Introduction

The last decade has seen a tremendous expansion in the financing and coverage of malaria control programmes. This has led to a wide scale reduction in malaria incidence and mortality: 50 of 99 countries with ongoing transmission are on track to reduce their malaria case incidence rates by 75% by 2015, in line with World Health Assembly and Roll Back Malaria targets. Elimination of malaria in the European Region appears attainable by 2015. Modeling suggests an estimated 1.1 million malaria deaths were averted between 2001 and 2010, 58% of these lives were saved in the ten countries with the highest malaria burden – thus progress is being made where it matters most.

However, in 2011 financing of malaria programmes was estimated to be at less than half of the estimated US$ 5.1 billion required globally. Millions still do not have access to interventions such as an insecticide treated mosquito nets, indoor residual spraying, diagnostic testing, and artemisinin-based combination therapies. As a result 219 million cases (range 154–289 million) and 660 000 deaths (range 490 000–836 000) occur every year. There is an urgent need to identify the funding to further scale up and sustain malaria control efforts and ensure that the most vulnerable populations have access to essential life saving interventions.

The complete World Malaria Report can be found at the following link:

Malaria is a global health priority. It occurs in 99 countries and more than 3 billion people are at risk of acquiring the disease.

In 2010, there were an estimated 219 million cases of malaria (range 154–289 million), and 660 000 malaria deaths globally (range 490 000–836 000). Approximately 80% of cases and 90% of deaths are estimated to occur in the WHO African Region, with children under five years of age and pregnant women most severely affected.

**WHO estimates of the number of malaria cases and deaths in 2010**

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimated cases ('000s)</th>
<th>Estimated deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>Lower limit</td>
</tr>
<tr>
<td>African</td>
<td>174 000</td>
<td>110 000</td>
</tr>
<tr>
<td>Region of the Americas</td>
<td>1 100</td>
<td>900</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>10 400</td>
<td>6 400</td>
</tr>
<tr>
<td>European</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>32 000</td>
<td>25 900</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>1 700</td>
<td>1 300</td>
</tr>
<tr>
<td>World</td>
<td>219 000</td>
<td>154 000</td>
</tr>
</tbody>
</table>

*Source: WHO estimates*
In 2010 the bulk of the malaria burden was concentrated in fewer than 20 countries.

Approximately 80% of the global malaria deaths occur in just 14 countries worldwide. The global burden is dominated by countries in sub-Saharan Africa: the Democratic Republic of the Congo and Nigeria together account for more than 40% of the global total of estimated malaria deaths. Approximately 80% of estimated cases in 2010 were found in 17 countries. The Democratic Republic of the Congo, India and Nigeria together accounted for more almost 40% of the global total of estimated malaria cases. International targets for reducing the burden of malaria will not be attained unless considerable progress is made in the most affected countries.

Source: WHO estimates
Malaria is inextricably linked with poverty.

Countries with higher proportions of their population living in poverty (on less than US$ 1.25 per person per day) have higher death rates from malaria. Within countries, parasite prevalence rates in children under 5 years of age are highest in poorer populations. Poorer populations are more prone to infection and disease because they are more likely to live in rural areas, in housing that offers little protection against mosquitoes, and they are generally less likely to have access to preventive measures such as insecticide treated mosquito nets (ITNs) or indoor residual spraying (IRS). They are also less likely to use health facilities which can offer effective diagnostic testing and treatment.
An estimated 5.1 billion dollars is required to control malaria each year. In 2012, the total international and domestic funding for malaria was estimated to be less than US$ 2.5 billion.

Total domestic spending on malaria control has increased every year since 2005 and was estimated to be US$ 625 million in 2011. International disbursements increased from less than US$ 390 million in 2005 to an estimated US$ 1.7 billion in 2010. However, since 2009 there has been a leveling off in the rate of increase of funds devoted to malaria and, if current trends persist, these are projected to remain below US$ 2.7 billion by 2015 and lower than the 5.1 billion dollars required globally.

Source: NMCP Reports, Global Fund, PMI reports, OECD database
International funding for malaria has been directed towards countries with higher mortality rates.

