Report of the Fourth Meeting of the RBM Partnership's

Working Group on Scalable Malaria Vector Control (WIN)

Basel, Switzerland
24-26 October, 2007

This Meeting Record should be accompanied by the Meeting CD containing all referenced documents and presentations

Summary of selected observations from the RBM WIN-4 for RBM Partners

LLINs

- For any ITN strategy, the use of LLINs rather than conventional ITNs should be the priority, regardless of the higher initial investment.
- All major models of ITN delivery have similarly high cost-effectiveness for malaria vector control in sub-Saharan Africa. What should inform choices in delivery systems is the feasibility and efficiency in local context for achieving both **rapid and sustained** high coverage.
- For targeted distribution, our models suggest that a single mass distribution "catch up" campaign, followed by a continuous delivery system integrated with ANC and EPI "keep up" strategy should rapidly achieve and sustain control coverage levels in excess of 80% without the need for further campaigns. Conversely, keep up strategies without initial "catch up" are unlikely to reach control thresholds. The RBM WIN recommended strategy of "catch up" plus "keep up" remains valid. Sustaining coverage thresholds through repeated mass distribution campaigns as the core strategy will likely require more frequent campaigns than currently expected.
- Coverage models are very sensitive to the effective life of the LLIN. More documentation of lifespan of LLINs in real life conditions is needed.
- LLIN use, especially following mass distribution campaigns, is sub-optimal and more effective communication strategies are needed.
- Although probable, there is a lack of empirical evidence on the marginal cost-effectiveness of full population targeting of all households for LLIN coverage over targeting pregnant women, under-5s and people living with HIV/AIDS. Settings changing their coverage strategies from vulnerables to full population will provide opportunities to examine this policy.
- For malaria in pregnancy there is a need for more operational guidance and lessons from countries concerning low LLIN use in pregnancy despite high ANC access and coverage.

IRS

- Recent costs and effectiveness studies confirmed that IRS is highly cost effective in SSA.
- The longer the transmission season, the more LLINs are the better strategic option for vector control. IRS is likely to be better in epidemic-prone areas.
- The RBM Procurement and Supply-chain Management Working Group should strengthen its membership and work with regard to forecasting and procurement of IRS supplies.
- Recent WHO GMP position statements encourage full coverage of LLINs plus supplemental IRS. There is a lack of empirical evidence for the cost effectiveness of combined LLINs plus IRS in tropical Africa. Efforts are needed to systematically document such experiences.
- The suggestion has also been made that combined full coverage of LLINs plus IRS can reduce local transmission to zero in Africa. Countries implementing such strategies will provide opportunities for step-wedge evaluation designs to determine the protective efficacy and effectiveness of combined LLINs and IRS.

Insecticide resistance management for LLINs and IRS:

- Pyrethroid resistance is a serious and growing problem.
- Its evolution and spread is accelerated not just by agricultural use but also by intense use of pyrethroids for IRS and/or ITNs.
- Susceptibility to pyrethroids is a non-renewable resource, and must be used in a way that preserves it, and extracts maximum benefit.
- Alternative compounds are in the pipeline or in development. Although these do not share all the key desirable characteristics of pyrethroids, they can be used in combination/mixtures with pyrethroids in order to delay pyrethroid resistance.
- Non-pyrethroids must be given priority for IRS over pyrethroids. Where pyrethroid LLINs are used, pyrethroid-based IRS should be avoided.
- Long-lasting IRS formulations of non-pyrethroids are needed.
- Resistance management strategies for LLINs and IRS that are effective against resistant *Anopheles* should be developed. Strategies should be based on sound science, with full knowledge of the resistance status and mechanisms involved before implementation.
- New types of LLIN that are effective against pyrethroid resistant *Anopheles* (kdr and other types) should be developed, tested and submitted to WHOPES. Various options exist, including integration of two or more insecticide classes within the same net.

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Working Group on Scalable Malaria Vector Control (WIN)

Day One – 24 October, 2007

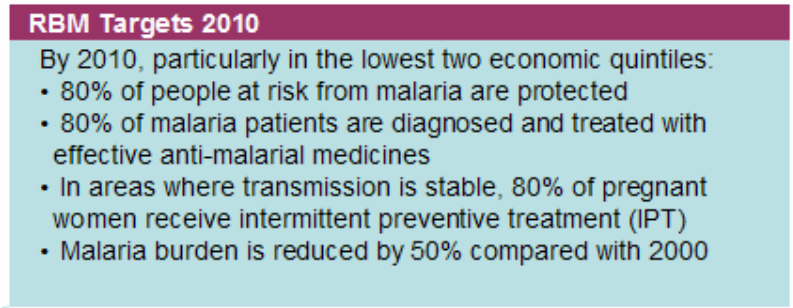
Taking Stock of Partnership Progress

Session 1 - Opening

The Chair of the RBM WIN (Don de Savigny, Swiss Tropical Institute) welcomed participants and thanked them for their commitment to the work of the RBM Partnership and the WIN. Over 37 were in attendance (Annex 1) with quorum representation from all constituencies (endemic countries 6; private sector 11; multi and bi-lateral organizations 6; NGOs & major projects 6; Academia 5; and RBM Secretariat 3). Regrets and apologies were received from a number of members including WIN Co-chair, Kabir Cham of WHO GMP who was unable to join due to other meetings. The chair's welcoming remarks recapped some of the major developments, achievements, opportunities, and challenges for scaling up malaria vector control over the previous year and the growing global commitment to malaria elimination to set the stage for the importance of the meeting. The Chair was pleased to note and welcome new partners who had joined the Group and the strong participation from the private sector. Participants were asked to introduce themselves to each other. In the introductions the Chair expressed the Working Group's appreciation to members for sponsoring their own participation in the work of the RBM Partnership and appreciation to the RBM Secretariat for sponsoring the attendance of the endemic country representatives. The Chair articulated the Group's gratitude to the Executive Secretary of the RBM Partnership, Prof. Awa Coll-Seck, for her staunch support of the Working Group.

Welcome remarks from the RBM Partnership – Thomas Teuscher

Thomas Teuscher from the RBM Secretariat officially opened the meeting on behalf of Prof. Coll-Seck. He proceeded to provide an update on what is new at RBM over the past year that the WIN must consider in its deliberations. He outlined the current goals and targets of the RBM Global Strategic Plan for 2010 and the interim objectives for 2008.



In preparation for this, over the past year there has been the rapid development and high support for the **Harmonization Working Group, the Procurement and Supply-Chain Management Working Group, and the move towards new strategic and operational direction under a Global Malaria Business Plan**. The latter will need to address the growing commitment of the international community and RBM to support a long-term vision of moving from **control to elimination to possible eradication**.

RBM Global Malaria Business Plan
Towards a Leadership Summit for a Shared Vision and Commitment

- A joint vision of the elimination of malaria as a public health and economic burden and agree that it is within reach.
- The struggle is global, but will require a special emphasis on Africa, where an infusion of resources and implementation support efforts will be required over the short-term to bring the disease under control.
- This will lay the foundation for the eradication of malaria, which we agree is the long-term goal.
- As leaders of the fight against malaria in Africa, partners will take responsibility for the enhancement of existing RBM partnership structures within the next 6 months to support this dramatic scale-up.
- A design and implementation support team is required to focus on a dramatic country-led scale-up and effective regional strategies (especially in Africa)
  - in which the most dedicated, talented, and committed professionals can focus exclusively on the goal.
  - this team will provide the leadership and will ensure the achievement of the shared vision.
  - the team members will require the full institutional support of key organizations, which must empower the team to have allegiance not to individual institutions, but to the shared vision.
- Partners will implement this shared vision and agree to key deliverables, roles, and responsibilities.

Thomas pointed out the intensive support RBM provided to 21 countries in 2007 as GFATM Round 7 support, yet still only 6 of the 21 countries proposed to scale-up to the 80% coverage thresholds expected by 2010. He reviewed the RBM priorities for 2008 which include assisting development of 31 country plans for SUFI (Scaling-up for [*sustainable?*] Impact); helping countries access additional resources; enhancing performance of countries which have secured resources; tracking progress in up to 20 countries through the MERG's MIS; improving access to commodities; and ensuring proper functioning of partnership mechanisms. RBM mechanisms must consider inclusion of work elements that support long-term focus on elimination and eradication.

Thomas concluded by pointing out that the RBM WIN is a good example of how we can learn together, and as a mechanism for functional partnership. He emphasized that the RBM Secretariat will do its best to support WIN's efforts. He also recognized the contribution of the Swiss Tropical Institute for hosting, organizing, and co-sponsoring the meeting and officially declared the meeting open.

WIN-4 meeting objectives and agenda – de Savigny

First, the Chair reminded the group of WIN's updated *Purpose Statement* and revised *Terms of Reference* since the Working Group's change of name and expansion of membership to include IRS scale-up. The following had been approved by the Secretariat and Board in May 2007.

RBM's Global Mission for Working Groups

- Synthesize evidence and build consensus on strategic issues
- Disseminate consensus statements to RBM Sub-Regional Networks
- Promote use of consensus statements by members
- Advise RBM Board on best practices for scale-up
- Update strategic frameworks regularly
- Develop and promote implementation of WG work-plans
- Provide *ad hoc* guidance and backstopping to SRNs

RBM WIN Terms of Reference Summarized

- Commission syntheses and assemble evidence on best practices for scaling-up for sustainable impact
- Identify operational and system constraints to scaling-up
- Develop guidance frameworks for Partners
- Facilitate consensus on scaling-up approaches

WIN's Purpose Statement

To align RBM Partners on best practices to rapidly scale-up malaria vector control interventions in order to meet and sustain RBM targets and Millennium Development Goals.

WIN-4 Meeting Objectives

The proposed meeting objectives were reviewed and endorsed as:

1. Take stock of latest experiences, progress and opportunities for scaling-up ITNs and IRS.
2. Examine the current landscape and assess whether WIN frameworks and consensus need updating.
3. Take decisions and update the WIN work plan in view of Objectives 1 and 2, and the new RBM Working Groups for Harmonization and Advocacy.

