

# Sustaining the gains in malaria control and elimination: the critical role of vector control

RBM Vector Control Working Group  
Geneva, Switzerland  
6 February 2012

**GLOBAL MALARIA  
PROGRAMME**

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## Objectives

- Overview of progress in malaria control, with a focus on vector control (primarily data from World Malaria Report 2011)
- Malaria Policy Advisory Committee
  - Articulation with VCWG
- Vector Control Innovation
- Global Plan for Insecticide Resistance Management (GPIRM)

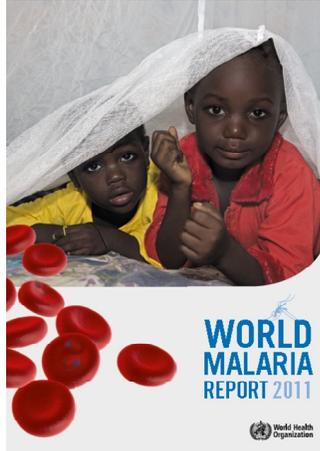


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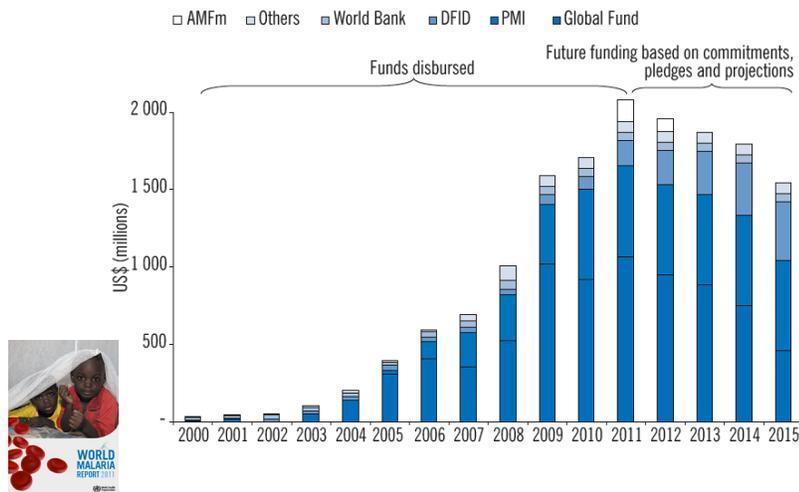
# World Malaria Report 2011



- 2011 Report released on 13 December 2011
- Annual reference on the status of global malaria control & elimination. Data to 2010 and 2011
- Principal data source is national programs in 106 endemic countries with support from: WHO Regional offices, ACT Watch, AMFm, ALMA, CDC, CHAI, Columbia University, DFID, DHS/ Measure, FIND, GHG UCSF, Global Fund, IHME, ISGlobal, JHU, PATH, R4D, RBM, Tulane University, UNICEF, UNSE, USAID
- Summarizes key malaria targets & goals
- Documents trends in financing, intervention coverage and malaria cases and deaths
- Updates malaria burden estimates for decade: 2000-2010
- NEW: Profiles for 99 countries with ongoing transmission

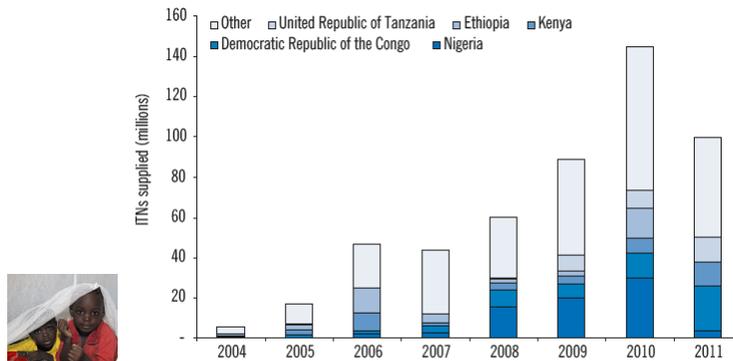


## Past and projected international funding for malaria control



## Number of LLINs delivered by manufacturers to countries in sub-Saharan Africa

294 million LLINs procured for distribution in Africa between 2008 and end 2010



Source: Alliance for Malaria Prevention. Data for the first three quarters of 2011 have been multiplied by 4/3 to provide an annual estimate.

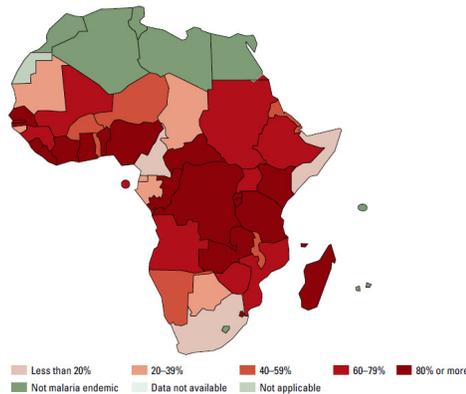


## LLINs delivered 2008-2010, sub-Saharan Africa

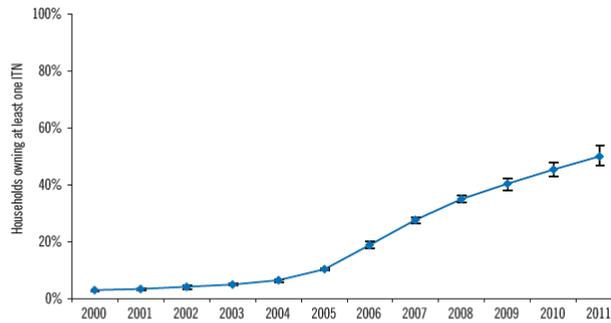
**Figure 5.7**

Number of LLINs delivered and available for use during 2008–2010 as a percentage of reported need to cover one net for every two people living in an area with malaria transmission

290 million LLINs have been delivered to African countries since 2008, satisfying nearly 80% of reported need across the region.



