Sustaining the gains in malaria control and elimination

International Malaria Colloquium
Bangkok, Thailand
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Director, Global Malaria Programme
## Number of malaria cases and deaths 2008

85% of 243 million cases are in Africa; 9% are in South East Asia

91% of 863 thousand deaths are in Africa, 85% in children <5 years of age

### BEING UPDATED FOR World Malaria Report 2010

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World Malaria Report 2009

- Comprehensive annual reference on the status of global malaria control & elimination
- Describes trends in funding
- Summarizes key malaria targets & goals
- Documents trends in intervention coverage and impact (malaria burden)
- Provides country-by-country summaries
- 2009 report specifically addressed elimination issues for the first time
World Malaria Report 2010

- Due for release on 14 December, 2010
- Completely updated from 2009 report
- Updates malaria burden estimates for entire decade: 2000-2009
RBM Finance Report

- Released 18 March 2010
- Produced by Unicef, WHO-GMP, & Macepa/PATH on behalf of the RBM Partnership
- Based on Finance chapter of the World Malaria Report 2009
  - Updated numbers
  - More detailed analyses
  - Deeper review in 12 countries
International donor disbursements for malaria

Figure 3.2.

International financial disbursements to malaria endemic countries have increased from approximately $100 million in 2003 to nearly $1.5 billion in 2009.

Key antimalarial interventions & strategies in 2010

**Prevention**
- Insecticide-treated bednets (ITNs) / Long-lasting ITNs (LLINs)
- Indoor Residual Spraying
  - In areas of moderate to high and stable transmission in Africa
- IPT in pregnancy (IPTp)
- IPT in infancy (IPTi)

**Diagnosis & Treatment**
- Parasite based diagnosis
  - Microscopy
  - Rapid Diagnostic Tests
- Artemisinin-based combination therapies (ACTs)
- Case management:
  - Health facilities
  - Community Case Management
  - Private sector

**Surveillance, M & E**
- Routine HMS
- Malaria surveillance and response systems
- Household surveys
- Drug efficacy monitoring
- Entomological monitoring

Strengthening health systems in endemic countries
Model-based estimate: % households owning at least one net: 35 high-burden countries in African Region, 2010

Estimated using Bayesian model that uses survey, manufacturer’s delivery and ministry of health distribution ITN data

NOT PUBLISHED – DO NOT CITE OR SHARE
Lives saved Tool (LiST) model estimates of child malaria deaths prevented over last decade in Africa

- Child malaria deaths prevented from **vector control** (ITNs and IRS) scale-up in 34 African countries (98% of population at risk in Africa)

- Child malaria deaths prevented from **malaria prevention in pregnancy** (IPTp and ITNs) scale-up in 27 African countries (82% of population at risk of malaria in Africa)
Child malaria child deaths prevented by malaria prevention interventions scale-up 2001-2010

736,000 (484,000 – 1,022,000) malaria-deaths prevented over past decade from malaria prevention intervention scale-up

World Health Organization

GLOBAL MALARIA PROGRAMME
Child malaria deaths prevented by malaria vector control interventions: Model-based estimates 34 African countries

2.95 million more children could be saved

736,000 children saved to date

Source: Saving Lives with Malaria Control, RBM, 2010
Regional trends: SEA Region

- India drives malaria burden in SEARO
- India accounted for 79% of cases in 2000 and 65% in 2009
- 5 countries with >50% decrease in confirmed cases in 2009 vs. 2000 (Bhutan, DPRK, Nepal, Sri Lanka, Thailand)
- India with 25% decrease
Distribution of Confirmed Malaria Cases in SEA Region, 2009

Total Confirmed Malaria Cases = 2,684,704

Source: SEARO, Country Reports, 2009

Bangladesh, India, Indonesia & Myanmar constitute 96% of total confirmed cases in SEA Region
Vector control: implementation status in the SEA Region

- ITNs are being scaled up widely in all countries. But coverage remains very low (large population size)

- Average **13.8%** of ITN/LLIN among high and moderate risk pop. (compared to **2-3%** in 2005)

- Coverage of ITN/LLIN significantly increased during 2005-07 (GFATM support)

- IRS coverage was 39.5% in 2007 and 31% in 2008 (among high risk populations)
Percentage coverage of Population at High and Moderate Risk under Bednets in SEA Region, 2008