The detailed agenda is at http://www.rollbackmalaria.org/ at the WIN page. Briefly the agenda can be summarized as follows:

Day 1. Taking Stock of Partnership Progress

- ❑ Updates from the wider RBM Partnership
- ❑ Updates on ITN & IRS supply and demand issues

Day 2. Taking Stock of national scale-up and responding to country needs
- ❑ Benin, Ethiopia, Kenya, Mali, South Africa, Tanzania, Zambia
- ❑ Issues discussion
- ❑ Discussions on lessons learned

Day 3. Charting the way forward
- ❑ Harvesting from Days 1 & 2
- ❑ IRS & ITN Sub-Group work on tasks, partners, plans & deliverables for 2007/08
- ❑ Plenary revision of work plan & budget
- ❑ Decisions for the RBM Board and observations for RBM partners

Quick overview of WIN progress and products since WIN-3: - de Savigny

The Chair provided an overview of the WIN-4 Meeting Binder (partly available on RBM WIN website) and progress in the 18 months since the WIN-3 meeting. He pointed out that the long interval since the last WIN meeting allowed time for the new WHO Global Malaria Programs Technical Expert Group (TEG) on IRS and Technical Expert Group on ITNs to meet and develop their work plans. Many members of the WIN are common to the WHO GMP TEGs so that at least some of the voice of the WIN was carried forward in this interval. This allowed a delineation of roles of the WIN and the TEGs to be reconciled and the revision of the WIN's *Terms of Reference* (http://www.rollbackmalaria.org/ at the WIN page). It has now been agreed that henceforth, the WIN would meet twice per year, with alternate meetings coordinated to take place in tandem with the annual meeting of the combined GMP TEG on Vector Control. The other consequence of this period was that the uncertainty regarding the emerging role of the WIN in the new landscape was that the WIN Secretariat was not moved and the 2007 work plan was not funded or driven as aggressively as it could have been. Nevertheless there were accomplishments:

- Revised RBM strategic framework for ITNs published and distributed;
- French translation of framework complete;
- Consensus statement on Wash Resistant Insecticide Treatment Kits developed and issued;
- Cochrane ITNs systematic review disseminated;
- New WHO GMP Position Statement on ITNs as published largely consistent with RBM WIN Framework;
- Systematic comparisons of national scale costs and effectiveness of ITNs & IRS completed and disseminated;
- IRS systematic review underway;
- Major progress in private sector production and development of LLINs; >65m
- Major increases in funding and partners working on LLINs and IRS;
- Major increase in LLINs distribution and IRS programming in Africa;

He pointed out that we may be on the verge of a tipping point in many countries where malaria investments and intervention coverages, although still modest, have been improving steadily in recent years. Of the 12 sub-Saharan malaria endemic countries that have published DHS surveys since 2004, eleven show a drop of under-5 mortality between 5% and 32% (median decline 23%) (exception Zimbabwe where under-5 mortality has increased). It is unlikely that such reductions in under-5 mortality can occur without concomitant reductions in malaria specific mortality. However, to paraphrase the RBM UNICEF Malaria & Children Report, 2007:

Full potential of malaria control cannot be reached without ……

- ➢ More commitment – political and financial

- Better policy guidance
- More systems integration and support
- Stronger partnerships & ownership
- Behaviour change
- Better forecasting, procurement and supply chains
- Better information for systems and M&E for programs

Session 2 – Updates from the RBM Partnership and Partners

RBM Partnership Secretariat Update – Teuscher

Covered under opening remarks above.

WHO Global Malaria Program – Hoyer

Kabir Cham and Pierre Guillet of GMP's Vector Control and Prevention Team were unable to attend however Stefan Hoyer of the GMP joined the first day to provide the WHO GMP's positions on ITNs and IRS which had been developed and disseminated over the past year.

The WHO GMP positions are as follows: The coverage of the entire population with long lasting insecticidal mosquito nets (LLIN) is by a large margin the most effective, cost-effective and most easily sustainable measure of malaria prevention and vector control. It results in a reduction in malaria incidence of 50% and overall child mortality of 18% per year at a cost of USD $0.80/person protected/year (calculations based on 5 year LLIN technology nets including operational cost). In direct comparison, the targeted coverage of high risk groups of children under the age of five and of pregnant women will provide personal protection but will not have a significant impact on malaria transmission. Even though the protection with LLIN of the above mentioned high risk groups would only cost 25% of the cost of covering the entire population, the overall cost of malaria control, including diagnosis and treatment would be higher than under the circumstances where universal access could be provided. For GMP, the coverage of the entire population living in an area of malaria transmission is the first imperative of malaria control. GMP considers the most effective and cost-effective method to rapidly scale-up LLIN coverage is the delivery free of charge to the population at risk in well prepared and executed mass distribution campaigns. All other methods of LLIN routine distribution in association with ante-natal care, routine EPI or other means are seen as useful as complementary measures to keep up the high LLIN coverage levels achieved by campaigns. Wherever the goal of universal LLIN coverage has been achieved, the next crucial step towards rapid impact on malaria mortality will be the provision of improved access to treatment of malaria in remote areas, based on a secured supply system, the full use of practical drugs and dependable rapid diagnostic tests.

GMP considers that indoor residual spraying has the same level of effectiveness as universal coverage with LLIN but at four times the cost/person/year. In addition it is 5 to 10 times more difficult operationally to sustain. Therefore, IRS is indicated and a complementary tool to universal LLIN coverage in areas where the aim of complete interruption of local transmission is achievable and sustainable in an effort aimed at malaria elimination.

GMP intends to be more directive than in the past in making sure that countries follow these policies and will shortly publish four implementation guides (integrated LLIN/vaccination mass distribution campaigns, stand alone mass distribution campaigns, routine ANC and routine EPI supplemental

distribution). There are sufficient opportunities in upcoming measles campaign to cover many countries but that the current funding is now running out. A meeting with CIDA to replenish these funds will take place in November this year.

Discussion: In discussion the following points were raised. The question came up whether the presented positions were official policies where within WHO and had passed the appropriate approval process within the organization. Stephan Hoyer responded that he only recently joined GMP and was not in position to answer this question. It was noted that these recent statements were more categorical than the published GMP position statement on ITNs. Of concern was the notion that routine integrated health service delivery was seen as only optional and supplemental to mass distribution campaigns as the normative means of delivery. Questions were raised concerning the empirical evidence base for: a) the contention that full coverage LLINs is more cost effective than LLINs targeted to vulnerable groups; and b) that full coverage LLINs plus IRS can achieve complete interruption of local malaria transmission for purposes of elimination.

Members from industry pointed out many different forecasts for what the demand will be for LLINs in 2008. For them it would be important to get a better understanding of how these were derived in order get a feeling for what is realistic. There was concern from several members that the emphasis on campaigns with other distribution or prevention approaches only being complementary did not reflect the experience on the ground and may not lead to the desired protection, particularly as some assumptions appear to be oversimplified (e.g. that all “5 year” LLIN will actually last that long).

Main points from the WHO GMP ITNs Position Statement 2007

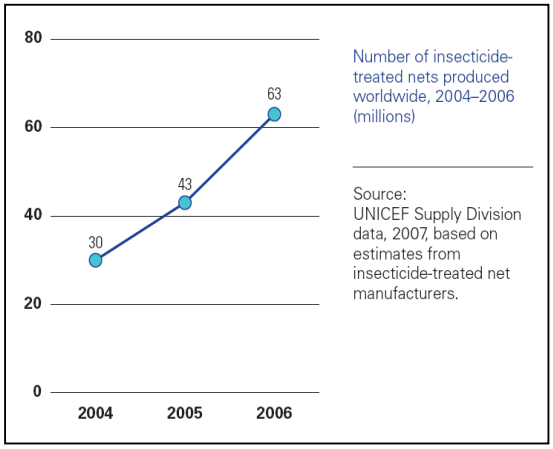
- NMCPs & partners purchase only LLINs;
- LLINs seen as vector control strategy at full coverage;
- Full coverage of all people at risk;
- Means to full coverage may vary;
- Young children & pregnant women: immediate priority on way to full coverage;
- Low transmission: prioritize on basis of geographical distribution;
- Rapid scale-up by free or highly subsidized distribution through public health services delivered by campaigns and routine services either directly or by vouchers); “catch-up and keep-up”
- Distribution accompanied by information on hang-up, use and maintenance;
- Position does not exclude other approaches that have been successfully applied;
- Research needed on combined benefits of LLINs & IRS.

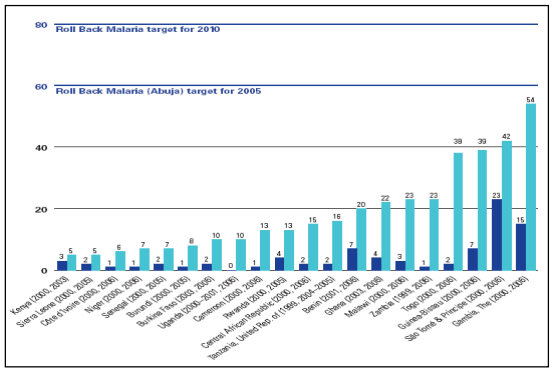
RBM Malaria in Pregnancy Working Group – Yartey

Juliana Yartey from WHO and Chair of the Malaria in Pregnancy Working Group (MIP) updated the WIN on the work of MIP. The MIP is working directly with coalitions such as MIPESA: Malaria in Pregnancy Eastern and Southern Africa Coalition (8 Countries), RAOPAG: Réseau d’Afrique de l’Ouest contre le Paludisme pendant la Grossesse (12 Countries) as well as with malaria and reproductive health program managers at country level. Collaboration with WIN concerns ITN delivery through ANC. Despite high ANC coverage across much of Africa, use of ITNs in pregnancy still remains well below these levels. Scaling up ITN use in pregnancy through linkage with ANC remains a priority and a challenge. There is a need for operational guidance on implementation and more lessons from countries. The WIN is encouraged to join the next MIP WG meeting in Zambia, 12-16 November and MIPESA/RAOPAG Meeting.

UNICEF - Blanco

Francisco Blanco from UNICEF gave a detailed report on the recently published UNICEF RBM *Malaria & Children: Progress in Intervention Coverage* report. This is based on the wealth of new coverage data arriving from recent national surveys under the DHS and MICS programs. The good news is that although most countries are still below scheduled targets for LLIN coverage, supply of LLINs has risen dramatically in the last two years and coverage rates are starting to improve in many countries, but are not yet captured in statistics. The lag in reporting means that we are currently underestimating the improvements in coverage. Some countries also use national population denominators when not all of their population is at risk, again meaning that coverage statistics are misleading in such settings. Success is supported by: Increased global financing (GFATM, PMI, WB Booster, etc); increased political commitment globally and nationally; enhanced partnership and improved harmonisation of support; new technologies (LLINs, ACTs); integration of malaria interventions into existing health delivery systems; ITNs increasingly being delivered free of charge to end-users; and increasing public awareness of and demand for malaria prevention and treatment services.