## Trend in estimated proportion of households with at least one ITN in sub-Saharan Africa



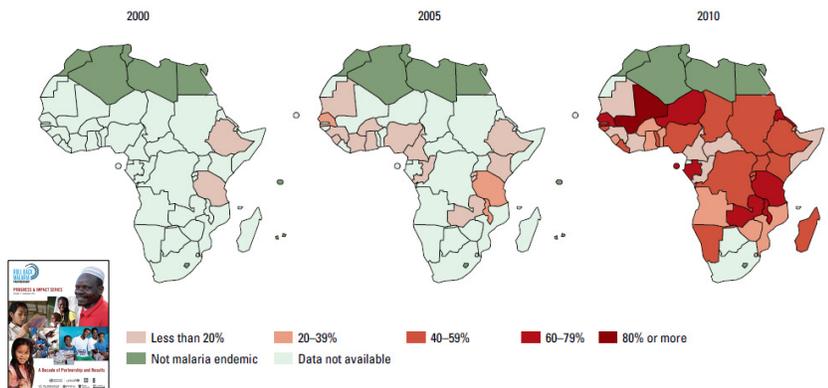
Source: ITN coverage model taking into account ITNs supplied by manufacturers, ITNs delivered by NMCPs and household survey results (1). Includes Djibouti, Somalia and Sudan which are in the WHO Eastern Mediterranean Region.

## Proportion of HH with at least one ITN, Africa

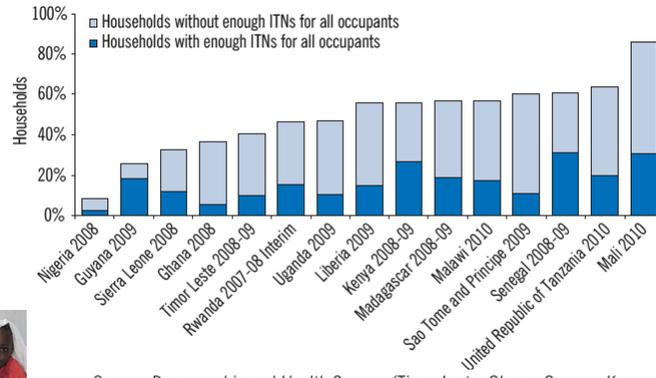
**Figure 5.6**

Proportion of households with at least one ITN, based on the latest survey data available by the end of 2000, 2005 and 2010

Steep increases were seen in the proportion of African households with at least one ITN.

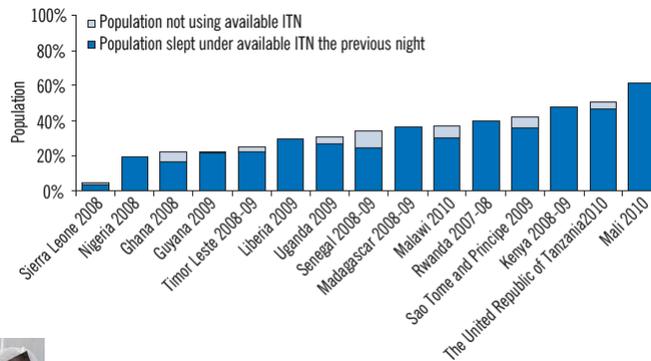


## Household ownership of ITNs



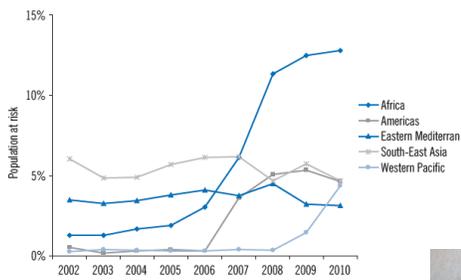
Source: Demographic and Health Surveys (Timor Leste, Ghana, Guyana, Kenya, Madagascar, Malawi, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, United Republic of Tanzania); Malaria Indicator Surveys (Uganda, Liberia); and a Special Survey (Mali).

## Use of ITNs available in households

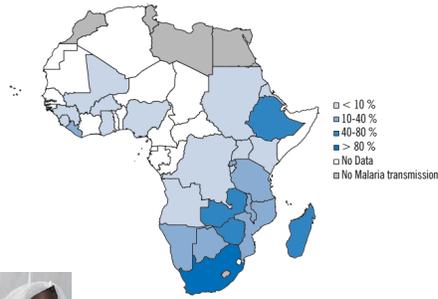


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## Proportion of population at malaria risk protected by IRS



Source: NMCP reports.

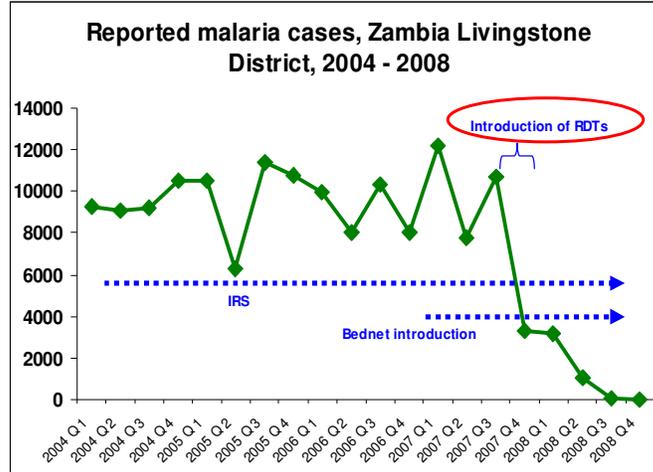


## Universal diagnostic testing

- 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: **fever no longer equals malaria**
  - Quality-assured RDTs are now available
  - Malaria diagnostic testing:
    - Improves differential diagnosis & fever management
    - Diminishes unnecessary use of ACTs
    - Provides accurate surveillance data to manage programmes

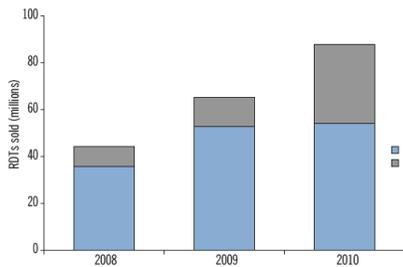


## RDT Introduction, Zambia



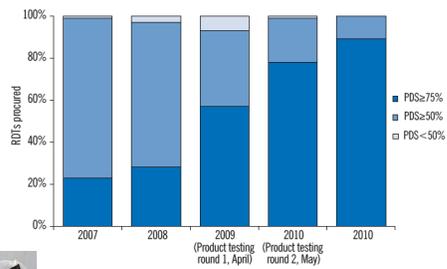
## Malaria RDT sales

**Sales to public and private sectors**



Source: data provided by 31 manufacturers participating in the WHO Malaria RDT Product Testing Programme

