World Malaria Report 2013

MPAC meeting
WHO HQ, 12 March 2014

WMR team
World Malaria Report 2013

- Released on 11 December 2013
- Annual reference on the status of global malaria control & elimination.
- Principal data source is national malaria control programs with support from: WHO Regional offices, AMFm, ALMA, CDC, DHS/ Measure, FIND, GHG UCSF, Global Fund, IHME, ISGlobal, JHSPH, Oxford University, RBM, Tulane University, UNICEF, UNSE, USAID.
- Data to 2012 and 2013.
- Summarizes key malaria targets & goals and policies
- Documents trends in financing, intervention coverage and malaria cases and deaths
- Profiles for 6 WHO regions and 99 endemic countries and areas
Core Team

**HQ**
- Kathryn Andrews/ Cristin Fergus: Data analyst
- Maru Aregawi: Epidemiologist
- Richard Cibulskis: Coordinator
- Mike Lynch (from CDC): Epidemiologist
- Zsofia Szilagi: Advocacy
- Mar Velarde (ISGlobal): Production manager
- Ryan Williams: Data base manager

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- Emr: Ghasem Zamani
- Eur: Elkhan Gasimov
- Sear: Leonard Ortega
- Wpr: Bayo Fatumbi

**External Reviewers**
- Melanie Renshaw (ALMA)
- Larry Slutsker (CDC)
- Rob Newman
- WHO Regions

**Collaborators**
- Oxford University (MAP)
New inclusions for 2013

3. **Financing**: Domestic investment priority index (DIPI)

4. **Vector control**: Missed opportunities to distribute ITNs in routine deliveries (ANC, EPI).

5. **Preventive therapies**: Missed opportunities in ANC inc. TT

6. **Diagnostic testing and treatment**: Testing for *P. vivax*. Estimates of malaria treatment coverage including *P. vivax*.

7. **Surveillance M&E**: Completeness of death reporting, availability of household surveys.


9. **Country profiles**: To include *P. vivax*

Translations ahead of launch event. 3 launch events.
Maps of % *P. falciparum* and *P. vivax* specific information for policies, therapeutic efficacy, and disease trends.
International disbursements to malaria-endemic countries have increased, from less than US$ 100 million in 2000 to US$ 1.6 billion in 2011, and an estimated US$ 1.94 billion in 2012 and 1.97 billion in 2013.
Malaria spending per person according to national income and estimated malaria mortality rates

Disbursements for malaria control per person at risk capita per year 2007–2011 (US$)

Countries ranked by malaria mortality rates 2000

- Government
- Global Fund
- PMI
- DFID
- World Bank
- CIDA
- AusAID
- Other

AusAID, Australian Agency for International Development; CIDA, Canadian International Development Agency; DFID, Department for International Development; GF, Global Fund; GNI, gross national income; PMI, President’s Malaria Initiative; WB, World Bank

Data on international disbursements by country are available only up to 2011 for most agencies (See Box 3.1)

Source: See Box 3.1

GNI per capita: World Development Indicators 2013, (http://wdi.worldbank.org/tables)

Malaria mortality rates: WHO calculations.
Chapter 4: Number of LLINs delivered by manufacturers to countries in sub-Saharan Africa, 2004–2013

Only 92 million ITNs were delivered by manufacturers in 2011, and only 70 million in 2012.

The estimated numbers of ITNs delivered in 2013 (136 million) closer to the need of 150 million.

LLIN, long-lasting insecticidal net
* The total number delivered for the first three quarters of 2013 has been multiplied by 4/3 to provide an annual estimate.

Source: Data from 7 WHOPES-approved manufacturers, collated by Milliner Global Associates.
Estimated proportion of households with at least one ITN and population with access to an ITN in sub-Saharan Africa

The percentage of households owning at least one ITN in sub-Saharan Africa is estimated to have risen from 3% in 2000 to 56% in 2012, but declined slightly to 54% in 2013.

The proportion of the population with access to an ITN in their household increased during the same period, reaching 42% in 2013.

The proportion of the population sleeping under an ITN was estimated to be 36% in 2013.