A particular case of success is highlighted by Ethiopia where 18 million LLINs were distributed in 2 years through:

- *A comprehensive and integrated Health Systems Extension Programme and Expanded Outreach Services approach to scaling up;*
- *Strong political support from highest level and strong in-country partnership;*
- *Human resources strengthening including 20,000 Health Extension Workers trained in prevention, diagnosis, case management and inter-personal communication for an integrated service provision;*
- *Procurement and supply management strengthening;*
- *Programme monitoring and evaluation strengthening.*

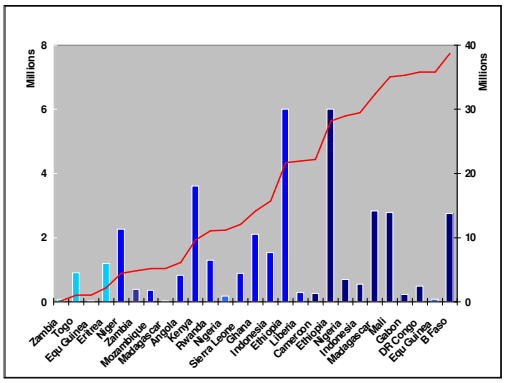
What is needed to sustain and amplify this is:

- *Further strengthening and sustaining political and financial commitments*

- *Expanding and strengthening the use of integrated approaches (integrated vaccination campaigns, routine EPI, antenatal care services, child health days, etc) to scale-up more rapidly*
- *Providing clear and timely policy guidance*
- *Expanding national and global partnerships*
- *Expanding social and behaviour change communication and strengthening community involvement*
- *Strengthening monitoring systems for evidence-based programming*
- *Developing and implementing new technologies*

Measles & Malaria Initiative - Hoyer

Stefan Hoyer reported for the Measles & Malaria Partnership which has distributed a total of 13.4 million nets (mainly LLINs) over the past few years, in nine countries largely through integrated or stand-alone mass distribution campaigns at national or sub-national level, mostly in Africa. The predominant financing of these has come from Canadian CIDA and the Canadian Red Cross. Since 2003, a cumulative total of almost 40 million ITNs have been distributed by mass distribution campaigns. This constitutes the "catch-up" part of the two-pronged "catch-up and keep-up" strategy advocated by the WIN. Some countries have sought support and endeavored to follow their campaigns with a "keep-up" strategy of integrated continuous delivery.



Candidate countries for integrated campaigns in 2008 are listed in the table below.

Measles SIAs planned in 2008	Measles campaign target (9-15 mo)	Total population est. 2007	Funds required for integrated campaign at 1 LLIN/U5 in USD*	Funds required for LLIN coverage of total population in USD**
Nation wide campaigns				
Guinea Equatorial	117,203	551,209	966,925	2,273,737
Central African Rep.	817,941	5,112,131	6,748,013	21,087,541
Chad	1,918,737	11,992,106	15,829,580	49,467,438
Mozambique	3,823,511	20,905,585	31,543,966	86,235,538
Subtotal	**6,677,392**	**38,561,032**	**55,088,484**	**159,064,255**
Sub-national Campaigns				
Côte d'Ivoire	1,175,073	18,013,419	9,694,352	74,305,353
DR Congo	4,068,833	65,751,512	33,567,872	271,224,987
Tanzania	7,583,239	39,384,223	62,561,722	162,459,920
Nigeria	12,518,925	135,031,164	103,281,131	557,003,552
Subtotal	**25,346,070**	**258,180,318**	**209,105,078**	**1,064,993,812**

US President's Malaria Initiative (PMI) – Dotson

Ellen Dotson from PMI-CDC presented an update on PMI's efforts on vector control which concentrate on LLINs and IRS. Together with IPTp and improved access to ACTs, the PMI intends to reduce malaria mortality by 50% by 2010 in 15 focus countries through achieving universal coverage (85%) of vulnerable groups with a budget of 1.3 billion USD. Focus countries are Uganda, Tanzania, Angola, Malawi, Zambia, Mozambique, Senegal, Rwanda, Benin, Ghana, Kenya, Liberia, Mali, Madagascar, and Ethiopia. In the initially PMI supported countries at the end of 2007, there were:

- 10 m people protected by IRS
- 4.2 m LLINs distributed
- 15 m treatment courses ACTs provided
- 1.5 m IPTp doses provided
- 14,000 health workers trained

For LLINs a multi-pronged strategy including free distribution through campaigns and routine distribution (ANC, EPI, <5 clinics) with targeted subsidies (incl. vouchers) and facilitation of the commercial sector.

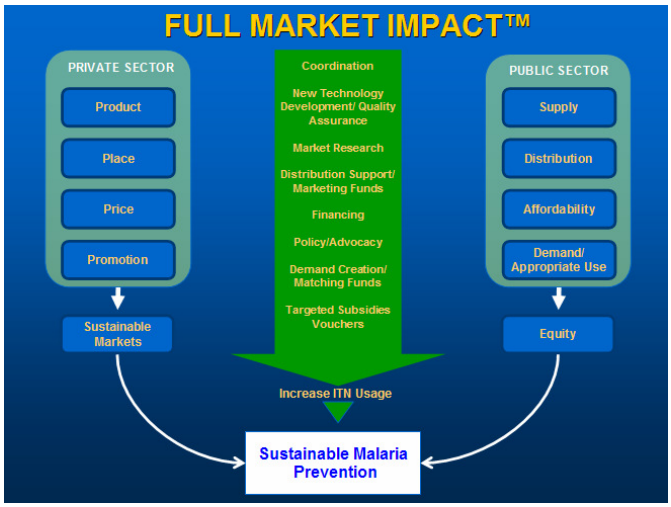
For IRS, the intention is to select the areas and insecticide to be used in collaboration with NMCPs and to assist with environmental assessment, pesticide management, entomological monitoring, capacity building, and development of procedures manuals. Larval source reduction is currently not supported as a primary vector control strategy. The PMI sees the combination of LLINs and IRS as a new approach to integrated vector management.

Population Services International (PSI) – Malmqvist

The PSI update was provided by Alison Malmqvist. PSI has a long tradition of working with ITN and LLIN promotion and currently works with ITNs in 17 countries. Programs are tailored to suit the specific country contexts. The approach typically includes a mix of mass distribution for rapid "catch-up" in coverage supplemented by ANC / private sector engagement for "keep up" according to the WIN strategy. PSI supports each of these strategies in different places. In Mali, the focus has been on a recent mass distribution where PSI assisted the MoH to deliver 200,000 LLINs through integrated campaign in 2 regions in July 2007. Results from post campaign coverage surveys showed ~80% of under 5's slept under a campaign net the night before. From December 2007, PSI will deliver 2 million LLINs to remaining 7 regions with partners: NMCP, UNICEF, USAID, WHO, and Hellen Keller International. Other programs are underway in Rwanda, Uganda, DRC, Sudan, Tanzania. PSI is also assisting additional countries with the Measles and Malaria Initiative. In Kenya, PSI is shifting from highly subsidized to free delivery through ANCs in 53 districts in close coordination with MoH. In Madagascar PSI works with the MoH in distribution of free nets to pregnant women and under-5s through health centers and campaigns using the traditional commercial sector (+5k sales points nationally [55% of distribution]) and Community Health Agents (+5k CHAs in endemic zones [45% of distribution]). The benefits include health impact, rural penetration, equity of coverage, income generation for incentivized CHAs, +2 million PSI nets since Jan 2004.

Challenges of this mixed approach include the problem of mixed messages, and reinforcing good "keep up" systems while scaling up through "catch up". The job is not finished – the Abuja target is 80% and more nets need to be distributed. There is a problem emerging with campaign nets which have lower hang-up rates then desirable. An intervention is needed here and we need to improve IEC campaigns, emphasizing importance of hanging and sleeping under ITN every night, especially under 5s and pregnant women.

Agency for Education Development (AED) – Mwenesi



Halima Mwenesi reported for the NetMark Project of AED. NetMark works in the niche to encourage a high quality, sustainable commercial market for affordable ITNs and LLINs in Africa. This is intended to complement public sector efforts for full impact. NetMark is also the key WIN partner in addressing the problem of taxes and tariffs in Africa. Taxes have been completely or substantially removed in 34 countries following NetMark efforts, and negotiations are underway in ten further countries. The other major thrust for WIN is AED's efforts to support African net and ITN manufacturing through improving production, developing new products, ITN bundling through open market traders, and linking yarn, net, insecticide and stitcher groups. Part of this includes the development of a transferable LLIN process to allow African polyester net manufacturers to convert to LLIN in-factory production. This is a joint venture of AED NetMark, Bayer, and Tana Netting. It will facilitate mass treatment of finished nets, be environmentally & worker friendly, be scalable to company's needs, provide off-the-shelf, reliable equipment, be a process available to all companies, and will operate as a stand-alone operation.

This is an ambitious technology transfer effort that faces a number of challenges. The developing trend towards polyethylene nets for durability makes for uncertainty for the future of polyester net production. Donors are using WHOPES recommendations as a requirement for tender bidding. New LLINs face financial stress while awaiting WHOPES recommendations for up to 2 years after setting up the production line. Quality assurance is still an issue for African net production and will be bigger issue for LLIN production. Quality control through local regulatory bodies lack capacity to test LLINs.

In summary achievements since the last WIN include creation/strengthening of six sustainable national markets; ITN/LLIN consumer prices down 30%-70%; coordination of a public-private partnership for development of a transferable, environmentally-friendly LLIN technology; elimination/reduction of taxes and tariffs on ITNs/LLINs in target countries; and over 50 million ITNs/LLINs sold.