Poorer countries with higher malaria mortality rates get a large share of their funds from international sources. In countries with the lowest mortality rates – those that tend to be richer – a higher share of malaria funding arises from domestic sources. Overall, it appears that many countries with the highest malaria mortality rates still have fewer total resources to control malaria than those with the lowest mortality rates.

Source: WHO financing database, NMCP reports, WHO estimates

The 99 countries with ongoing malaria transmission countries have been divided into 5 equal sized groups according to their malaria mortality rates.
Increased funding has allowed rapid expansion in the ownership and use of insecticide treated mosquito nets (ITNs). However, ownership and use of ITNs are substantially below targets for universal coverage.

ITNs are an effective means of preventing malaria, protecting people from mosquito bites when they sleep. The proportion of households in sub-Saharan Africa owning at least one ITN increased dramatically from 10% in 2005 to 53% in 2011 and the proportion of the population sleeping under an ITN rose from 4% to 33% during the same time period. However, these proportions leveled off at 53% and 33% in 2012, substantially below the targets for universal coverage. The main reason for the leveling off was a decrease in the number of ITNs delivered to countries in the last two years.

Source: ITN coverage model from the Institute for Health Metrics and Evaluation, which takes into account ITNs supplied by manufacturers, ITNs delivered by NMCPs and household survey results (1). Includes Djibouti, Somalia and Sudan which are in the WHO Eastern Mediterranean Region.
After substantial increases in the proportion of the population at risk protected by IRS between 2006–2009, IRS coverage has remained at about 5% for the past 3 years.

National malaria programmes reported that 153 million people were protected by IRS in 2011, representing 5% of the global population at risk. In the African Region and in the Americas, the proportion of the population protected by IRS increased substantially during 2006–2008, reaching 11% and 5% of the population at risk in 2011 respectively. The proportion of the population protected by IRS increased more recently in the Western Pacific Region, largely due to an increase in the numbers protected by IRS in China. IRS coverage by national programmes in the Eastern Mediterranean and South-East Asia Regions has varied little during the last 10 years.

Proportion of population at malaria risk protected by IRS, 2002–2011

Source: NMCP Reports.
Mosquito resistance to at least one insecticide used for malaria control has been identified in 64 countries.

Monitoring insecticide resistance is a necessary element of the implementation of insecticide-based vector control interventions. In 2011, 77 countries reported that they had adopted the policy of insecticide resistance monitoring. The Global Plan for Insecticide Resistance Management in malaria vectors was launched in May 2012, providing a global blueprint for managing insecticide resistance.

Countries with ongoing malaria transmission where insecticide resistance has been identified in at least one of their major vectors

Source: Data from WHO regional entomologists in WHO Regional Offices, complemented by a literature review by WHO’s Global Malaria Programme
There has been an increase in the proportion of suspected malaria cases receiving a diagnostic test for malaria. However, many fever cases are still treated with antimalarial medicines in the absence of a confirmed malaria diagnosis.

Globally, the proportion of suspected cases attending public health facilities receiving a diagnostic test increased from 68% in 2005 to 77% in 2011. In 2011, this proportion was less than 50% in the WHO African Region where the majority of cases occur. These proportions are still far below the goal of universal diagnostic testing recommended by WHO, and may overestimate the true testing rate in the public sector, since countries with higher testing rates have a greater propensity to report.

Source: NMCP reports

Results are based on reports received from NMCPs. The proportion of cases receiving a diagnostic test may be overestimated, since countries with higher testing rates have a greater propensity to report.
The number of artemisinin-based combination therapies (ACTs) procured for the treatment of malaria has increased every year since 2005.

ACTs are the most effective antimalarial medicines available today. These therapies combine two active ingredients with different mechanisms of action. The number of ACT treatment courses delivered by manufacturers to the public and private sectors increased greatly from 11 million in 2005 to 76 million in 2006, and reached 278 million in 2011. However, the total amount of ACTs procured for the public sector decreased in 2011 compared to 2010. Moreover, it has been difficult to track whether all these ACT courses have been given to patients with a malaria confirmed diagnosis.