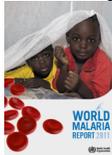
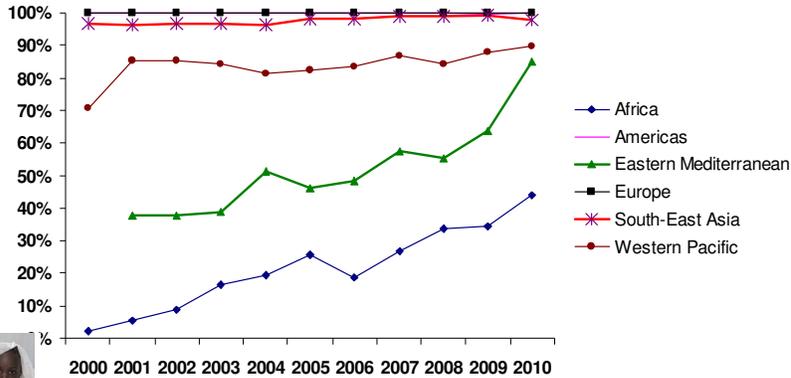
**Sales by panel detection score (PDS)**



Source: Data provided to FIND by 17 manufacturers eligible for the WHO Malaria RDT Product Testing Programme



## Proportion of suspected malaria cases at public health facilities receiving a parasitological test



Despite improvements, long way to go to reach universal access to diagnostic testing, especially in Africa



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## Universal access to malaria diagnostic testing: an operational manual



### UNIVERSAL ACCESS TO MALARIA DIAGNOSTIC TESTING

AN OPERATIONAL MANUAL 2011

- **Target Audience:** managers at national, regional or district levels
- **Content:** emphasis on HOW as opposed to WHAT
- **Technical inputs:** 15 agencies and 5 malaria control programmes
- **Released:** September 2011



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# Estimates of malaria cases and deaths by WHO Region, 2010

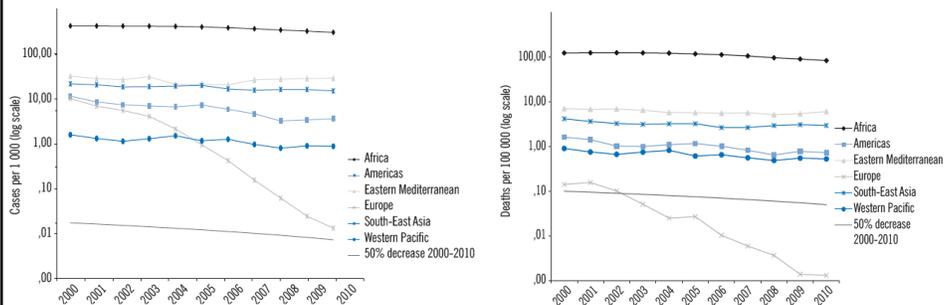
**TABLE 7.2**  
Estimates of malaria cases and deaths by WHO Region, 2010

Region	Estimated cases (000s)			% <i>P. falciparum</i>	Confirmed cases reported	Reported/estimated
	Estimate	Lower	Upper			
Africa	174 000	113 000	239 000	98%	20 000	11%
Americas	1 000	1 000	1 000	34%	1 000	59%
Eastern Mediterranean	10 000	8 000	14 000	82%	1 000	10%
Europe	0.2	0.2	0.2	0%	0.2	87%
South-East Asia	28 000	23 000	35 000	54%	2 000	9%
Western Pacific	2 000	2 000	2 000	77%	257	13%
World	216 000	149 000	274 000	91%	24 000	11%

Region	Estimated deaths			% <5
	Estimate	Lower	Upper	
Africa	596 000	468 000	837 000	91%
Americas	1 000	1 000	2 000	29%
Eastern Mediterranean	15 000	1 000	38 000	60%
Europe	0	0	0	4%
South-East Asia	38 000	28 000	50 000	31%
Western Pacific	5 000	3 000	6 000	41%
World	655 000	537 000	907 000	86%



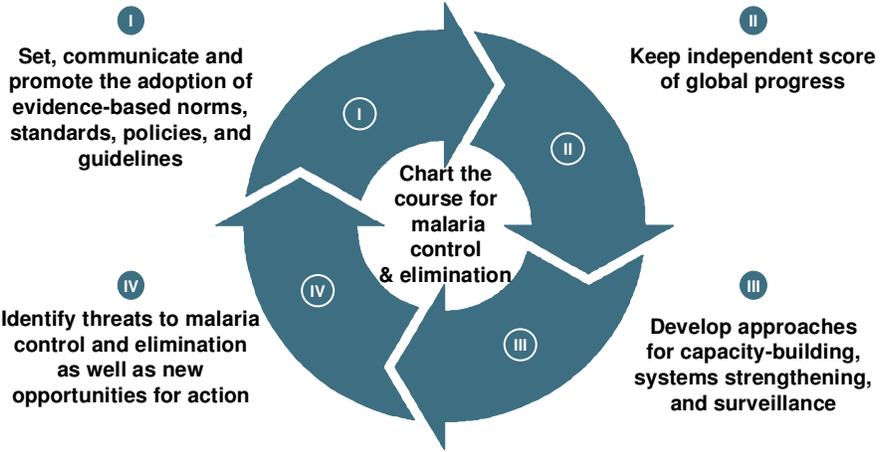
## Estimated trends in malaria cases (per 1000) and deaths (per 100 000) persons at risk by WHO Region, 2000–2010



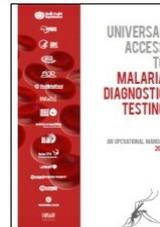
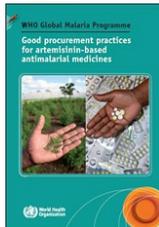
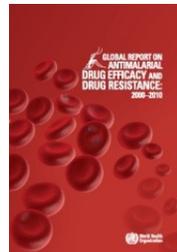
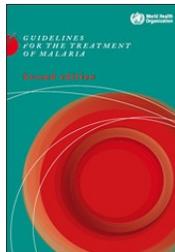
Source: WHO. Rates are plotted on a logarithmic scale. A line representing the slope required to achieve a 50% reduction between 2000 and 2010 is shown to aid interpretation.