Updates on Supply and Demand Issues – Blanco and van Erps

RBM PSM. Jan van Erps from the RBM Partnership Secretariat reported on the new Procurement and Supply-chain Management Working Group (PSM) that replaces the efforts of the Malaria Medicines and Supplies Service (MMSS). The PSM has 5 taskforces led by different partners: Forecasting (CHAI) ; Delay monitoring (CHAI); Procurement guidelines (WHO) ; ACT interventions: framework, regional meetings (UNITAID); Mapping API, ACT markets; TA (UNITAID). Most of the work of PSM will be in support of ACT procurement problems however activities that will also benefit LLINs and IRS procurement include:

- Make experts available to countries for assistance with the development of procurement plans, including PSM plans for the Global Fund

- Ensure accurate forecasting for Artemisinin-based Combination Therapies (ACTs), Rapid Diagnostic Tests (RDTs), Long-Lasting Insecticidal Nets (LLINs) and insecticides for Indoor Residual Spraying (IRS) for public and private sectors in-countries
- Ensure the development of a delay monitoring system, quantifying delays in the funding and delivery processes for commodities and identifying action for lead time reduction
- Support the establishment of country coordinating committees for PSM

In discussion, it was noted that the PSM has inadequate representation from academia, and for insecticide procurement expertise. Questions were raised whether the ITN quarterly reports would re-appear on the work plan and it is expected that they would. It was suggested by the private sector that John Thomas could represent the preventive products industry on the PSM. It was also pointed out that there is need for better forecasting for IRS supplies by the PSM and that UNICEF could not be expected to cover this. It was also suggested that the PSM assist in tackling the problem of counterfeit products including LLINs.

UNICEF Supply Division. Francisco Blanco updated the WIN on UNICEF's procurement efforts. For UNICEF, distribution and promotion of use of insecticide treated nets (ITNs) has always been a key intervention in Accelerated Child Survival and Developments strategies. UNICEF is a major buyer of Long Lasting Insecticide Treated Nets (LLINs) and works closely with partners to facilitate LLIN availability for programs. UNICEF works with countries receiving funding from WB, GFATM, USAID, and other partners as well as UNICEF funded programmes. UNICEF retains a close relation with manufacturers to ensure quality and timely availability. Forecasting was introduced in 2006 and updated regularly through the year and shared with industry during 2007. Procurement of non-treated nets was very limited in 2007 with almost all procurement dedicated to LLINs. In 2006, approximately half of all nets were procured for partners through UNICEF Procurement Services (GFATM, WB funds and NGOs). In 2007, quantities have decreased partly due to utilization of other procurement mechanisms (Countries with GFATM/WB funding, PMI/JSI, Red Cross). FOB Prices of LLINs have remained largely stable through the scale-up: (2005 USD 4.70-5.10)(2007 USD 4.50-5.30). Continued increase in demand and entrance of new manufacturers would enable a more competitive market. The range of products is also expanding, which brings new issues in the establishment of competition. Until recently there has been a choice of only two brands of LLIN (Olyset and Permanet). A new LLIN was recommended in beginning of 2007 (Interceptor), and it is expect that more will be recommended in the next WHOPES meeting (Dec 07). UNICEF will tender in October for 2008, and will invite all potential manufacturers. Product preferences (especially by type of fiber) make it difficult to consider "generic" competition and management of purchase arrangements, but from 2008 it is expected that more than one product by type of net would be available.

Supplier	Net	Material	Insecticides	Treatment process	
Sumitomo Chemical Co. Ltd.	Olyset	Polyethylene	Permethrin	Incorporated to fiber	WHOPES Approved
Vestergaard Frandsen S.A.	PermaNet	Polyester	Deltamethin	Coated	WHOPES Recommended
BASF South Africa PTY Ltd.	Interceptor	Polyester	Alphacypermethin	Coated	WHOPES Recommended
Tana Netting Co., Ltd	Dawa Plus	Polyester	Deltamethin	Coated	
Bestnet Europe Limited	Netprotect	Polyethylene	Deltamethin	Incorporated to fiber	Undergoing WHOPES Phase III
Clarke Mosquito	DuraNet	Polyethylene	Alphacypermethin	Incorporated to fiber	
Syngenta		Polyester	Lambda-cyhalothrin		

There are a number of issues related to LLINs for which there is no clear guidance for programmes.

- Durability – polyethylene vs. polyester / 75 vs. 100 denier
- Wash resistance standards
- Effective life of the net
- Acceptability of materials by populations

Some of these aspects are being studied now, and should be considered when developing guidelines, especially if minimum generic specifications for LLINs are to be developed.

The UNICEF tender for 2008 will have the objective to establish multiple supply arrangements to ensure a sustainable and uninterrupted supply of affordable quality products. There will be tags in nets that are generic, without any specific UNICEF logos. All manufacturers that have undergone WHOPES phase I will be invited. Awards will be conditional to products passing WHOPES phase II. Quality will consider: products with WHOPES recommendations (phase II); pre-qualification of net manufacturers prior to procurement; factory inspection, sample testing at lab; and pre-delivery inspection before shipment on every order plus lab testing on net consignments.

In discussion it was confirmed that there is no plan to have different packaging for campaign nets, however brand is retained. Usually in mass distribution the packaging is retained for reconciling numbers. There have been limited requests for wash resistant retreatment kits so far.

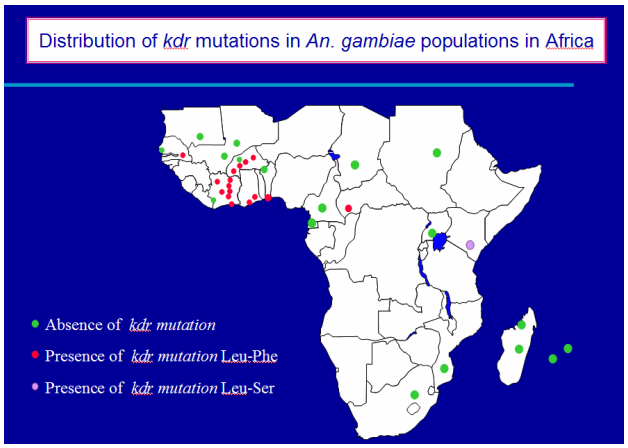
Report of the 4th Meeting of the RBM Working Group
SCALABLE MALARIA VECTOR CONTROL (WIN)
24-26TH October, Basel, Switzerland

Day Two – 25 October, 2007

Taking Stock of Country Scale-up Progress

Session Three – Updates from National Scale-up Experiences

Benin – Akogbeto



Martin Akogbeto, Director of the OCCGE Malaria Institute, reviewed the history of malaria vector control in Benin from the eradication era mid-twentieth century (using chemotherapy and temporarily IRS) through the exclusive reliance on chemotherapy after 1960; the return to IRS in peri-urban areas from 1982 to 1988; once again abandoning IRS and reliance on chemotherapy after 1988, later joined by ITNs after 1995 to the present. Benin has a strong program of evaluation of quality of ITNs/LLINs and like others, has documented increasing pyrethroid resistance, along with difficulties in sustaining re-treatment, public concerns about cultural acceptability, durability, efficacy and flammability of nets.

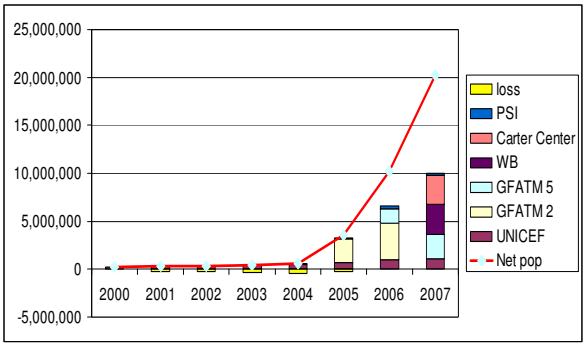
As a PMI supported country, Benin from 2008, will investigate the protective efficacy of the combination of LLINs and IRS with a non-pyrethroid insecticide in a Phase III community cluster randomized trial in an area where *A. gambia* s.s. has a high degree of pyrethroid resistance.

Ethiopia – Chibsa

Shelema Chibsa of the Ethiopia Ministry of Health provided an update of malaria control in Ethiopia. The specific vector control objectives of the program are:

- to achieve 100% coverage of all households in ITNs targeted districts with two ITNs per household by end of 2007;
- to achieve 60% coverage of villages targeted for indoor residual spraying by the end of 2010;
- To detect and contain 80% of malaria epidemics within two weeks from onset by 2010.

Ethiopia has distributed ITNs through commercial retail outlets and through targeted social marketing, but since 2005, all LLINs have been provided through free distribution channels involving both routine health facilities and mass distribution campaigns. A total of 18.2 million ITNs/LLINs have now been distributed to users with a further 5.1 million nets procured and in the pipeline. Coverage of 2 ITNs/LLINs per household now stands at 88%. Utilization studies show greater than 85% of households with children under-5 reported children using the ITN the previous night. For IRS, over 1.5 million structures are sprayed annually and 5 million population protected. Challenges



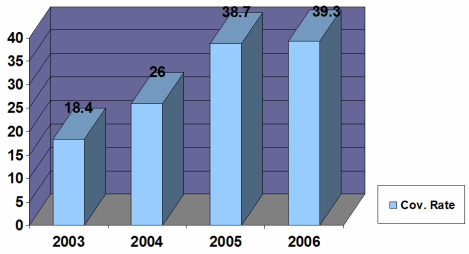
remaining for ITNs include: replacement over time to maintain coverage; questions of LLIN efficacy from users; and early biting mosquito behaviour. Challenges for IRS include: high operational cost, labour intensity, and technical complexity; re-plastering of walls reducing effectiveness; and outdoor feeding and resting mosquitoes. Program challenges include: overlap between IRS and ITNs distribution; shortage of operational delivery budgets; shortage of insecticides, pumps and spare parts; shortage of manpower; and sustainability of IRS. Next steps for the program include:

- Strengthen implementation in the new five year strategic plan for 2006 – 2010,
- Consolidate resource mobilization and utilization,
- Scale-up interventions to achieve marked reduction in malaria morbidity and mortality and maintain it,
- Strengthen documentation of program progress: conduct RBM Malaria Indicator Survey (MIS)
- Intensive work on ITNs utilization and IRS support in the community.

Mali – Guimogo

Dolo Guimogo of the Malaria Research and Training Center (MRTC), Université de Bamako, Mali, provided the country experience update for the Mali NMCP. The Program has conducted four annual ITN national coverage sample surveys since 2003. There has been growth in coverage and as of 2006, national ITN coverage had reached 22.5%, under-5's 39.3% and pregnant women 39.8%. Coverage appears to be plateauing in the last two years and a mass distribution "catch-up" campaign with 2.2 million LLINs is planned for mid-December 2007.