Source: Data provided by 8 manufacturers eligible for procurement from WHO/UNICEF and AMFm reports (as of 30 August 2012). ACT deliveries through non-AMFm private-sector channels are not monitored, but are estimated to be a small fraction (approx. 5-10%) compared to public sector deliveries. The AMFm is a financing mechanism whose aim has been supply quality-assured ACTs at highly subsidized prices in the public and private sectors.
Resistance to artemisinins has been detected in 4 countries in South-East Asia.

Resistance to artemisinins has now been detected in 4 countries of the Greater Mekong subregion: Cambodia, Myanmar, Thailand and Viet Nam. Despite the observed changes in parasite sensitivity to artemisinins, ACTs continue to cure patients provided that the partner drug is still efficacious. In Cambodia’s Pailin province, resistance has been found to both components of multiple ACTs, and special provisions for directly observed therapy of malaria patients, using a non-artemisinin-based combination (atovaquone-proguanil) have been put in place. WHO urges countries to implement the Global Plan for Artemisinin Resistance Containment to protect ACTs as an effective treatment of malaria.
**Therapeutic efficacy studies (TES) to detect *P. falciparum* resistance to artemisinins were undertaken in 47 countries out of the 71 countries where such testing was possible.**

Routine monitoring of therapeutic efficacy of ACTs is essential to detect early signs of drug resistance and enabled the detection of *P. falciparum* resistance to artemisinins in Cambodia, Myanmar, Thailand and Viet Nam. In 2010–2011, studies of first- or second-line antimalarial treatments were completed in 47 countries where testing was possible but 24 countries did not conduct these studies.

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### Status of therapeutic efficacy monitoring in countries with ongoing malaria transmission, 2008-2012

<table>
<thead>
<tr>
<th>Year</th>
<th>Studies not possible</th>
<th>No TES conducted</th>
<th>TES conducted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–2009</td>
<td>31</td>
<td>44</td>
<td>24</td>
</tr>
<tr>
<td>2010–2011</td>
<td>47</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>2012 (planned)</td>
<td>49</td>
<td>22</td>
<td>28</td>
</tr>
</tbody>
</table>

*Therapeutic Efficacy Studies (TES) are impractical in countries with low malaria transmission.*

**Source:** WHO Global Malaria Programme database on antimalarial therapeutic efficacy monitoring by country, November, 2012
Malaria surveillance systems detect only 10% of cases that occur worldwide and are weakest in countries with the highest number of cases.

Case detection rates are lowest in countries with the highest number of malaria cases. A reliable assessment of trends can be made in 58 countries out of 99 with ongoing transmission using data submitted to WHO. These 58 countries account for only 34 million or 15% of total estimated cases in 2010. There is a critical need to strengthen malaria surveillance in the remaining 41 countries which account for 85% of estimated malaria cases, so that programmes can identify and direct resources to the populations most in need, respond to outbreaks of disease, and assess the impact of control measures.

Proportion of malaria cases captured by a surveillance system in relation to total number of cases estimated to occur in a country

Source: NMCP reports, WHO estimates
Changes in Malaria Incidence and Mortality

Surveillance systems indicate that 50 countries are on track to reduce malaria case incidence by 75% by 2015.

Of the 58 countries in which it is possible to make an assessment of malaria trends using data from surveillance systems, 50 are on track to meet international targets to achieve a 75% reduction in malaria cases by 2015, compared to 2000. While this represents tremendous progress, these countries account for only 3% of total estimated cases worldwide. In the remaining countries progress has been slower or must be inferred from modeling rather than surveillance data.

Map showing the trends in reported malaria incidence, 2000-2011
Modeling indicates that malaria programmes are having their greatest impact where the burden is highest.