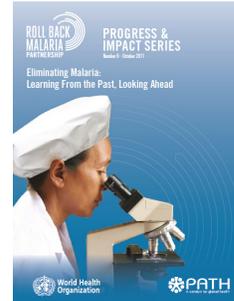
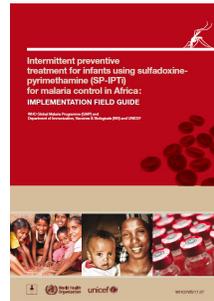
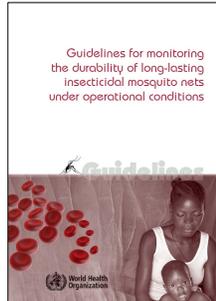
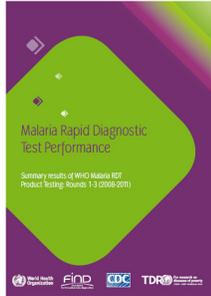
## WHO Global Malaria Programme: four key roles



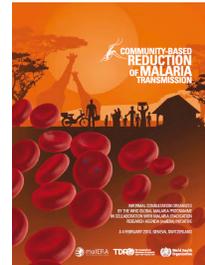
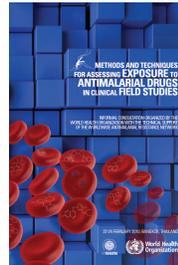
## Recent GMP Products (1)



## Recent GMP Products (2)

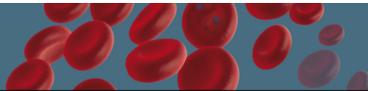


## Recent GMP Products (3)



## Malaria Policy Advisory Committee (MPAC) - background

- **Setting policy, norms and guidance on malaria control is primary role of WHO/GMP**
  - Malaria Expert Committee - 20th (last) meeting in 1998
  - Technical Expert Groups (TEGs) - since mid-2000s
  - Ad-hoc Technical Consultations as needed
- **Scale up of malaria control + major investment in research = rapidly evolving policy environment for new tools and technology**
- **GMP strengthening policy setting process to be more:**
  - Timely
  - Transparent
  - Accountable



## MPAC: basic elements

The Malaria Policy Advisory Committee (MPAC) will provide independent strategic advice and technical input to WHO for the development of policies related to malaria control and elimination

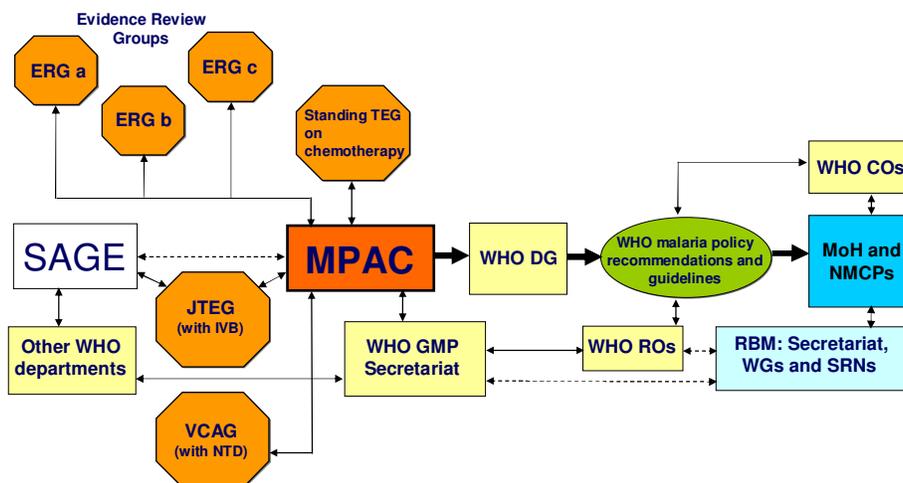
- 15 members, integrators, with **broad range** of
  - Expertise, professional affiliation, gender, geography
- To meet twice a year
- Open call for nominations
- Nominated by selection committee
- Appointed by WHO for three-year terms, renewable once
- Recommendations to be published within two months of meetings



## MPAC: Chronology

- **GMP Advisory Group on policy setting was convened in Geneva in March 2011**
  - Review previous and existing WHO/GMP policy setting processes
  - Consider successful models from other WHO departments
  - Propose draft ToR for new policy setting body
- **Selected model based on SAGE, to be called Malaria Policy Advisory Committee (MPAC)**
- **Draft ToR of MPAC sent to over 40 resource persons and stakeholders on 21 April; ~90% response rate**
- **Open call for nominations, September 2011: 100 applications received; 15 selected by independent nomination panel, and approved by WHO DG**
- **Inaugural meeting: 31 January – 2 February 2012**

## MPAC: organogram



## Interface between RBM and WHO-GMP

- **RBM Roles**
  - Advocacy
  - Resource mobilization
  - Partner harmonization
- **Important to optimize interface between RBM mechanisms and WHO-GMP**
  - Example: MPAC meetings are offset from RBM Board meetings by 3 months

## Major challenges ahead

- Political commitment
- Financial resources
- **Procurement and supply chain management**
  - Sustaining high intervention coverage
- Health system capacity
- Delivering quality case management in the private sector
- Human resource capacity
- Antimalarial drug resistance
- **Insecticide resistance**
- Inadequate surveillance; burden estimation controversies
- **Delivering results in highest burden countries**