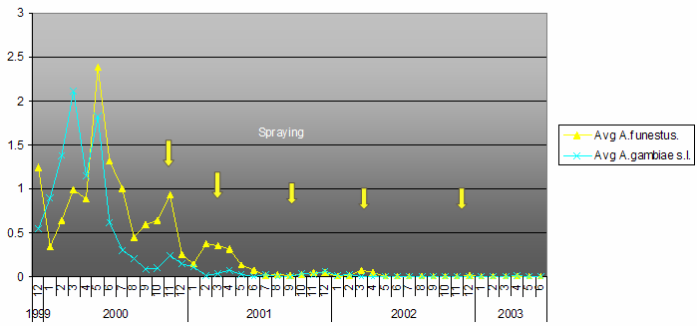
ITNs Coverage rate 2003-2006
Children < 5years sleeping under an ITN



South Africa, Mozambique and Swaziland – Maharaj

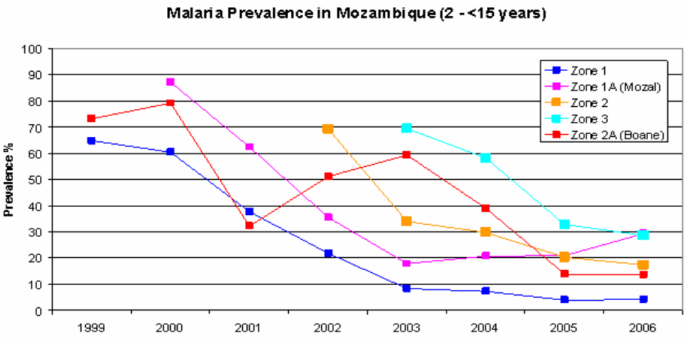
Rajendra Maharaj, Director of the Malaria Research Programme of the Medical Research Council, Republic of South Africa reported on the history and use of IRS in South Africa and the Lubombo Spatial Development Initiative (LSDI) at the southern fringe of malaria in Africa. IRS was first used in South Africa in 1933 using kerosene-pyrethrum, switching to DDT in 1946, synthetic pyrethroid in 1996, and back to DDT in 2000 following the emergence of severe pyrethroid resistance. This

Average *A.funestus* group and *A.gambiae s l* per hut per day
Zone 1



program has had a 60+ year history of efficient malaria control strategies, but malaria remains a problem. This has emphasized the need for regional cooperation in control and the need to set up the LSDI together with Mozambique and

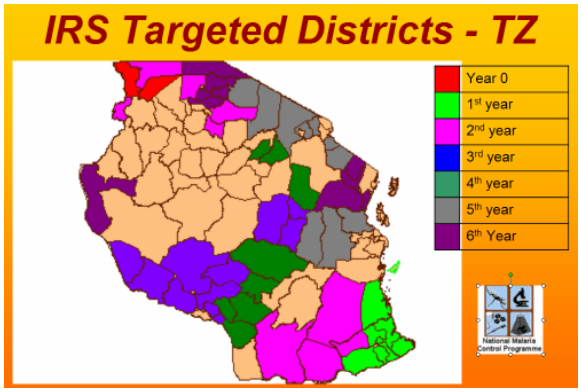
Swaziland to control malaria across borders. In addition to the health benefits of malaria control, the initiative has underlying economic objectives to develop the region for agriculture and tourism. The main pillars of the LSDI are the staged introduction and scaling up of IRS and ACTs.

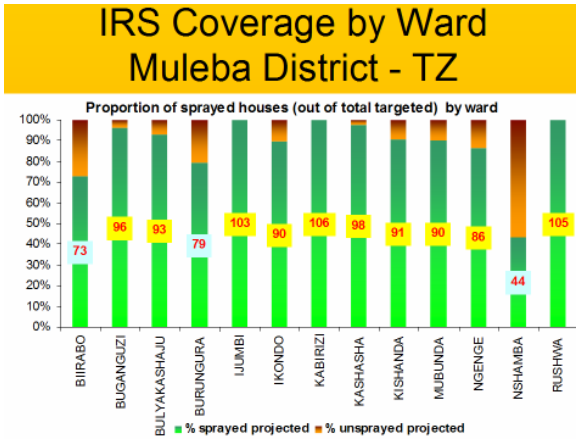


Monitoring entomologic impact and insecticide resistance are on going in the LSDI. Mozambique had the highest baseline prevalence of malaria of the three countries (>60% in 1999). This has been reduced to <30% by 2006, largely through IRS. This constitutes huge reductions in malaria in the region while in neighboring countries malaria incidence is on the increase. St Lucia and surrounding areas are now classified as "malaria free". The project has had such an impact that infected persons are scarce in South Africa and Swaziland. The LSDI malaria control programme shows that with effective malaria vector control plus antimalarials, malaria can be controlled, and that regional control efforts are more effective than country-specific initiatives.

Tanzania – Mandike / Brown

Renata Mandike of the National Malaria Control Program, Ministry of Health, United Republic of Tanzania provided a thorough overview of the new IRS initiative for the Tanzania mainland. Malaria control in Tanzania is challenged by the immense size and diversity of the country, population movements, malaria vector ecological changes, and human behaviour. Since the late 1990's ITNs have been the main vector control strategy, however Tanzania is planning to move to a more comprehensive approach to vector control that will supplement ITNs with IRS and environmental management. Plans are to extend IRS programming in stages over the next 5-6 years to cover 60% of districts. This is facilitated by political commitment for the re-introduction of DDT, willingness of funding partners to support IRS, increased demand for effective vector control, and the growing strength of decentralized district councils and comprehensive council health planning. The medium-term goal is the protection of all the at-risk population in targeted districts with integrated malaria vector control by 2013. The 60 rural districts targeted for IRS include districts in transmission strata of: stable endemic (whole districts); unstable or highly seasonal endemic (sub-district areas); unstable epidemic or no transmission (sub-district areas); and districts



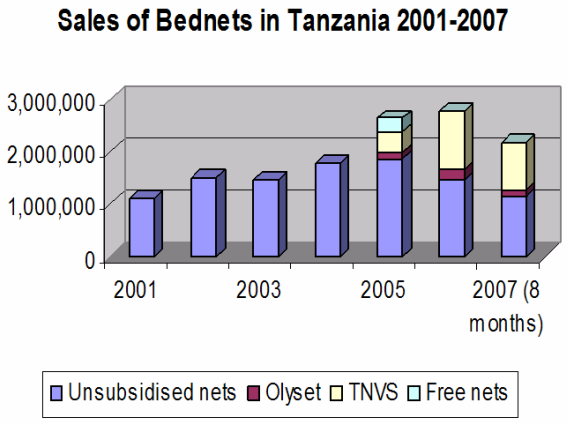


targeting malaria elimination (5) (full district in island districts or mountainous districts 2000m and more above sea level). Ultimately this will cover 2.7 million households and 15.8 million of Tanzania's current 40 million population. IRS will use DDT as first line insecticide (once registered) and lambda-cyhalothrin as second line. The program started in 2007 in part (13 wards) of a single district (Muleba District) where a program target to reach 85% of 40,000 households (230,000 population) was attempted using lambda-cyhalothrin in May-June (rainy season) mobilizing 15 district and national level organizations as partners. Target household coverages in excess of 90% were achieved in 11 of 13 wards, and overall, 34,700 households (86%) were covered (190,850 population) at a total cost of about 446 million TZS (370,000 USD).

Immediate plans for the way forward include:

- Prepare Pesticide Management Plan
- Strengthen NMCP capacity on IRS management
- Preparation for DDT introduction
- Clarification on where, when and why to use alternative pesticides
- Develop capacity at the regional and district level
- 2nd spray round (Muleba)

Nick Brown from the NATNETS Cell in the National Malaria Control Program gave an update on the ITN scale-up in Tanzania. The NatNets program is a public:private partnership intended to establish an integrated "keep up" system that is sustainable while providing acceptable and affordable access to pregnant women and infants. NatNets coordinates four complementary programs: ITN Cell in the National Malaria Control Programme (funded by SDC); Tanzania National Voucher Scheme (funded by GFATM Round 1 & the PMI); Insecticide Provision and LLIN Introduction (funded by the PMI); and Behaviour Change Communication (funded by the PMI and the GFATM RCC). The corner stone is the Tanzania National Voucher Scheme. The TNVS introduced a high value discount voucher at ANC clinics for pregnant women in late 2004 achieving nationwide coverage by May 2006. By September 2007, 2.3 million nets have now been acquired through vouchers by pregnant women from over 5,000 local retailers and wholesalers competing to deliver product close to ante-natal care clinics across the country. Currently, with PMI and GFATM support the TNVS is expanding to provide a 2nd voucher for infants at EPI with measles vaccination. The NATNETS program also provides free insecticide treatment kits for bundling with all nets sold in Tanzania and subsidized re-treatment kits for commercial sale, and is working on LLIN technology transfer to local manufactures (with PSI). With this approach ITN coverage of infants only reached 27% in 2006. (Following the meeting this figure has been updated for 2007 at 34%). Plans are underway to conduct a series of supplemental "catch up" campaigns in 2008 to push coverage above 80%, while retaining the voucher scheme for "keep up".

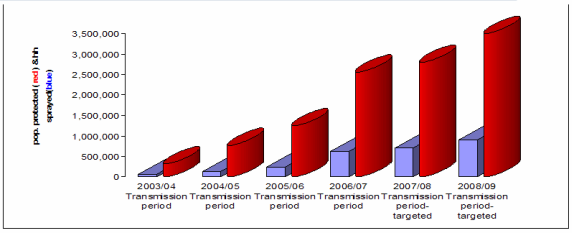


Zambia – Chizema / Libisowski

Paul Libisowski from MACEPA presented an update for Zambia prepared by Elizabeth Chizema of the Zambia National Malaria Control Program who was unable to attend at the last moment. Zambia's

current national goals are to have: 80% of population sleeping under ITNs; 85% of eligible households in 22 targeted districts covered by annual IRS; 80% of pregnant women having access to three courses of IPT and sleeping under an ITN; and at least 80% of malaria patients diagnosed and treated within 24h of onset of symptoms. Zambia has good longitudinal national coverage data having had a DHS survey in 2004 and a Malaria Indicator Survey in 2006. ITNs are available through free distribution to pregnant women, under-5s, and vulnerable populations along side commercial sale of ITNs for others. The 2005 Abuja targets for ITNs for pregnant women were met in 2006, however coverage of under-5s remained less than 25%. Health benefits in terms of reduced fever incidence and anemia were documented in ITN users. In 2007, over 5 million ITNs are being delivered in Zambia and these coverage rates are expected to dramatically improve. For IRS, 15 districts (250,000 structures and 1.5 million people) were targeted in 2005/06. In 2007/08 this will scale-up to 700,000 structures and 3.2 million population protected. Since 2003, there has been a steady reduction in malaria mortality recorded at health facilities in Zambia.