Note: Maldives is Malaria Free; Note: * Population at low risk also covered for bednet distribution; ^ pop. at low risk only.
Source: Country Reports, 2008; WMR, 2009
Countries with >50% decline in cases: SEARO

Countries with >50% decline in confirmed cases 2000 vs 2009

Democratic People's Republic of Korea
Sri Lanka
Bhutan
Nepal
Thailand
Examples of success stories: Bhutan

• Control phase
• Cases decreased from 5,982 in 2000 to 972 in 2009 (mainly in deeply forested areas)
• *P. falciparum* % fell to 58%.
• Only 4 deaths in 2009
• 100% of the pop at risk covered with either IRS or ITNs
• Access to diagnosis and treatment: use of Malaria Mobile Clinics (MMCs) in remote areas
• ABER is ~ 70%
Examples of success stories: Sri Lanka

• In pre-elimination phase
• Cases decreased from 210 000 in 2000 to 558 in 2009 (mainly in the deep forested areas)
• *P. falciparum* proportion decreased – from 28% to 5%.
• Zero deaths in 2009
• 50% of the pop at risk covered with either IRS or ITNs
• Access to diagnosis and treatment: use of Malaria Mobile Clinics (MMCs) in remote areas
Regional trends: WP Region

- PNG, Cambodia and Sol. Islands accounted for 70% of cases in 2009
- PNG: ~1.4 m prob. & confirmed cases / yr
- Malaysia, Philippines and Vanuatu had 25-50% decrease
Countries with >50% decline in confirmed cases 2000vs2009

- Lao People's Democratic Republic
- Solomon Islands
- Viet Nam
- China
- Republic of Korea

Countries with >50% decline in cases: WPRO
Examples of success stories: Malaysia

- In pre-elimination phase
- ~7,000 cases/year reported (mainly in the deeply forested areas); 8% imported
- Low incidence (<0.1/1000 in mainland)
- 11% of cases diagnosed in active case detection
- \textit{P. falciparum} % declining: from 51% to 39%.
- 95% of population at risk covered with IRS or ITNs
- >100% ABER
Malaria in the Western Pacific

- Moving from control to elimination
  - Regional Action Plan 2010-2015 is endorsed by the WPR Regional Committee Meeting (WPR/RC60.8) and Resolution (WPR/RC60.R5)
  - Urges Member States where malaria is endemic:
    - ... To use the Regional Action Plan for Malaria Control and Elimination in the Western Pacific (2010-2015) to update national malaria control or elimination plans and as a framework for monitoring implementation and mobilizing resources
  - Immediate use:
    - Serves as roadmap (reference) for all countries for the period 2010 -2015.
    - Serves as framework for updating - National strategies, PoA, and M&E Plan
    - Serves as a tool for: Mobilising resources and accountability
Regional Action Plan to Control and Eliminate Malaria in WPR

- **Goal:**
  - To consolidate and build on the recent achievements in malaria control in the region and progressively eliminate malaria, where possible.

- **Objectives:**
  - Strengthen malaria programme management, based on firm political commitment and strong partnerships
  - Ensure full coverage of the population at risk with appropriate vector control measures,
  - Maximize utilization of malaria services (through appropriate information, education and communication and/or behaviour change communication) and dramatically strengthen community mobilization efforts,
  - Ensure access for all to early diagnosis and affordable, safe, effective and prompt antimalarial combination treatments through active public and private sector initiative
  - Ensure comprehensive coverage of vulnerable, poor and/or marginalized populations at high risk of malaria with appropriate malaria control measures
  - Establish and/or strengthen the routine malaria surveillance system (all species) and ensure adequate outbreak response capability
  - Accelerate malaria elimination efforts (for all species) in participating countries
Progress is fragile

Inpatient malaria cases, <5 years old

Eastern Province
Luapula Province

Zambia
Increasing our efforts in countries with the greatest malaria burden

Cumulative % of deaths

- 5 countries account for 53% of deaths
- 15 countries account for 80% of deaths
- 22 countries account for 90% of deaths
- 28 countries account for 95% of deaths
Funding per person at risk

Map 3.2.
Cumulative funding commitments for the life of the grants from all external sources for 2003–2009 per person at risk (ppr) of malaria.