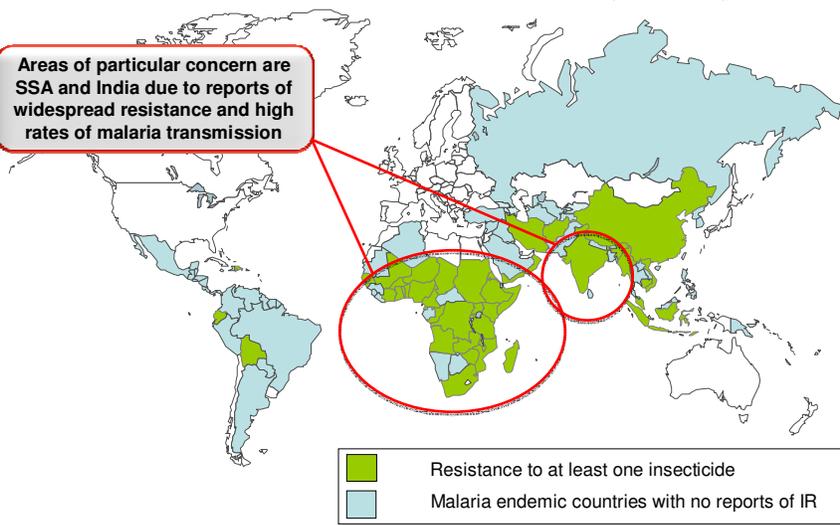
## Challenge: Insecticide resistance

- **Context**
  - Current vector control efforts highly dependent on pyrethroids
  - Resistance to pyrethroids is widespread, particularly in Africa
  - Resistance to other insecticides also present in many settings
    - Not associated with widespread control failures to date
- **Potential solutions**
  - Fully implement the *Global Plan for Insecticide Resistance Management in malaria vectors (GPIRM)*
    - Such a plan requested by both World Health Assembly (2011 Resolution) and the RBM Board
- **Risks**
  - Short term costs of IRM prevent timely action



## 48 endemic countries report insecticide resistance, most of them to at least pyrethroids

Countries reporting insecticide resistance in at least one of their main malaria vectors, as indicated by bioassays



## Global Plan for Insecticide Resistance Management (GPIRM) in malaria vectors

- Global strategy to coordinate action against insecticide resistance and ensure continued effectiveness of current & future vector control tools on transmission, morbidity and mortality
- Currently being developed with input from >130 stakeholders
- Launch: March-April 2012
- End goal of GPIRM: Maintain effectiveness of malaria vector control in the long-term
- Near-term objective of GPIRM: Preserve susceptibility of major malaria vectors to pyrethroids and to other classes of insecticides at least until a range of new classes is made available for large-scale vector control



## GPIRM builds on recommendations from May 2010 WHO consultation

### The technical basis for coordinated action against IR:

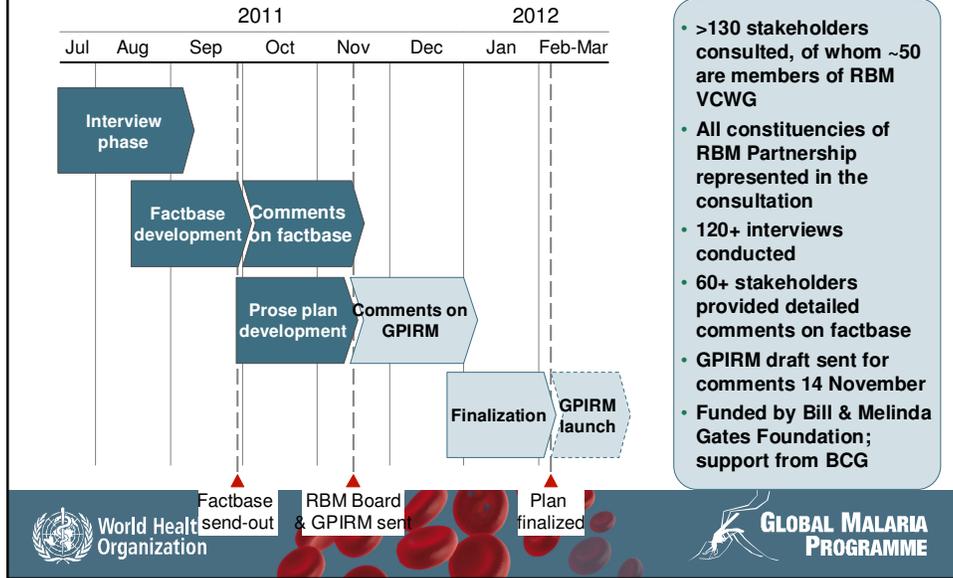
*Preserving the effectiveness of modern malaria vector control*



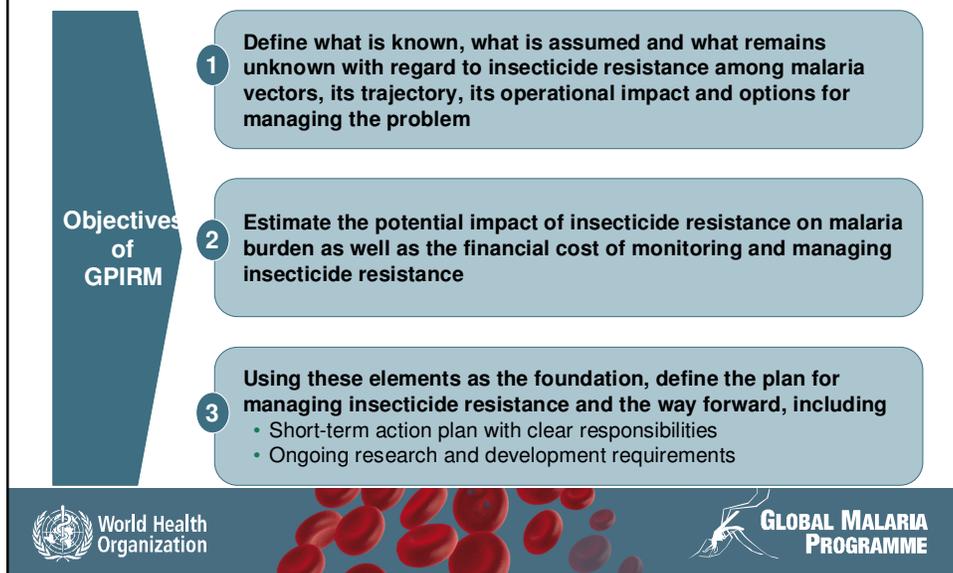
- ❖ Use insecticides with care and deliberation
- ❖ Use IR management approaches to avoid single class insecticide pressure
- ❖ Define IR management strategy from inter-sectoral perspective
- ❖ Incorporate IR management into all vector control programs
- ❖ Conduct regular insecticide resistance monitoring
- ❖ Assess short-term increased cost of IR management against health impact and long-term cost impact