Indoor Residual House Spraying (IRS) Zambia



Current challenges for Zambia include:

- inadequate human resources;
- financial gaps;
- maintaining momentum for the 'three ones' for malaria;
- demonstrating impact for meeting expectations and moving towards malaria 'eradication'

Paul went on to describe vector control issues from MACEPA's perspective in Zambia with reference to ITN delivery systems which use a direct distribution model for both LLINs and retreatment kits. He identified the comparative advantages of direct distribution as: reduced distribution costs; reduced time to usage; reduced storage requirements; less labor intensity; and streamlined supply chain management. The model takes direct distribution into the district process where district needs are assessed (partner mapping and commitment, local transport capacity, storage capacity, budgets). ITNs are procured nationally and ordered with delivery of containers to the lowest point in the distribution chain before unbundling. Deliveries are tracked. With direct delivery to districts Zambia documented: 33% reduction of in-country distribution costs (transport, fuel, drivers, etc.); 75% reduction in time between arrival in country and access at community level; 50% reduction in storage costs; increased flexibility in storage options (retain container option); more money available for commodities.

Comparisons of national scale ITNs and IRS implementation – Lengeler

As a bridge from the country experiences session to the issues session, Christian Lengeler of the Swiss Tropical Institute introduced a document prepared under our RBM WIN Work Plan entitled: ***Operations, Costs and Cost-Effectiveness of Five Insecticide-Treated Net Programs (Eritrea, Malawi, Tanzania, Togo, Senegal) and Two Indoor Residual Spraying Programs (Kwa-Zulu-Natal, Mozambique)*** by Joshua Yukich, Fabrizio Tediosi, Christian Lengeler. This document is available on the RBM WIN website. The aim of this review was to systematically review and compare the cost, cost-effectiveness, and main operational features of large-scale indoor residual spraying (IRS) and insecticide-treated nets (ITNs) for malaria control in sub-Saharan Africa. This is the first time that large scale and national-scale efforts have been examined for comparative purposes for costs and effectiveness using a common and standard costing guidelines and analysis framework. For

costs, the methods took a provider perspective with the exception of user contributions for the purchase of nets and insecticide treatment kits where this was part of the program. The time frame aimed for three years including start-up costs. Costs were collected retrospectively from financial and operational records, stakeholder interviews and direct observation. For effects, the analysis looked at health benefits in terms of deaths averted assuming 5.5 deaths averted per 1000 person-years of protection in under-5s for both ITNs and IRS. Benefits for older individuals, pregnant women or untreated nets were not included.

The two IRS programs reviewed were both model vertical programs (KwaZulu Natal and LSDI Mozambique). The five LLIN programs reviewed covered a spectrum of model delivery systems including: free distribution through the health system (Eritrea – 0.9 million ITNs); free distribution through immunization mass distribution campaigns (Togo – 0.9 million ITNs); commercial distribution through retail markets (Senegal – 0.75 million ITNs); social marketing with subsidized ANC sales (Malawi – 4.7 million ITNs); and integrated commercial distribution of highly subsidized voucher delivery integrated in ANC health systems (Tanzania 6.4 million ITNs).

The main conclusion from the ITN comparisons is that all delivery systems examined performed within a highly comparable range of excellent cost-effectiveness. Cost per treated net year ranged from $1.18 to $1.90 USD. Cost per death averted ranged from $431 to $692 USD. Cost per DALY averted ranged from $13 to $21 USD. These are all highly cost-effective. Not surprisingly, IRS had a low-cost per person protected, but substantially higher costs per child protected, death averted, or DALY averted since most of these burdens are concentrated in children, whereas the intervention cannot be targeted to children alone.

Average annual economic costs for ITN and IRS programmes. LLIN with 5 years duration (2005 USD)

ITN program	Average cost per LLIN distributed	Average cost per TNY	Cost per death averted	Cost per DALY averted
Eritrea	7.78	1.18	431	13
Malawi	5.05	1.79	651	20
Tanzania	5.74	1.62	588	18
Senegal	7.36	1.67	606	18
Togo	3.23	1.90	692	21
IRS program	**Cost pp protected (whole population)**	**Cost per under-five child protected**	**Cost per death averted**	**Cost per DALY averted**
KwaZulu-Natal	3.27	23.96	4,357	132
Mozambique	3.90	21.63	3,933	119

Seasonality is a major factor influencing the CE of IRS because of the need for increasing numbers of spray rounds with increasing length of the transmission season. Consensus among IRS implementers is that beyond two spray rounds per year IRS becomes very difficult to implement. Hence, in areas of year-round transmission, ITNs will have a significant feasibility and cost-effectiveness advantage. This is especially true with the use of shorter-lived insecticides for IRS such as carbamates as opposed to insecticides with longer residual lifetimes. In areas of shorter and lower transmission and typically also in epidemic-prone zones, IRS may have significant advantages because IRS programmes protect the entire population and the burden of disease is likely to be distributed much more evenly across all age groups. Further, IRS can be restricted to periods in which there is a clear risk of epidemic.

Conclusions:

- Vector control with either ITNs or IRS is remarkably cost-effective in SSA
- For any ITN strategy, the use of LLIN rather than conventional nets should be promoted, regardless of the higher initial investment.
- Four of the models aim both for “catch-up” and “keep-up” continuously over time and fit best the RBM concept and framework whereas mass distribution in vaccination campaigns address “catch-up” only; both strategies need to be combined.
- The longer the transmission season, the more LLINs are the better strategic option for vector control. IRS is likely to be better in epidemic-prone areas.

Discussion raised questions about the merit of the heavy emphasis on DDT and the need for alternatives. Also discussed was the strategy to use IRS to bring down transmission and then maintaining low levels with LLINs while phasing out the IRS. Others questioned why do IRS at all in stable endemic areas if it is so much less cost effective.

Session 4 Discussion: Current issues in response to country needs

Control - Elimination – Eradication

In the week prior to the WIN-4 meeting, announcements at the Gate's Malaria Forum in Seattle placed the aspiration for malaria eradication back on the table. Any discussion on elimination and eradication has huge bearing on vector control strategies. There was no time to revise our agenda specifically to tackle these implications, however some preliminary discussion was invited. The chair provided the current WHO definitions of key terms:

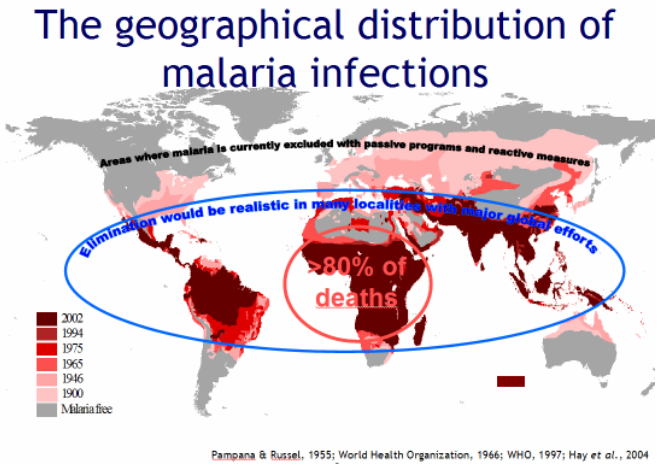
Control
- Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate efforts

Elimination
- Reduction to zero of the incidence of infection in a defined geographical area as a result of deliberate efforts. Continued measures to prevent re-establishment of transmission are required

Eradication
- Permanent reduction to zero of the worldwide incidence of infection, as a result of time-bound, deliberate efforts. Intervention measures are no longer needed once eradication has been achieved

Until now, Abuja and MDG targets for malaria consider the above definition of control as sufficient to lead eventually to ***elimination of malaria as a public health problem*** (not the elimination of malaria transmission or malaria incidence to zero, which can only be achieved in some limited epidemiologic settings with current technologies).

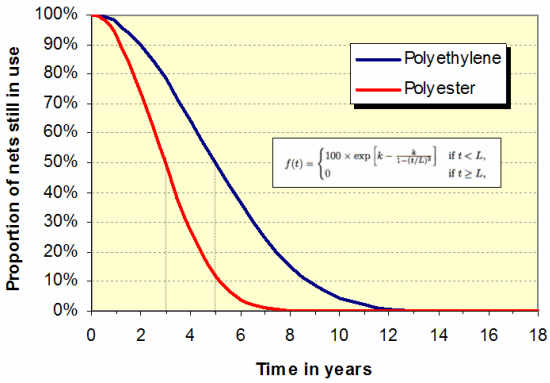
Tom Smith of the Swiss Tropical Institute raised the distinctions between malaria and eradicable diseases such as smallpox or polio in terms of the lack of a single sufficiently effective technical intervention (e.g. immunization), the complicating role of vectors and vector ecology in malaria, the extraordinarily high R_0 of malaria in Africa, the difficulty in diagnosis and surveillance, and the less understood importance of heterogeneity. Acquired immunity to malaria controls disease but does not prevent re-infection. Everyone remains susceptible to re-infection. There is therefore no theoretical minimum host

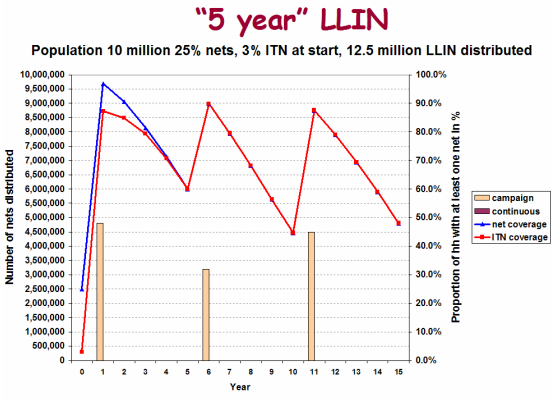


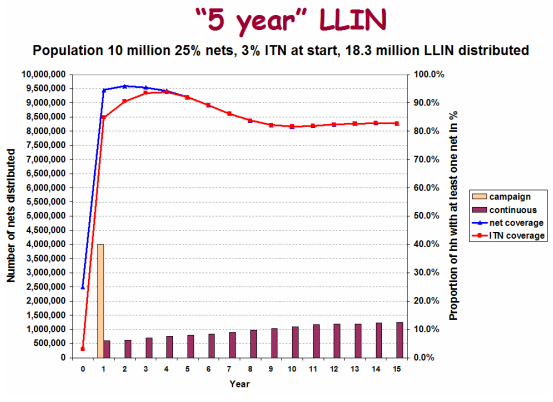
population for the persistence of *P. falciparum* and *P. falciparum* can persist undetected in small pockets. Heterogeneity of transmission risk makes it harder to eliminate the pathogen without targeting interventions, and targeting interventions is difficult because of the difficulty in diagnosis. Implications are that we need to repair or construct well-functioning health systems before planning for elimination. In some places (e.g. Central America, Middle East, China, Pacific Islands) it makes sense to consider elimination now while Africa, where 80% of malaria deaths occur, remains the geographic priority for global malaria control. The general conclusion of the discussion at this stage was the importance of achieving and sustaining coverage goals in Africa first, before shifting vector surveillance and control strategies into elimination or eradication mode. It was also emphasized that protection against insecticide resistance is vital to all strategies.