There is an approximate 90-fold difference between ppr funding levels in sub-Saharan Africa: Côte d’Ivoire received $0.57 ppr and Sao Tome and Príncipe received $50.93 ppr over the seven years from 2003–2009.
### Malaria control and elimination: 2011 – 2015

| The era of one-size-fits-all approach for malaria control is coming to an end as malaria transmission drops and new interventions are introduced |
| Sustaining high intervention coverage may prove more difficult than initially achieving it |
| Resistance to antimalarials and insecticides are major threats to continued success |
| Malaria control paradigm is shifting, as countries move from lowering morbidity & mortality to reducing transmission |
| Fundamental changes are happening (e.g. universal diagnostic testing) and are on the horizon (e.g. vaccines) |
| Routine surveillance is critical to sustained control and eventual elimination |

*P. vivax* will become increasingly important as *P. falciparum* burden drops, and is a more formidable elimination challenge
Universal diagnostic testing

- WHO recommends confirmation of malaria through parasite-based diagnosis in all patients prior to instituting treatment (Malaria Treatment Guidelines 2010)

- Rationale:
  - Malaria prevalence amongst fever cases decreasing in many areas
  - Quality-assured RDTs are now available
  - Parasitologic confirmation in persons with suspected malaria will:
    - Improve differential diagnosis and fever management
    - Diminish unnecessary use of ACTs
    - Provide accurate surveillance data to manage programmes
Simple, inexpensive, and accurate Rapid Diagnostic Tests (RDTs) exist
RDT introduction, Zambia

Reported malaria cases, Zambia Livingstone District, 2004 - 2008

Source: NMCC, Zambia MoH

World Health Organization
Senegal: Rapid Diagnostic Tests (RDTs) are scaled up, and the need for antimalarial treatment drops

Source: Sénégal Programme National de Lutte contre le Paludisme and Université Cheikh Anta Diop de Dakar
“Knowledge is power. Information is liberating.”

Kofi Annan, 7th Secretary General of the UN
The power of communities

If communities can know the true burden of malaria, and can see the fruits of prevention and control efforts, then the will to eliminate and ultimately eradicate malaria will never fade.
Potential new foci of artemisinin resistance
Delayed parasite clearance, western Cambodia

(p=0.0001 for Δ slopes between sites)

Dondorp et al, NEJM, 2009
WHO database on antimalarial drug efficacy

- Data come from three main sources:
  - published data, obtained by searching journal articles
  - unpublished data from reports by ministries of health, national malaria control programmes, nongovernmental organizations, research institutes and partners involved in the development of new antimalarial medicines; and
  - raw data from regular surveillance studies conducted
- Contains 3932 studies representing 267,841 patients
- For this report, 1120 studies representing 81,848 patients were included
Artemether-lumefantrine (AL): treatment failure rates in SEA Region

![Graph showing treatment failure rates in SEA Region](image)

- **Thailand**
- **Lao People's Democratic Republic**
- **Myanmar**
- **Cambodia**
Artesunate-mefloquine: treatment failure rates in Cambodia
Artesunate-mefloquine: treatment failure rates in Thailand
Percentage of patients with Pf parasitemia on day 3 after treatment with an ACT
Percentage of patients with Pf parasitemia on day 3 after treatment with oral artesunate monotherapy.
Global Plan for Artemisinin Resistance Containment (GPARC)

**Goal:** Protect ACTs as an effective treatment for *Pf* malaria

- Define priorities to contain and prevent artemisinin resistance (AR)
- Motivate actions and provide clear accountabilities for key stakeholders
- Mobilize resources to fund AR containment and prevention
- Increase collaboration and coordination on AR containment activities
- Define governance mechanisms and indicators to assess progress

Developed with input from ~100 partners across RBM partnership
What should be done going forward?