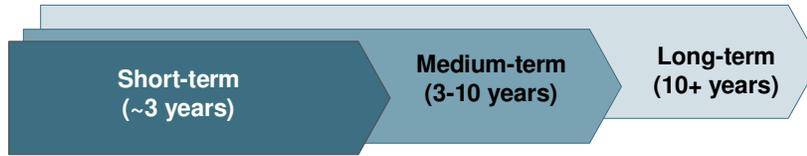
## GPIRM being developed through consultative process engaging all constituencies of RBM



## GPIRM is being developed to coordinate action on the prevention and management of insecticide resistance



## GPIRM strategy: a window of opportunity to improve sustainability and impact of vector control

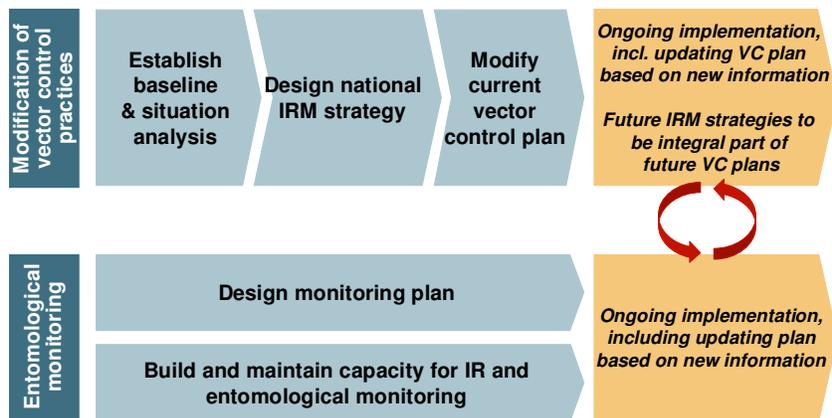


Five pillars of strategy

- I Plan and implement IR management strategies in malaria endemic countries
- II Ensure proper & timely entomological and resistance monitoring and effective data management
- III Fill knowledge gaps on IR mechanisms and impact of current IRM approaches
- IV Develop new and innovative vector control tools
- V Ensure key enablers in place (advocacy, human and financial resources)



## At country level, two parallel efforts needed in the short-term



## Ongoing research agenda

Impact of IR and IRM approaches

Dynamics of resistance

New & innovative vector control tools

IR modeling

Operational impact of IR

Metabolic resistance

Reformulations and new AIs

Burden modeling

IRM approaches

Genetics of resistance

New paradigms

Financial modeling



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## Managing IR is a shared responsibility for all RBM Partners

	Global norms & guidelines	Designing IRM strategies	Implementation	Evaluating IRM strategy	Monitoring	Coordination of action / info	Research	Resource mobilisation	Advocacy
NMCPs	✓	✓	✓	✓	✓	✓	✓	✓	✓
Government officials			✓			✓		✓	✓
Agricultural sector					✓	✓	✓		
Implementation agencies / NGOs		✓	✓	✓	✓	✓		✓	✓
WHO GMP	✓	✓	✓	✓	✓	✓	✓	✓	✓
WHO regional / country offices	✓	✓	✓	✓	✓	✓		✓	✓
Multilaterals		✓	✓					✓	✓
Funding agencies					✓		✓	✓	✓
WHOPES	✓	✓		✓			✓	✓	
Research / Academia		✓		✓	✓		✓		✓
Insecticide/LLIN manufacturers				✓			✓	✓	✓

✓ Primary role    ✓ Supporting effort

## Challenge: Delivering results in countries with highest malaria burden

- **Context**

- Major progress in last decade, but progress lagging in highest burden countries

- **Potential solutions**

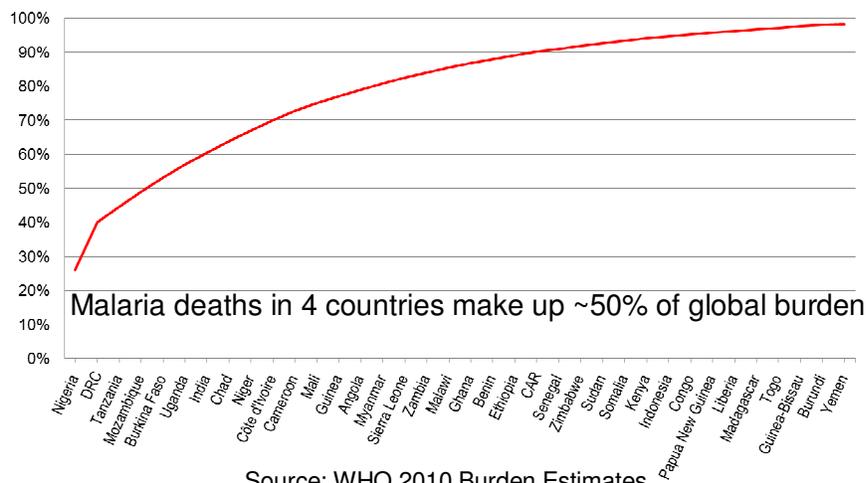
- WHO-GMP and RBM Malaria Situation Room to track progress (intervention coverage and impact) in 10 countries in WHO African Region with highest burden
  - Proactively identify bottlenecks requiring resolution: political, financial, procurement and supply chain,

- **Risks**

- Inadequate resources to fully scale up current interventions in countries with greatest burden