ITN/LLIN distribution strategies.

Albert Kilian of the Malaria Consortium led off a discussion on how knowledge of the useful life of an ITN could influence our thinking on distribution strategies. There is limited evidence on the useful life of nets and ITNs in real life settings, and what evidence there is suggests that the pattern of useful life is more complex than we think. Life span can be separated in two components: physical decay of the net (3 types of holes – tears, burns and rodents) and the replacement cycle of the net (depending on physical condition, availability, perceptions). Data from projects tends to overestimate the life experienced in "real life" and durability is not a linear function of time, with slow decay at first, and then more rapid decay after 3 years, but with a long tail of net survival. This varies with socio-economic status, and likely changes (improves) as net culture matures and use patterns adjust. Albert Kilian, together with Nakul Chitnis the Swiss Tropical Institute have been collaborating in modeling the dynamic loss functions for polyester nets and polyethylene nets. With this, it has been possible to generate scenarios for scaling up LLINs coverage using repeated "catch-up" mass distribution campaigns at different intervals, compared with a single "catch-up" campaign followed by a continuous integrated supply through health systems as "keep up". The models forecast the level and stability of household coverage levels. The result was that campaigns with a five year interval achieve coverage in access of 80% immediately after the campaign, but coverage drops below target thresholds within two years, and as low as 45% by four years. This suggests that campaigns with polyethylene LLINs (five median year life span) would need to be repeated every two years to maintain coverage over 80%. However







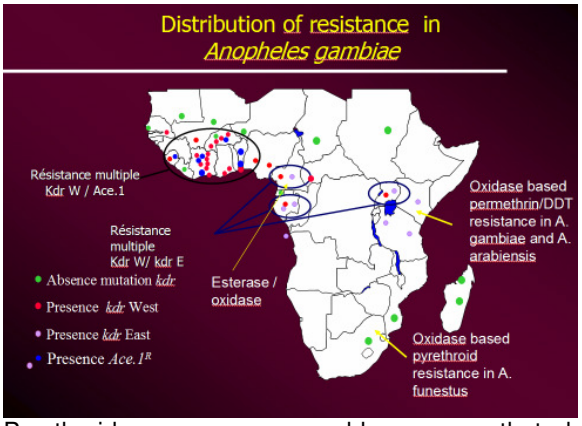
the coverage remains above 80% indefinitely after a single campaign plus continuous delivery in the "catch-up – keep-up" strategy. Repeated mass distribution campaigns with polyester (3 year median life span) nets drops below 80% within one year of the campaign and thus campaigns would need to be mounted annually to sustain coverages at target levels. But for this, larger initial campaign distributions are needed to permit the catch-up system to maintain coverage above 80%. The models also confirm that the "keep up" system alone comes close but cannot reach 80% coverage, and needs about 7 years to plateau (polyethylene 5-year nets). Polyester (3-year nets) in such programs plateau at a ceiling of about 55% coverage. These findings would appear to reinforce the RBM WIN position that the "catch-up with keep-up" is still the best strategy. They further suggest that longer lasting LLINs are preferred to reach and sustain targets, even if they are initially more costly on a unit cost basis. See the presentation on the RBM WIN website for predictions from other input scenarios.

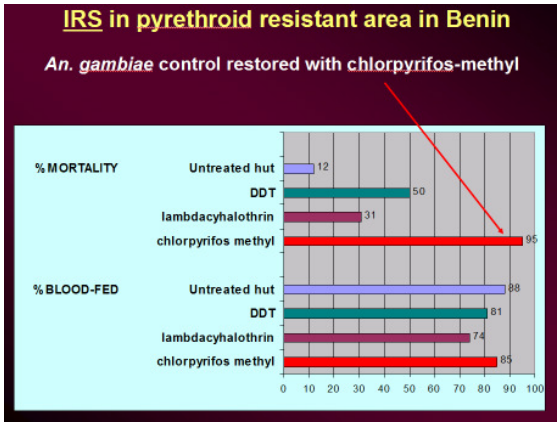
Jo Lines continued the theme of net and ITN coverage with examples from Asia where there are high numbers of never treated or expired ITNs. He pointed out that understanding the ratios of never treated nets, expired ITNs, valid ITNs and no net can help program decisions on the potential gains from converting nets to ITNs through re-treatment campaigns compared with free ITN distribution campaigns.

Jayne Webster extended the discussion to public sector-only delivery models or mixed private-public partnerships. Public is defined as largely under the control of central or local government while private includes all those outside of the public sector whether their aim is philanthropic or commercial. LLIN delivery systems have components of: procurement; quality assurance; movement of product through the delivery system; transfer of product from provider to end user; and monitoring. Strategies of delivery include: delivery of subsidy; level of subsidy; targeting; product (LLIN, pre-treated ITN, bundled ITN, untreated nets, and local nets); treatment; and replacement. Mixed models need to consider: capacity of the public sector; capacity of the private sector; constitution of the private sector within country; policy environment; and sustainability. Models seek: higher levels of ownership and use; fewer disparities in ownership and use: reduced gaps between ownership and use; and higher cost effectiveness of delivery at scale.

Insecticide resistance

Mark Rowland from the London School of Hygiene and Tropical Medicine and the Innovative Vector Control Consortium (IVCC) introduced current issues on insecticide resistance asking the questions: What resistance is in Africa and is it important? Does pyrethroid resistance undermine effectiveness of ITNs & IRS in Africa? What can be done about it? Are there alternative insecticides? Mark described work in West Africa where pyrethroid resistance is more advanced. Evaluation of operational impact of resistant vectors for ITNs and IRS is studied in experimental huts trials. Trials of alternative insecticides against resistant vector populations are also underway examining vector population indicators and disease control indicators. The experimental hut trials determine insecticide performance under realistic, controlled conditions for personal protection (prevention of blood-feeding), deterrence of entry, mosquito mortality (for transmission control), and survival of resistant mosquitoes (of operational importance). Studies in Northern Benin and Ivory Coast where pyrethroid resistance plus the S form biotype is prevalent is associated with little or no loss of ITN efficacy. However efficacy of both ITNs and IRS with pyrethroids has been lost in Southern Benin where pyrethroid resistance plus the M form is prevalent. Similarly, IRS with pyrethroids in Bioko Island, Equatorial Guinea had limited efficacy (M form) while carbamate was still effective. Loss of efficacy is associated with the M molecular form of biotype plus metabolic or behavioural resistance, while the S molecular form is associated with continued efficacy. There is now evidence that IRS and ITNs select pyrethroid resistance in *An. gambiae* kdr in the M form biotype. This has operational impact. Disease control trials are urgent and we need alternative insecticides to supplement the pyrethroids.





Pyrethroids are a non-renewable resource that should be preserved while continuing to use these insecticides for malaria control. Alternative insecticides, while not possessing all the characteristics of pyrethroids, may be used to help preserve the pyrethroids. The requirements of an alternative to pyrethroids and DDT would be low human toxicity, no cross-resistance to pyrethroids, and long residual activity. In addition it would be desirable to have toxicity to mosquitoes at low concentrations, rapid action, and repellency. There are new candidates such as chlorpyrifos-methyl and chlorfenapyr which may be as effective as pyrethroids or DDT although they are not repellent or effective at low dosages. Chlorfenapyr needs reformulating to make it long lasting. Discovery and development of new classes of insecticide is promoted by the IVCC with the objectives of developing new products (e.g. insecticides and formulations) and development of better tools to facilitate malaria (and dengue) vector control.

Ole Skovmand pointed out lessons from the history of IRS in India, particularly with the evolution of insecticide resistance. He pointed out that DDTase is not cross-resistant to pyrethroids but Kdr resistance causes resistance to DDT and pyrethroids. Residual wall spraying selects faster for resistance because mosquito males and females are exposed. For resistance management he suggested that IRS insecticides and LLIN insecticides should be physiologically unrelated in effect.

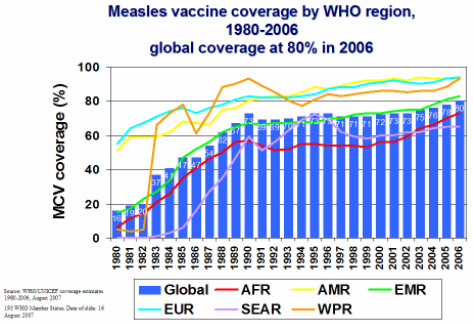
In summary of the discussion on insecticide resistance, the WIN concluded:

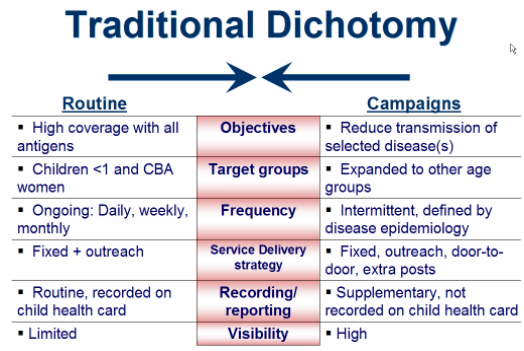
- Pyrethroid resistance is a serious and growing problem.
- Its evolution and spread is accelerated by IRS and ITNs with pyrethroids.
- Susceptibility to pyrethroids is non-renewable resource, and must be used in a way that preserves it, and extracts the maximum benefit from it.
- Alternative compounds are in the development pipeline. Although these do not share all the key desirable characteristics of pyrethroids, they can be used in combination/mixtures with pyrethroids in order to delay pyrethroid resistance.
- Non-pyrethroids must be given priority for IRS over pyrethroids.
- Long-lasting IRS formulations of non-pyrethroids are needed.
- Resistance management strategies possibly based on combination (bi-treated) LLINs should be developed, tested in field in small and large-scale, submitted to WHOPES.
- New types of LLIN incorporating insecticide combinations in fibers should be considered for development and submission to WHOPES.
- Such bi-treated nets should be deployed not only to overcome a resistance problem (e.g. Benin) but used elsewhere to prevent or delay resistance from developing. Such products should help to preserve the pyrethroid component.

