 cases
- > 1 cases per 1000 population per year but ≤ 10 cases
- > 0 case per 1000 population per year but ≤ 1 cases;
- 0 recorded cases.

The first four categories correspond to the high-transmission category defined above. 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.

Intervention policies and strategies

Intervention 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, socioeconomic 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.

Antimalarial policy Antimalarial treatment policies are shown along with the results of recent therapeutic efficacy tests where these are available. Data on therapeutic efficacy were extracted from the WHO global database on antimalarial drug efficacy and originate from three main sources: published data, unpublished data, and regular monitoring data from surveillance studies conducted according to the WHO standard protocol. The percentage of treatment failures is equal to the total number of early treatment failures plus late clinical failures plus late parasitological failures, divided by the total number of patients who completed the study follow-up. The number of studies included in the analysis and the years during which the studies were conducted are shown for each antimalarial medicine. The median, minimum and maximum describe the range of treatment failures observed in the studies for each antimalarial medicine.

Financing

Government and external financing 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 donor agencies, as reported by these agencies, is given in Annex 3. All countries were requested to convert their local currencies to 2010 US\$.

Expenditure by intervention The pie chart shows the proportion of malaria funding from all sources, spent on different activities in 2010: ITNs, insecticides and spraying materials, IRS, diagnosis, antimalarial medicines, monitoring and evaluation; and human resources and technical assistance. There may be differences in the completeness of data, and the expenditures on activities listed may not include all items of expenditure. Government expenditures usually only include expenditures specific to malaria control and do not take into account costs related to maintaining health systems, human resources, etc.

Coverage

Coverage of ITN and IRS The percentage of households that own at least one ITN, and the percentage of persons who slept under an ITN, are taken from nationally representative household surveys, such as multiple indicator cluster surveys (MICS), demographic and health surveys (DHS), and malaria indicator surveys (MIS). 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 many of these surveys are conducted during the dry season for logistical reasons, and the estimates may not reflect the use of nets during peak malaria transmission when the rate of ITN use may be higher. For high-burden countries in the WHO African Region a model was used to estimate the percentage of households owning at least one ITN for years in which household surveys were not undertaken. The model takes into account data from three sources: household surveys, the number of ITNs delivered by manufacturers to a country, and the number of ITNs distributed by NMCPs (Section 4.1) (3).

Coverage with IRS is calculated as the number of people living in a household where IRS has been applied 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. 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 and 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.

Cases tested and ACT delivered: programme data (public sector) (i) Percentage of suspected cases tested is calculated as the number of suspected cases examined by microscopy or by RDT divided by the total number of suspected malaria cases x 100. This indicator reflects the extent to which a programme can provide

diagnostic services to patients attending public health facilities. (ii) The percentage of malaria cases receiving any antimalarial in the public sector is derived from the number of antimalarial treatment courses delivered by health services divided by the number of reported malaria cases attending public sector health facilities x 100, with correction for reporting completeness. This indicator can provide information on whether the malaria control programme delivers sufficient antimalarials to treat all patients who seek treatment in the public sector. (iii) The percentage of falciparum malaria cases receiving ACT in the public sector is derived from the number of ACT courses delivered divided by the number of reported falciparum malaria cases in the public sector x 100, with correction for reporting completeness. This indicator can provide information on whether the malaria control programme delivers sufficient ACTs to treat the number of falciparum cases seeking treatment in the public sector.

Impact

Malaria test positivity rate and ABER ABER is calculated as the number of parasitological tests done (by microscopy and/or RDTs) divided by the total population at risk. This indicator reflects the extent of diagnostic testing in the population and is useful in interpreting trends in confirmed cases (an increase in diagnostic testing can produce an increase in cases even if case incidence in the population is constant). RDT and slide positivity rates are derived from the number of parasitologically positive cases per 100 cases examined by RDT or microscopy. They measure the prevalence of malaria parasites among people who seek care and are examined in health facilities.

Confirmed cases, admissions and deaths The numbers of confirmed cases, admissions and deaths are derived from case reports divided by the population at risk x 100 000. Values are plotted on a logarithmic scale. These indicators help to assess changes in the incidence of malaria over the years, provided that there has been consistency in case reporting over time. For countries in the pre-elimination and elimination phases, the total number of cases is plotted on an arithmetic scale along with those acquired within the country (indigenous).

References

1. *World population prospects*. New York, United Nations, United Nations Population Division, 2010. http://esa.un.org/wpp/unpp/panel_population.htm
2. *Malaria elimination: a field manual for low and moderate endemic countries*. Geneva, World Health Organization, 2007. http://www.who.int/malaria/docs/elimination/MalariaElimination_BD.pdf.
3. Flaxman AD et al. Rapid scaling up of insecticide-treated bed net coverage in Africa and its relationship with development assistance for health: a systematic synthesis of supply, distribution, and household survey data. *PLoS Medicine*, 2010, 7(8): e1000328