Contain or eliminate artemisinin resistance where it already exists
Prevent artemisinin resistance where it has not yet appeared

1. Stop the spread of resistant parasites
2. Increase monitoring & surveillance to evaluate the AR threat
3. Improve access to diagnostics & rational treatment with ACTs
4. Invest in artemisinin resistance-related research
5. Motivate action and mobilize resources
GPARC: summary of recommendations by Tier

**Tier III**
- Good Control
- More routine monitoring
- Eliminate monotherapies & poor-quality drugs

**Tier II**
- Intensified & accelerated control
- Intensified monitoring, esp. on border near foci
- Actively eliminate monotherapies & poor-quality drugs
- Lower transmission; focus on mobile & migrant populations

**Tier I**
- Intensified & accelerated control to universal coverage
- Intensified monitoring, esp. around foci
- Aggressively eliminate monotherapies & poor-quality drugs
- Lower transmission; focus on mobile & migrant populations
- Consider ACD, MSAT, FSAT or MDA

**World Health Organization**

**Global Malaria Programme**
Cost to implement the GPARC estimated at ~$175 M USD per year

<table>
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<th>Annual costs (USD)</th>
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<tbody>
<tr>
<td>~$110 M USD</td>
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<tr>
<td>• Tier I costs (all recommendations)</td>
<td>~$10-20 / PAR*</td>
</tr>
<tr>
<td>• Tier II costs (Tier I costs exc. transmission reduction tools)</td>
<td>~$8-10 / PAR*</td>
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<tr>
<td>• Tier III costs</td>
<td></td>
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<tr>
<td>– Monitoring of ACT efficacy</td>
<td>~$50-100K / country</td>
</tr>
<tr>
<td>– Additional costs to enforce drug regulations</td>
<td>~$260-714K / country</td>
</tr>
<tr>
<td>• Global costs (implementation, monitoring and surveillance)</td>
<td>~$8-14M</td>
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<th>~$65M USD</th>
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<td>• Additional non-artemisinin drug development costs</td>
<td>~$50M</td>
</tr>
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<td>• Acceleration of laboratory research</td>
<td>~$10-15M</td>
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Total GPARC costs

~$175 M USD

Implementation costs will vary significantly by area depending on intensity of threat and starting infrastructure

* PAR : Person-At-Risk
GLOBAL PLAN FOR ARTEMISININ RESISTANCEcontainment
Insecticide Resistance - vulnerability

- Vector control = 60% of 2010 GMAP budget
- Highly dependent on pyrethroids
  - Only class currently used on ITNs / LLINs
  - Cheaper and longer-lasting than most alternatives for IRS
- Resistance so far mainly Africa, both *An. gambiae* and *funestus*; some reports from India, but situation not well characterised
- Main focus = pyrethroids but resistance to organophosphates, carbamates, DDT are also present
- One type of resistance – *kdr* – has been spreading in *An. gambiae* for several years and is now widespread in West and Central Africa, has not been linked to immediate control failure
- Urgent need for a comprehensive global strategy on the prevention and management of insecticide resistance
Building capacity in endemic countries at regional, national, district, and community levels

- **Regional**
  - Need regional canters of excellence capable of training tomorrow's scientists and programmatic leaders

- **National**
  - Need adequate number of well trained staff capable of managing integrated malaria control programme

- **District**
  - As malaria transmission falls, malaria programme management will need to take place at the district level
  - Staff need to be able to use data for decision making

- **Community**
  - Need to take ownership over defeating malaria
  - Should not be seen as passive recipients of goods and services
Elimination

- Major progress in WHO EURO and EMRO regions
  - Morocco certified as free of malaria May 2010,
  - Turkmenistan certified as free of malaria October 2010
  - Armenia certification process ongoing
- Need to capture lessons learned
- Unrealistic expectations in some settings
- Need to make sure that cart does not get ahead of the horse
  - Some countries developing strategic plans for elimination without a sufficient program review and feasibility assessment
- WHO Global Malaria Programme, with partners, is developing a tool on Elimination Scenario Planning
  - Will help countries to understand how resource requirements and timelines to achieve elimination are related in a given country
  - Due for release in mid-2011
Malaria-free countries and malaria-endemic countries in phases of control*, pre-elimination, elimination, and prevention of reintroduction, end 2010

*China, Indonesia, Philippines, Solomon Islands, Sudan, Vanuatu and Yemen have localized malaria-free projects.
Malaria Eradication