## Need to increase our efforts in countries with the greatest malaria burden



Source: WHO 2010 Burden Estimates



## Major opportunities ahead

- Malaria elimination
- New uses for existing tools. Example: Seasonal Malaria Chemoprevention
- **Fostering innovation: new tools**
- Integrated community case management
- **Improving efficiency and value for money. Example: a 5-year LLIN**
- **Stratification:**
  - Using data for decision making
  - Determining the optimal intervention mix for different epidemiological settings
- **Universal diagnostic testing, improved case management, and strengthened surveillance**



## Opportunity: Value for money

- **Context**
  - Financial gap in malaria control unlikely to be closed through increased resources alone
- **Actions needed**
  - Thoroughly examine current malaria control efforts to identify opportunities for increased efficiency and better value-for-money
- **Risks**
  - Insufficient data to make well-informed decisions
  - Product development timeline may be too slow to produce near-term gains
  - Unintended consequences of new approaches



## Evidence that LLIN longevity is variable and 2 years or less in some settings / cases

- Multi-country analysis by A. Kilian et al found *average* 50% survivorship after 3 years
- Madagascar preliminary analysis of 3-year follow-up data:
  - survivorship of 51% of polyester and 41% of polyethylene LLIN
  - residents report most holes caused by sparks from fire
- Nigeria: AMP household surveys report high loss after 1 year
- Mentor Initiative: report high 3-year failure of 2 major current LLIN types in eastern Chad

## Two 75 denier polyester nets, both 3 years old, in a durability study



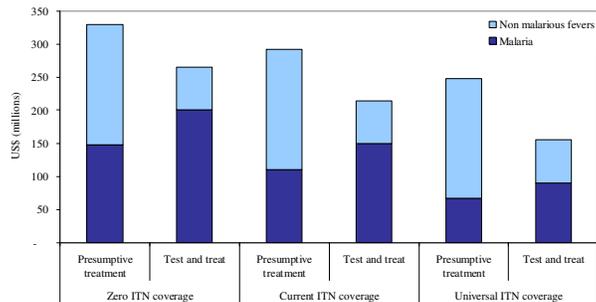
(a) rate of physical deterioration is variable, and  
(b) in such a study, some nets are kept which otherwise would have been discarded.  
(Photos - Albert Kilian)

## Potential savings of a longer lasting ITN

	3 year net	5 year net	Saving
ITNs needed in Africa 2011-2020 (millions)	1,250	750	500
Financing required @ US\$ 7.66 per ITN (US\$ millions)	9,575	5,745	3,830

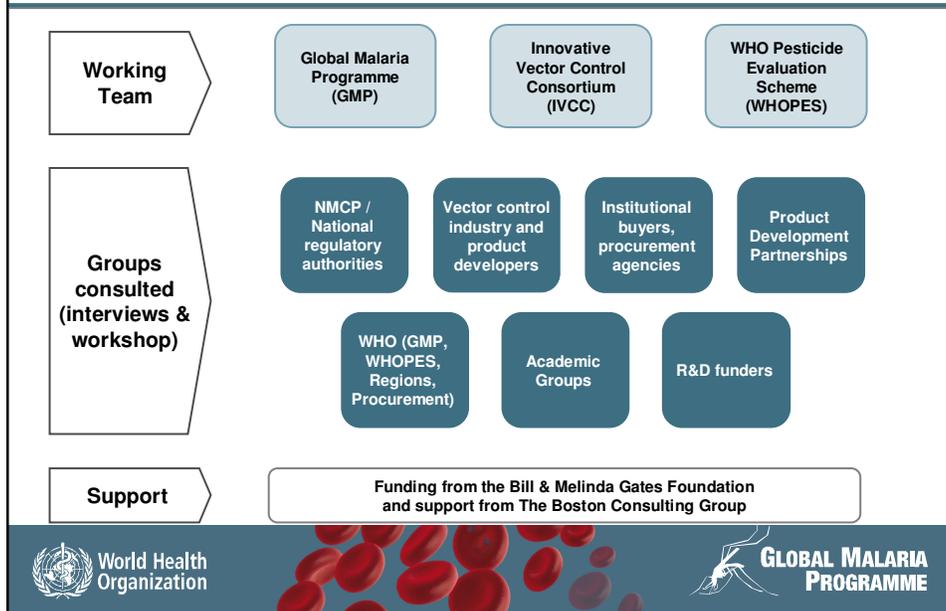
## Impact of malaria control on treatment costs

Commodity cost of treating cases presumptively, or with a policy of test and treat, with different levels of ITN coverage



Source: WHO model with treatment cost US\$ 1.40

## A collaborative project to foster introduction of innovative vector control tools in public health



## Objectives: map current innovation process in vector control & generate options for improvement

1

### Map out current innovation process

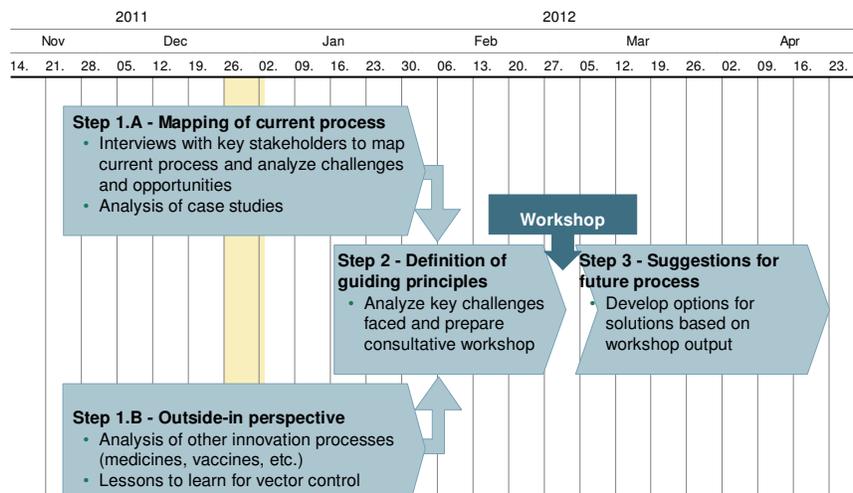
- From idea generation to procurement in endemic countries
- For new forms of vector control and new products within existing vector control technologies
  - Map out various steps and functions of vector control process
  - Identify strengths, challenges, gaps and potential bottlenecks in current system

