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)
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. 280 million LLINs have been delivered to African countries since 2000, 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. Sharp 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

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).
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

Reported malaria cases, Zambia Livingstone District, 2004 - 2008

Introduction of RDTs
Bednet introduction

Malaria RDT sales

Sales to public and private sectors
Sales by panel detection score (PDS)

Sales to public and private sectors

Sales by panel detection score (PDS)

Source: data provided by 37 manufacturers participating in the WHO Malaria RDT Product Testing Programme.
Despite improvements, long way to go to reach universal access to diagnostic testing, especially in Africa.

Universal access to malaria diagnostic testing: an operational manual

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

<table>
<thead>
<tr>
<th>Region</th>
<th>Estimate (000s)</th>
<th>Lower</th>
<th>Upper</th>
<th>% P. falciparum reported</th>
<th>Reported/estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>174 000</td>
<td>113 000</td>
<td>239 000</td>
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<td>1 000</td>
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<td>Eastern Mediterranean</td>
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<td>South-East Asia</td>
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<td>World</td>
<td>216 000</td>
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<table>
<thead>
<tr>
<th>Region</th>
<th>Estimate (000s)</th>
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<td>596 000</td>
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<td>South-East Asia</td>
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<tr>
<td>World</td>
<td>655 000</td>
<td>537 000</td>
<td>967 000</td>
<td>86%</td>
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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

I. Set, communicate and promote the adoption of evidence-based norms, standards, policies, and guidelines

II. Keep independent score of global progress

III. Chart the course for malaria control & elimination

IV. Identify threats to malaria control and elimination as well as new opportunities for action

V. Develop approaches for capacity-building, systems strengthening, and surveillance

Recent GMP Products (1)
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
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

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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

Areas of particular concern are SSA and India due to reports of widespread resistance and high rates of malaria transmission
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 is being developed to coordinate action on the prevention and management of insecticide resistance.

Objectives of GPIRM:

1. Define what is known, what is assumed and what remains unknown with regard to insecticide resistance among malaria vectors, its trajectory, its operational impact and options for managing the problem.

2. Estimate the potential impact of insecticide resistance on malaria burden as well as the financial cost of monitoring and managing insecticide resistance.

3. Using these elements as the foundation, define the plan for managing insecticide resistance and the way forward, including:
   - Short-term action plan with clear responsibilities
   - Ongoing research and development requirements

>130 stakeholders consulted, of whom ~50 are members of RBM VCWG.
All constituencies of RBM Partnership represented in the consultation.
120+ interviews conducted.
60+ stakeholders provided detailed comments on factbase.
GPIRM draft sent for comments 14 November.
Funded by Bill & Melinda Gates Foundation; support from BCG.
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

 Modification of vector control practices

- Establish baseline & situation analysis
- Design national IRM strategy
- Modify current vector control plan
  
- Ongoing implementation, incl. updating VC plan based on new information
  
- Future IRM strategies to be integral part of future VC plans

 Entomological monitoring

- Design monitoring plan
- Build and maintain capacity for IR and entomological monitoring
  
- Ongoing implementation, including updating plan based on new information

Local / Global database
Ongoing research agenda

Impact of IR and IRM approaches
- Operational impact of IR
- IRM approaches

Dynamics of resistance
- Metabolic resistance
- Genetics of resistance

New & innovative vector control tools
- Reformulation and new AIs
- New paradigms

IR modeling
- Burden modeling
- Financial modeling

Managing IR is a shared responsibility for all RBM Partners

<table>
<thead>
<tr>
<th>Role</th>
<th>Global norms &amp; guidelines</th>
<th>Designing IRM strategies</th>
<th>Implementing</th>
<th>Evaluating IRM strategies</th>
<th>Monitoring</th>
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<td>Insecticide/LLIN manufacturers</td>
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- 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

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

![Graph showing Malaria deaths in 4 countries make up ~50% of global burden](source:WHO 2010 Burden Estimates)

- Malaria deaths in 4 countries make up ~50% of global burden

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*World Health Organization*  
*GLOBAL MALARIA PROGRAMME*
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

<table>
<thead>
<tr>
<th></th>
<th>3 year net</th>
<th>5 year net</th>
<th>Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITNs needed in Africa 2011-2020 (millions)</td>
<td>1,250</td>
<td>750</td>
<td>500</td>
</tr>
<tr>
<td>Financing required @ US$ 7.66 per ITN (US$ millions)</td>
<td>9,575</td>
<td>5,745</td>
<td>3,830</td>
</tr>
</tbody>
</table>

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 (VCAG and others)
     - Interactions between various groups involved
Project based on three major steps

<table>
<thead>
<tr>
<th>Step 1.A - Mapping of current process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews with key stakeholders to map current process and analyze challenges and opportunities</td>
</tr>
<tr>
<td>Analysis of case studies</td>
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<table>
<thead>
<tr>
<th>Step 1.B - Outside-in perspective</th>
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<tbody>
<tr>
<td>Analysis of other innovation processes (medicines, vaccines, etc.)</td>
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<tr>
<td>Lessons to learn for vector control</td>
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<thead>
<tr>
<th>Step 2 - Definition of guiding principles</th>
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<tbody>
<tr>
<td>Analyze key challenges faced and prepare consultative workshop</td>
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<thead>
<tr>
<th>Step 3 - Suggestions for future process</th>
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<tbody>
<tr>
<td>Develop options for solutions based on workshop output</td>
</tr>
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</table>

Nearly 70 stakeholders interviewed so far to map current process and identify challenges
Different layers of innovation

Intervention with new mode of action on the vector population, epidemiological outcome not yet evidenced

Innovative product characteristics defining new Target Product Profile

New active ingredient, not used / registered previously

New formulation of already existing AI (from public health or agriculture)

Example innovations covering one or several innovation layers

New product category

New active ingredient (AI)

New formulation

New paradigm

Depending on the combination of "innovation layers", the activities of the innovation process change

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

Protect investments (money and time) made by original innovator

Maintain competitive market with sufficient number of players and products at affordable prices

Several "forces" need to be taken into account

Maintain full confidence of endemic countries in the independence and high quality of evaluation
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

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