- **Eradication is the only acceptable goal**; challenge is to make people understand the timeline and commitment required
  - Along the way we WILL achieve phenomenal global health goals
- **Eradication will require new tools**
  - Vaccine with effect on transmission could be transformational
- **Eradication includes** *Plasmodium vivax*, a huge challenge that has not received sufficient attention
- **Need to determine way to map execution of malaria eradication research going forward**
  - Critical to keep endemic country scientists engaged
Changing the paradigm: transmission reduction

- Will require a re-think of the way we use tools
  - Diagnostics
  - Antimalarial drugs
    - Treatment
    - Prevention
    - New approaches to screening and treatment
    - Transmission blocking
  - Surveillance (as an intervention)
  - Potential vaccines
  - Tools not yet imagined

- Will be critical to involve communities not only in reducing morbidity and mortality from malaria, but also in reducing malaria transmission to zero
Malaria vaccine

- Currently no licensed malaria vaccine
- Phase 2 trials with RTS,S demonstrated 30-60% efficacy
- Large phase 3 trial of RTS,S underway with 11 sites in 7 sub-Saharan African countries
  - Expected enrolment of ~16,000
  - Initial trial results based on 12 m follow-up in 5-17 month cohort expected in late 2011
  - Full trial results based on 30 m follow-up in EPI cohort expected in 2014
  - WHO has convened a joint technical expert group (Global Malaria Programme and Vaccines Department) which will advise SAGE
    - Policy recommendation expected in 2015
Regional challenges, 2010 and beyond

- Complex border areas
- Large numbers of migrant individuals
- Difficult geographic and political access in some places
- Antimalarial drug resistance
  - Especially threat of artemisinin resistance
- *Plasmodium vivax*
- Urgent need to develop cross-border activities
  - Particularly sharing surveillance data
- In the face of declining burden:
  - Maintaining fiscal and political commitment
  - Maintaining human resource capacity in the
Some closing thoughts (1)

- The business case for investing in malaria control is clear and compelling; we cannot let the world's attention wander
  - Rapid increase in funding has resulted in rapid scale-up of today's tools
  - Scale-up is contributing to health systems strengthening
  - Where scale-up has occurred, malaria cases and deaths drop, as does all-cause child mortality
  - Quickest path to achieving MDG 4 in many countries, especially in Africa

- The greatest risk to continued success is unstable financing
  - We need to fully fund the Global Malaria Action Plan
  - R&D for development of new tools and strategies must continue
  - Funding for setting evidence based norms, standards, & policies is essential

- The challenges ahead are a mix of programmatic and political: we must be prepared for both
Achieving success on malaria critical to delivering on health-related Millennium Development Goals

- MDG 4: Reduce child mortality
  - Target 5: reduce by two-thirds the under-five mortality rate

- MDG 5: Improve maternal health
  - Target 6: reduce by three-quarters the maternal mortality ratio

- MDG 6: Combat HIV/AIDS, malaria and other diseases
  - Target 8: have halted by 2015 and begun to reverse the incidence of malaria and other major diseases

Need for sustained commitment: failure to deliver on malaria would prevent success on MDGs
Figure 6.1.
Estimated annual global resource requirements for malaria control and current global malaria commitments from Global Fund, World Bank, and US-PMI.

The Global Malaria Action Plan estimated that between $5.0–$6.2 billion is required per year between 2010 and 2015 to scale up and sustain control and progress toward malaria elimination globally. While there have been substantial increases in funding for malaria control, they continue to fall short of the needs to achieve the global goals.

Source: Global Malaria Action Plan (RBM, 2008), Global Fund, World Bank, and US-PMI.
Fighting malaria - a continuous cycle requiring balanced investment

Surveillance, monitoring & evaluation → Basic and applied research → Program implementation → Policy change
Some closing thoughts (2)

- Need to find a balance
  - Primary near-term focus should remain reduction in malaria-related morbidity and mortality in countries with greatest burden
  - Cannot penalize success: must continue to finance countries that have been successful in reducing malaria transmission
- Transformational tools will be critical to achieve elimination in higher-transmission settings and for ultimate eradication
- Universal diagnostic confirmation of malaria along with timely and complete surveillance are key to sustaining the gains and moving towards elimination
  - Cross border collaboration crucial
- Training next generation of endemic country scientists and programme staff is essential
- If we stay together and remain focused, the result will be a phenomenal public health achievement
Keep our eye on the prize: a world free of malaria