2

### Propose improvements to current process and map out options

- Propose ways to re-configure how responsibilities are assigned to stakeholder groups / institutional structures
  - Clarify role of each stakeholder group
  - Operational procedures for new groups (VACG and others)
  - Interactions between various groups involved

## Project based on three major steps



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## Nearly 70 stakeholders interviewed so far to map current process and identify challenges

**WHO**

Robert Newman, GMP  
Abraham Mnzava, GMP  
Morteza Zaim, WHOPEP  
Rajpal Yadav, WHOPEP  
Jeffrey Hii, WPRO  
A.P. Dash, SEARO  
Christian Frederickson  
Keith Carter, AMRO  
Salaheldin Elkhalfa, EMRO  
Paul Acrivadias, WHO Procurement  
Sergio Vasques, WHO Procurement  
Kevin Marsh, MPAC Chair / KEMRI  
Jan Van Erps, RBM Secretariat  
Gamini Manuweera, UNEP

**Vector control industry**

Egon Weinmueller, BASF  
Mark Birchmore, Syngenta  
Andy Bywater, Syngenta  
John Lucas, Sumitomo  
Nobuako Mito, Sumitomo  
M. Vestergaard, Vestergaard Frandsen  
H. Pates-Jamet, Vestergaard Frandsen  
Gerhard Hesse, Bayer  
Joseph Naro, Clarke Mosquito Control  
John Dawson, Dow AgroSciences  
John Fitt, Dow AgroSciences  
Maude Meier, SC Johnson  
Richard Allan, Mentor  
Bernhard Johnen, CropLife  
Ole Skovmand, IIC

**Academia**

Bob Wirtz, CDC  
John Gimnig, CDC  
Mark Rowland, LSHTM  
Fabrice Chandre, IRD  
Marc Coosemans, ITMA  
Kamaraju Raghavendra, NIMR  
India  
Ahmad Rohani, IMR Kuala Lumpur  
Qiyong Liu, NICDC China  
Maureen Coetzee, NICD  
Gerry Killeen, LSTM  
Graham White, UF  
Christian Lengeler, STI  
Brian Greenwood, LSHTM  
Immo Kleinschmidt, LSHTM  
Jo Lines, LSHTM

**Instit. buyers**

Joelle Daviaud, Global Fund  
Sophie Logez, Global Fund  
Michael MacDonald, PMI  
Francisco J. Blanco, UNICEF  
David Whybrew, Crown Agents  
Desmond Chavasse, PSI  
Melanie Renshaw, ALMA<sup>1</sup>  
Neel Lakhani, CHAI  
Justin Cohen, CHAI  
Bruno Moonen, CHAI

**NMCP / NRA**

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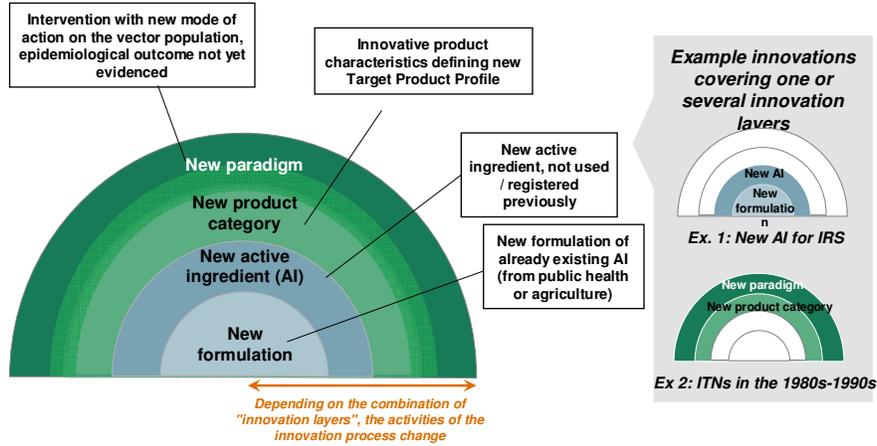


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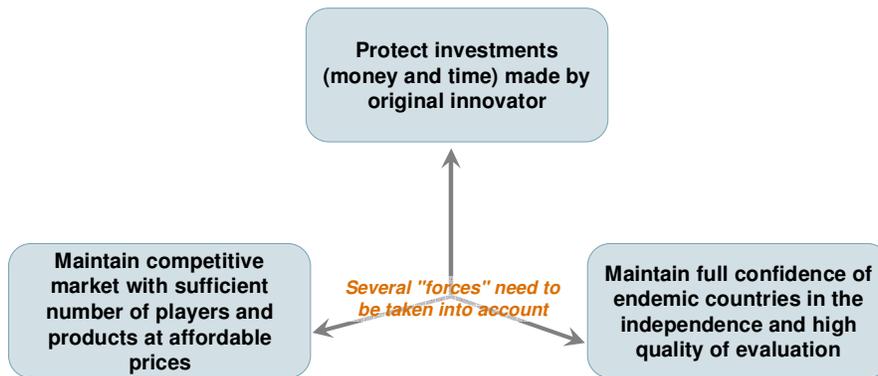


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## Different layers of innovation



## Any solution would need to take into account balance between several dimensions



## Next step: consultative workshop in early March

Reframe innovation as a team effort and a joint challenge

Obtain mutual understanding of the goals and constraints of others

- Clarify motivations, requirements, constraints, challenges for all stakeholder groups

Raise awareness on challenges existing in the community

- Including prioritization of these challenges

Initiate alignment on vision for improvement

- Degree of improvement required
- Key principles for the "to-be" innovation process

Generate initial range of options to solve challenges

- Differentiate "quick wins" from "systemic changes"
- Generate initial options integrating constraints of all stakeholder groups



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## Keep our eye on the prizes

- **First: near zero deaths from malaria**
  - In 2012, no one should die from malaria for lack of a 5 dollar bednet, a 50 cent diagnostic test, and a 1 dollar antimalarial treatment
- **Ultimately: a world free of malaria**



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