ITN, insecticide-treated net
Proportion population with access to an ITN derived from relationship with household ownership of at least one ITN analyzed by linear regression in 48 household surveys 2001-2012, $y = 0.77x$

Source: ITN coverage model from the Institute for Health Metrics and Evaluation, which takes into account ITNs supplied by manufacturers, ITNs delivered by National Malaria Control Programmes and household survey results (1). Includes Djibouti, Somalia, South Sudan and Sudan which are in the WHO Eastern Mediterranean Region.
Proportion of population at malaria risk protected by IRS, by WHO Region, 2002–2012

AFR, African region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; IRS, indoor residual spraying; SEAR, South-East Asia Region; WPR, Western Pacific Region

Source: National Malaria Control Programme reports
Chapter 5: Proportion of pregnant women receiving 2+ doses of tetanus toxoid and the proportion receiving 2+ two doses of IPTp during pregnancy, 2000–2012
Chapter 6: Proportion of suspected malaria cases/febrile children receiving a diagnostic test

Suspected cases receiving test in public sector

AFR: African Region; AMR: Region of the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; RDT: rapid diagnostic test; SEAR: South-East Asia Region; WPR: Western Pacific Region

Source: National Malaria Control Programme reports

Febrile children receiving test

Public sector includes government and non-profit facilities, and community health workers.
Private sector includes private clinics and providers, pharmacies, shops and traditional providers.

Source: Household surveys
ACT deliveries 2005–2012 and ratio of RDT and microscopy performed to ACTs distributed, African Region, 2006-2012

ACT, artemisinin-based combination therapy; AL, artemether-lumefantrine; AMFm, Affordable Medicine Facility – malaria; AQ, amodiaquine; AS, artesunate; Co-B, co-blistered pack; FDC, fixed-dose combination; MQ, mefloquine; SP, sulfadoxine-pyrimethamine

Source (Figures 6.6, 6.7, 6.8): Data provided by 8 manufacturers eligible for procurement from WHO/UNICEF and AMFm reports

Routine ACT public sector deliveries monitored 2005–2012; AMFm-facilitated public and private sector deliveries through AMFm monitored 2010–2012, in 2010 by AMFm reports and in 2011–2012 by reports of manufacturers

ACT deliveries through non-AMFm private sector channels are not monitored, but are estimated to be a small fraction (about 5–10%) compared to public sector deliveries

Source: National malaria control programme reports
Number of countries allowing marketing of oral artemisinin-based monotherapies and undertaking therapeutic efficacy testing

**Oral artemisinin-based monotherapies**

**Therapeutic efficacy testing**

AFR, African Region; AMR, Region of the Americas; EMR, Eastern Mediterranean Region; EUR, European Region; SEAR, South-East Asia Region; WPR, Western Pacific Region

*Source: [http://www.who.int/malaria/monotherapy_NDRAs.pdf](http://www.who.int/malaria/monotherapy_NDRAs.pdf)*

*TES studies are impractical in countries with low malaria transmission or transmission of *P. vivax* only.

TES, therapeutic efficacy study

*Source: WHO Global Malaria Program database on antimalarial therapeutic efficacy monitoring by country, November, 2013*
Prioritized areas for artemisinin resistance containment activities, Greater Mekong subregion, 2013.
Chapter 7: Proportion of all cases and deaths captured by health-facility reports

Source: National malaria control programme data, WHO estimates
Household surveys conducted, 2000–2012 and in the past 3 years (2010–2012)

Source: Household surveys, WHO estimates
Proportion of surveys in which key indicators were measured

For calculation of proportions the denominator for malaria specific indicators is the number of surveys with malaria specific questions. For all-cause under-5 mortality rate the denominator is total surveys undertaken.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Proportion</td>
</tr>
<tr>
<td>Proportion of population with access to an ITN within their household</td>
<td>209</td>
<td>83%</td>
</tr>
<tr>
<td>Proportion of population who slept under an ITN the previous night</td>
<td>188</td>
<td>75%</td>
</tr>
<tr>
<td>Proportion of households with at least one ITN for every two people and/or sprayed by IRS within the past 12 months</td>
<td>58</td>
<td>23%</td>
</tr>
<tr>
<td>Proportion of women who received three or more doses of IPTp during ANC visits during their last pregnancy</td>
<td>194</td>
<td>77%</td>
</tr>
<tr>
<td>Proportion of children under 5 years old with fever in the past 2 weeks who had a finger prick or heel stick</td>
<td>42</td>
<td>17%</td>
</tr>
<tr>
<td>Proportion receiving first line treatment among children under five years of age with fever in the past two weeks who received any antimalarial drugs</td>
<td>209</td>
<td>83%</td>
</tr>
<tr>
<td>Parasite prevalence: proportion of children aged 6–59 months with malaria infection</td>
<td>88</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Surveys with malaria specific questions</strong></td>
<td>252</td>
<td></td>
</tr>
<tr>
<td><strong>All-cause under 5-mortality rate (5q0)</strong></td>
<td>288</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Total surveys</strong></td>
<td>323</td>
<td></td>
</tr>
</tbody>
</table>