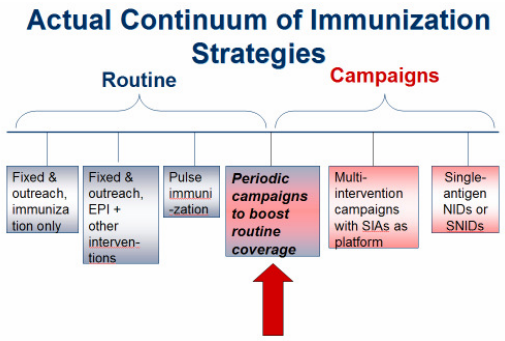
- We need to further document the impact of resistance on control. During LLIN and IRS scale up (particularly during initial campaigns) mosquito collections should be genotyped for R/S and tested for sporozoites.

Integrating ITN delivery into health systems

Tracey Goodman from WHO EPI led off a discussion on integration of ITN delivery with health systems. The most common model at present is integration with high coverage services such as ANC and MCH (immunization) services. The EPI contact point is increasingly powerful due the continued improvement of immunization coverage worldwide, including Africa. Even measles immunization coverage in Africa is approaching 80% while coverage for other vaccines is even higher. Immunization has a long experience of balancing the need for periodic campaigns while building continuous routine delivery systems.







Continuous routine delivery is the norm and the ideal. Campaigns are only supplemental to routine immunization services. EPI+ is being strengthened by strategies such as Reaching Every District (RED) which seeks to: re-establish outreach services; provide supportive supervision; link services with communities; monitor and use data for action; and plan and manage resources. EPI+ will include ITNs at 9 months with measles immunization. This would constitute the 2nd ITN for that infant, assuming the first had been provided at ANC.

EPI coverage data (2006) by country available at:
http://www.who.int/vaccines/globalsummary/immunization/countryprofileselect.cfm

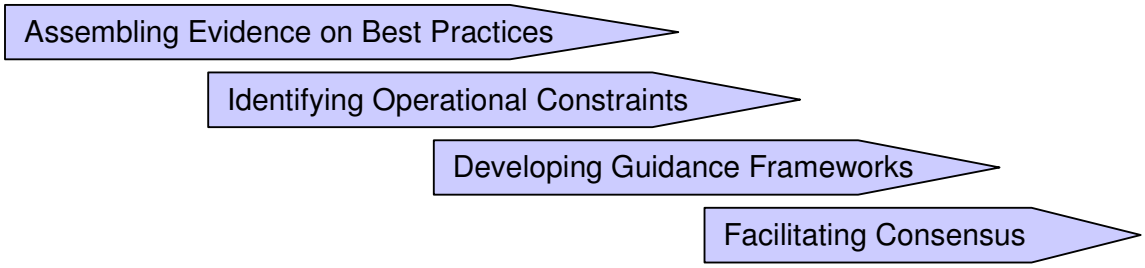
Day Three – 26 October, 2007

Session 5 – Charting the way forward

The final day was devoted to brainstorming and group work (ITNs sub-group and IRS sub-group) to establish the WIN partnership work plan, commitments and budget for 2008. This can be summarized as the WIN deliverables below.

WIN deliverables

The work plan commits to 18 deliverables under our four key functions of: Assembling evidence on best practices; identifying operational constraints; developing guidance frameworks; and facilitating consensus.



WIN Function	Activity	Deliverables 2007-08
Assembling evidence on best practices	Systematic review of IRS efficacy	Cochrane review
	Cost-effectiveness comparisons of major national scale-up strategies for ITNs & IRS	In depth analysis of 5 model ITN and 2 IRS delivery systems at scale
	Review of current IRS scale-up practices	Document existing experiences
	Meeting on IRS "best" practices	Meeting
	Relationship between periodic "Catch-up" mass distributions and Continuous "Keep-up" systems to achieve necessary coverage	Document from model simulations and actual experience with mixing periodic campaigns and continuous distribution leading to operational recommendations
Identifying operational constraints	Taxes & tariffs (ITNs, LLINs, IRS and associated materials)	Updated data, identifying technical constraints (visit to various countries not covered by current funding)
	Technology access for LLIN production	Meeting with industry
	LLIN life-span and washing practices	Review of current evidence and guidance on methodology One day meeting to review progress, data and methodologies
	Update and communicate implementation research agenda for LLIN & IRS at scale	Agenda derived from operational constraints
	Harmonized national registration of IRS & ITN insecticides	Meeting with national regulatory authorities
	Operational review of IRS and LLIN scale-up	Document: review of successful country programmes who have used diverse distribution approaches.

WIN Function	Activity	Deliverables 2007-08
Developing guidance frameworks	RBM WIN Framework for Scaling up Malaria Vector Control (LLIN & IRS) 3rd Edition	Updating strategic framework document, developing training materials, printing, distribution, roll out to SRNs, including WIN IRS Sub-group meeting.
	Resistance Task Group: Activities for monitoring and manageing insecticide resistance	Workshop and document assembling data and agreeing on interpretation of the data.
	Working with the partnership	Facilitate access to technical assistance for SRNs, HWG, assisting M&M conference calls, working with MACEPA, etc.
Facilitating Consensus	Electronic fora and consensus statements as required	Industry self-stewardship in tendering
	Public:Private Sector fora for innovation	Annual meeting
	LLIN & IRS scale-up exchange and consensus fora	Two WIN meetings per year
	General Secretariat Operations	Deliver on entire workplan

Version 2.0 (after WIN-4 Meeting, October 26, 2007)

A copy of the full work plan matrix including indicators, lead partners, links to the RBM Harmonized Work Plan and Sub-tasks is provided at http://www.rollbackmalaria.org/ at the WIN page..

Session 6 – Wrap-up Plenary Discussions

In the final session the sub-groups presented their work plans and these were synthesized, rationalized and agreed in plenary. Funding the Working Group's work plans remains a challenge as its first four annual plans had remained unfunded since 2003. However there was reason for optimism as signals from the RBM Secretariat were promising that the Board could allocate funding to Working Groups this year. The Chair undertook to re-frame the new WIN Work Plan to map it to the RBM Harmonized Work Plan and Sub-tasks for submission to the Board in December 2007. It was also clear that the WIN needed more traction between meetings and that the only way this could be achieved would be to have a pro-active WIN Secretariat. It had been decided at WIN-3 to move the WIN Secretariat from WHO-GMP to the Swiss Tropical Institute; however that action had been put on hold pending decisions on the future of the WIN by RBM and GMP. Since the WIN will now continue, we can proceed to move the Secretariat. The Chair undertook to prepare proposals and approach donors who had shown interest in supporting a WIN Secretariat with proposals.

Kabir Cham announced that he is stepping down as co-chair since he would be retiring from WHO GMP in 2008. We therefore need to start a process to elect new chairs for the WIN and this will take place at WIN-5.

The next meeting (WIN-5) had been agreed to coincide in date and venue with the next WHO GMP Technical Expert Group on Vector Control meeting which is expected to take place in March or April, 2008. The WIN will be notified as soon as the date is confirmed but in any case should meet within approximately six months from WIN-4 (by April 2008).

Closing remarks

The Chair drew the meeting to a close, thanking everyone for their active and rich participation in the meeting and partnership in the Working Group and especially those who prepared such clear presentations as a resource to the meeting and its report. Special thanks were given to the many new players, especially from the IRS world. The Swiss Tropical Institute was thanked for organizing, hosting and co-sponsoring the meeting and especially Margrit Slaoui of the STI who handled the administrative support for the meeting so efficiently. The Chair thanked the RBM Secretariat for financial support for the travel of endemic country participants and for contributing to the administrative costs of the meeting. Finally the Chair thanked Kabir Cham, Co-Chair for his strong and always willing support over the past year, and indeed, the life of the WIN.

The Chair closed the meeting with a reflection that we are truly at a turning point in malaria control having seen dramatic and substantial progress in scaling up vector control interventions across a broad array of increasingly integrated delivery models. Moreover we are seeing the beginnings of impact. It was also clear that there was an extraordinary level of consensus in the WIN in support of diversified delivery strategies for LLINs that address both “catch up” and “keep up” as stated in the current WIN Framework for Scaling-up ITNs, contrary to impressions of a split in the malaria community promoted in the media. It is the role of the group to share and broadcast these experiences and continue to pull out best practices. We must also be prepared to play a larger role in the RBM Harmonization Working Group and the GFATM Technical Review Panel support, in order to ensure competent and professional advice is provided. There was much discussion in the meeting regarding the lack of global health leadership and architecture for malaria control, elimination, and possibilities of eradication. We must be prepared to assist the development of global strategies together with WHO GMP and the broader RBM partnership, through for example, the forthcoming Global Malaria Business Plan (GMBP). We also have achieved greater clarity in our Working Group role relative to WHO, as well as a sharply re-focused and updated work plan. If the RBM WIN Secretariat can be re-established and supported the WIN will have, for the first time, the possibility to pro-actively drive its Work Plan, and facilitate the work of the partners in delivering on the plan. The meeting was closed on this optimistic note having reviewed many recent positive accomplishments and having focused the road ahead for an expanded Working Group with new horizons.

Annex 1. Meeting Participants

RBM WIN-4 Meeting Basel Switzerland October 24 - 26, 2007

Participants List

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Link to Meeting Resource CD and Web Site for Participants List, Agenda, and Background Documents is at http://www.rollbackmalaria.org/ at the WIN page.

RBM/WIN-4 Meeting 24 – 26 October 2007

Schützenhaus, Basel - Switzerland