Surveillance systems are not sufficiently strong to allow an assessment of trends in 41 countries so it is necessary to use modeling to produce estimates of trends across all countries. Such estimates suggest that the incidence of malaria decreased by 17% globally between 2000 and 2010 while malaria mortality rates fell by 20% globally and by 33% in the African Region. These rates of decline are lower than internationally agreed targets for 2010 (reductions of 50%) but nonetheless, they represent a major achievement. It is estimated that 1.1 million deaths and 274 million cases were averted between 2001 and 2010 with the majority of lives being saved in the 10 countries which had the highest estimated malaria burdens in 2000. Thus malaria programmes appear to be having their greatest impact where the malaria burden is highest.

*Source:* WHO estimates. The number of deaths averted are estimated by subtracting the number of deaths estimated in each year between 2001-2010 from those that would have occurred if mortality rates estimated for 2000 had applied throughout the decade.
There has been continued progress in eliminating malaria from the edge of its range.

Four countries have been recently certified by WHO as having eliminated malaria in recent years: the United Arab Emirates (2007), Morocco (2010), Turkmenistan (2010), and Armenia (2011). Globally ten countries are classified by WHO as now being in the malaria elimination phase, and eleven countries in the pre-elimination phase. The WHO European Region has a real possibility of becoming the first to achieve elimination of malaria and aims to do so by 2015 in line with the ambitions of the 2005 Tashkent declaration.
## Annex 1 - Summary of Trends in Reported Malaria Incidence 2000-2011

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Region of the Americas</td>
<td>Argentina Belize Bolivia (Plurinational State of) Costa Rica Ecuador El Salvador French Guiana, France Guatemala</td>
<td>Honduras Mexico Nicaragua Paraguay Suriname Colombia Panama Peru Brazil</td>
<td></td>
<td></td>
<td>Dominican Republic Guyana Venezuela (Bolivarian Republic of) Haiti</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>Afghanistan Iran (Islamic Republic of)</td>
<td>Iraq Saudi Arabia</td>
<td></td>
<td></td>
<td>Djibouti Pakistan* Somalia South Sudan Sudan* Yemen*</td>
</tr>
<tr>
<td>European</td>
<td>Azerbaijan Georgia Kyrgyzstan</td>
<td>Tajikistan Turkey Uzbekistan</td>
<td></td>
<td></td>
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<td>--------------------------------------------------</td>
<td>------------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
</tbody>
</table>
| South-East Asia  | Bhutan
Democratic People's Republic of Korea
Nepal
Democratic People's Republic of Korea
Nepal
Sri Lanka
Thailand
Bangladesh | India                                              |                                                  |                                                | Indonesia
Myanmar+
Timor-Leste+                               |
| Western Pacific  | Cambodia
China
Lao People's Democratic Republic
Philippines
Republic of Korea
Cambodia
China
Lao People's Democratic Republic
Philippines
Republic of Korea
Cambodia
China
Lao People's Democratic Republic
Philippines
Republic of Korea
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Republic of Korea
Cambodia
China
Lao People's Democratic Republic
Philippines
Republic of Korea | Solomon Islands
Vanuatu
Viet Nam
Malaysia
Solomon Islands
Vanuatu
Viet Nam
Malaysia | Papua New Guinea |                                                  |                                                |                                |

Source: NMCP reports
Countries in prevention of reintroduction phase are not included in this table
Countries in bold achieved ≥75% decrease in case incidence by 2011

* Progress in reducing cases has been reported sub-nationally where interventions have been intensified.
+ Country has recently expanded diagnostic testing, so assessment of trends is difficult.
Acknowledgements

Numerous people contributed to the production of the WMR. We are especially grateful to staff of malaria control programmes that submit the data and respond to queries with the support of WHO country and regional offices. The following organizations also contributed to the production of the report: ISGlobal, Global Fund, University of Oxford, IHME, OECD, UCSF Global Health Group, Milliner Global Associates, MESA, Rotarians Against Malaria, Papua New Guinea Institute of Medical Research/The University of Queensland, Wellcome Trust. We are also grateful for financial support from the Government of Japan, the Government of Monaco, the Norwegian Agency for Development Cooperation and the United Kingdom Department for International Development.
“Behind the statistics and graphs lies a great and needless tragedy: malaria still takes the life of an African child every minute.”

Dr Margaret Chan
Director-General
World Health Organization

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