ACT, artemisinin-based combination therapy; ANC, antenatal clinic; IRS, indoor residual spraying; IPTp, intermittent preventative treatment in pregnancy; ITN insecticide-treated net

Source: Household surveys
Chapter 8: Decreases in reported malaria case incidence rates, 2000–2012, by WHO region

59 out of 103 countries that had ongoing malaria transmission in 2000 are meeting the MDG target of reversing the incidence of malaria.

Of these, 52 are on track to meet RBM and WHA targets of reducing malaria case incidence rates by 75% by 2015. These account for 4% of estimated cases in 2000.
Slower rate of decrease in *P. vivax* incidence than *P. falciparum*

% cases due to *P. falciparum* in high vs low years

Reductions in case incidence in 58 countries showing decrease

% cases due to *P. falciparum* outside of Africa by programme phase

Source: NMCP reports
## Estimated number of malaria cases and deaths 2012

### a) Estimated cases ('000s)

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimate</th>
<th>Lower</th>
<th>Upper</th>
<th>Estimated P. vivax cases ('000s)</th>
<th>Lower</th>
<th>Upper</th>
<th>Estimates P. vivax as % of total cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>165 000</td>
<td>93 000</td>
<td>245 000</td>
<td>1 900</td>
<td>1 600</td>
<td>2 100</td>
<td>1%</td>
</tr>
<tr>
<td>Region of the Americas</td>
<td>800</td>
<td>700</td>
<td>1 000</td>
<td>500</td>
<td>400</td>
<td>600</td>
<td>65%</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>13 000</td>
<td>10 000</td>
<td>18 000</td>
<td>3 700</td>
<td>3 000</td>
<td>4 500</td>
<td>28%</td>
</tr>
<tr>
<td>European</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>89%</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>27 000</td>
<td>22 000</td>
<td>33 000</td>
<td>13 000</td>
<td>10 000</td>
<td>16 000</td>
<td>47%</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>1 000</td>
<td>1 000</td>
<td>2 000</td>
<td>200</td>
<td>100</td>
<td>300</td>
<td>16%</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>207 000</strong></td>
<td><strong>135 000</strong></td>
<td><strong>287 000</strong></td>
<td><strong>18 900</strong></td>
<td><strong>16 000</strong></td>
<td><strong>22 200</strong></td>
<td><strong>9%</strong></td>
</tr>
<tr>
<td>Outside sub-Saharan Africa</td>
<td>33 300</td>
<td>28 000</td>
<td>39 400</td>
<td>16 600</td>
<td>13 800</td>
<td>19 800</td>
<td>50%</td>
</tr>
</tbody>
</table>

### b) Estimated deaths, all ages

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimate</th>
<th>Lower</th>
<th>Upper</th>
<th>Estimated deaths, &lt;5</th>
<th>Lower</th>
<th>Upper</th>
<th>Deaths &lt;5 as % of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>562 000</td>
<td>410 000</td>
<td>722 000</td>
<td>462 000</td>
<td>386 000</td>
<td>534 000</td>
<td>82%</td>
</tr>
<tr>
<td>Region of the Americas</td>
<td>800</td>
<td>500</td>
<td>1 200</td>
<td>230</td>
<td>200</td>
<td>270</td>
<td>27%</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>18 000</td>
<td>11 000</td>
<td>31 000</td>
<td>6 600</td>
<td>5 400</td>
<td>8 100</td>
<td>37%</td>
</tr>
<tr>
<td>European</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>22%</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>42 000</td>
<td>26 000</td>
<td>60 000</td>
<td>11 000</td>
<td>9 000</td>
<td>14 000</td>
<td>26%</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>3 500</td>
<td>2 100</td>
<td>5 200</td>
<td>1 600</td>
<td>900</td>
<td>2 400</td>
<td>46%</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>627 000</strong></td>
<td><strong>473 000</strong></td>
<td><strong>789 000</strong></td>
<td><strong>482 000</strong></td>
<td><strong>408 000</strong></td>
<td><strong>565 000</strong></td>
<td><strong>77%</strong></td>
</tr>
<tr>
<td>Outside sub-Saharan Africa</td>
<td>50 000</td>
<td>33 000</td>
<td>68 000</td>
<td>14 000</td>
<td>11 000</td>
<td>17 000</td>
<td>28%</td>
</tr>
</tbody>
</table>

*Source: WHO estimates*
Trends in estimated malaria case incidence and mortality rates

Global malaria mortality rate, all ages

Global malaria mortality rate, <5

Worldwide, between 2000 and 2012, estimated malaria mortality rates fell by 42% in all age groups and by 48% in children under 5 years of age.

If the annual rate of decrease that has occurred over the past 12 years is maintained, then malaria mortality rates are projected to decrease by 52% in all ages, and by 60% in children under 5 years of age by 2015.
Cases and deaths averted 2001-2012

<table>
<thead>
<tr>
<th>Region</th>
<th>Cases averted, 2001–2012 (millions)</th>
<th>Percentage of total</th>
<th>Deaths averted, 2001–2012 (millions)</th>
<th>Percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>337</td>
<td>67%</td>
<td>3.08</td>
<td>93%</td>
</tr>
<tr>
<td>Region of the Americas</td>
<td>14</td>
<td>3%</td>
<td>0.01</td>
<td>0%</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>66</td>
<td>13%</td>
<td>0.09</td>
<td>3%</td>
</tr>
<tr>
<td>European</td>
<td>0.4</td>
<td>0%</td>
<td>–</td>
<td>0%</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>67</td>
<td>13%</td>
<td>0.11</td>
<td>3%</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>15</td>
<td>3%</td>
<td>0.04</td>
<td>1%</td>
</tr>
<tr>
<td><strong>World</strong></td>
<td><strong>500</strong></td>
<td><strong>100%</strong></td>
<td><strong>3.32</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: WHO estimates

Figure 8.5 Estimated numbers of (a) cases averted in 2000–2012 versus cases in 2000 and (b) number of deaths averted in 2000–2012 versus deaths in 2000

Source: WHO estimates
Conclusions

- 59 out of 103 countries that had ongoing malaria transmission in 2000 are meeting the MDG target of reversing the incidence of malaria.
- Of these, 52 are on track to meet Roll Back Malaria (RBM) and World Health Assembly targets of reducing malaria case incidence rates by 75% by 2015, including 8 countries of the WHO African Region. These countries account for 4% of total estimated cases in 2000.
- In 41 countries, which accounted for 80% of cases in 2000, it is not possible to assess trends using reported.
- Between 2000 and 2012, estimated malaria mortality rates fell by 42% globally in all age groups and by 48% in children <5.
- Malaria mortality rates are projected to decrease by 52% in all ages, and by 60% in children under 5 years of age by 2015
Conclusions

- An estimated 3.3 million malaria deaths were averted between 2001 and 2012, and that 69% of these lives saved were in the 10 countries with the highest malaria burden in 2000 - progress is being made where it matters.

- About 3.2 million (96%) of the deaths averted between 2001 and 2012 are estimated to be in children under 5 years of age. These account for 20% of the 15 million child deaths that are estimated to have been averted globally since 2000 through overall reductions in child mortality rates. Thus, decreases in malaria deaths have contributed substantially to progress towards achieving the target for MDG 4.

- In 2012, financing of malaria programmes was estimated to be less than half of the estimated US$ 5.1 billion required globally.
Conclusions

- 40% of household in sub-Saharan Africa did not have access to a single ITN, millions still do not have access to diagnostic testing and artemisinin-based combination therapies (ACTs).

- As a result, an estimated 207 million cases (uncertainty interval, 135–287 million) and 627 000 malaria deaths (uncertainty interval, 473 000–789 000) are estimated to have occurred in 2012.

- There is an urgent need to increase funding for malaria control and to expand programme coverage, in order to meet international targets for reducing malaria cases and deaths.
Future priorities for WMR

Using what we have got:

1. Enhance data analysis: Combining surveys and routine data for more accurate estimation of progress
2. Enhance dissemination: short summaries, regional reports, peer review, MOOCs
3. Enhance linkages between national and international monitoring
   • take advantage of ALMA (elimination scorecard), APLMA

Enhancing what we have got:

1. Better define tools for use at country level:
   • expenditure tracking, health facility surveys, rapid impact assessments
2. Support to countries to implement guidance
   • surveillance; regular health facility surveys for T3, revising HMIS
3. More comprehensive analysis of country progress - building the data base. PMI evaluations, epidemiological profiles, GF assessments, MPRs