

8th Outdoor (Residual) Malaria Transmission Work Stream Meeting

Wednesday 5th November 2014

9:00am to 12:00pm

International Ballroom

Doubletree Hotel, 300 Canal St, New Orleans, LA 70130

Co-leaders: Marc Coosemans & Mike Reddy

Rapporteur: Konstantina Boutsika

General summary

- Everyone agrees on core work stream mission statement: **developing a research and operational implementation agenda to address malaria transmission that is maintained (often at a very low level) despite high coverage of long lasting insecticide nets (LLINs) and indoor residual spraying (IRS) and which is not related to insecticide resistance.** Malaria that is maintained as a result of insecticide resistance does represent a challenge to “residual” transmission, but this effort is being targeted within the Insecticide Resistance work stream. The naming of “outdoor” or “residual” remains open. Both names include early biting (in the evening or in the morning) of mosquitoes (in or outdoors).
- All stakeholders agree to the benefit of regional networks to sustain interest and outline a research agenda for outdoor/residual transmission.
- Existing partnerships are already in place in each region that can be engaged to provide input on a general and regional-specific research agendas as well as potentially coordinate and host stakeholder meetings.
- Inclusion of Indonesia as a fifth Regional Hub was proposed as malaria transmission dynamics in the region fit the mission of the outdoor/residual transmission work stream.
- The hubs shall try and generate as much information as possible on the behavior of mosquitoes, as this was a recurring theme throughout today’s work stream meeting (keeping in mind that the same species may have different behavior depending on the context and that shift in behavior or vector species may occur after scaling up ITN/IRS).
- In addition to this there is a need for social sciences to understand the adherence to control methods and also the relationship to vectors.
- Scaling up LLINs (or IRS) remain an absolute priority, all other methods are supplementary to reducing malaria and achieving elimination.
- Requirements of personal or community protection to address outdoor/residual transmission is a debate and will be context-specific; especially as rates of malaria transmission change due to elimination efforts (i.e., personal protection may become a greater focus for targeted control as the number of persons infected drops).
- The development of new paradigms may be context or regional specific.

From Outdoor Transmission to Residual Malaria Transmission WS: Context, Challenge and Framework for Solution – Marc Coosemans

Presentation summary

Extension from “outdoor” to “residual” aims:

1. Establish regional networks in Mekong, Africa and Amazonia.
2. Develop guidelines /estimate importance of residual transmission.
3. Develop guidelines /estimate malaria risk in specific populations exposed to outdoor transmission (soldiers, forest workers, migrants, mobile populations).
4. Outline strategic plan for the research and development (R&D) of new tools.
5. Establish network of communications and mutual technical support amongst stakeholders including an effective “feedback system” to inform on operational impact of any new tools being developed/evaluated specific for residual transmission.

Approach:

1. Establish regional hubs.
2. Define role of regional hub secretariats.
3. Strategic plan development.
4. Mobilize stakeholders.

Discussion

- Name change:
 - The term “residual” could be more difficult for the public to understand than the word “outdoor”. For communication purposes the term “outdoor” would be preferable. However this will not cover indoor transmission before sleeping time (e.g. watching television).
 - Discussion around the relationship between indoor and outdoor transmission. Suggestion that purely the word “transmission” captures it all.
 - Decision to postpone the final name decision until after all today’s sessions have been completed, this is a semantic problem.
- Regional Hubs: The South East Asian region already has a vector control hub, suggestion to engage the already established working groups instead of creating new regional hubs.

Africa

Residual Malaria Transmission: a hindrance for vector control - Ousmane Ndiath

Presentation summary

- Anopheles mosquitoes are developing more and more resistance.
- Residual Malaria Transmission (RMT): Between 9pm and 6am transmission is controlled through bednets and IRS. Between 6am and 9pm the risk is higher.
- The Dielmo project in Senegal showed that the introduction of LLINs in 2008 greatly reduced the number of malaria cases. In the following years, they tended to adapt by shifting to outdoors host seeking, by biting earlier.
- Residual malaria management strategies.

- Challenges are to require a deeper understanding of vector biology, coordination between National Malaria Control Programmes (NMCPs) and budget and authority to broadly implement.
- Response tactics:
 1. Establish baselines.
 2. Periodic vector population investigation: New catching methods!
 3. Correlate change with intervention.
 4. Survey insecticide resistance.

Addressing residual malaria transmission in East Africa - Nicodem Govella

Presentation summary

Support required:

1. Establish African hub institution (secretariat) with a role to identify, or mapping members from different institution, engaging implementing partners (e.g. NMCPs) and coordinating residual transmission activities. This will facilitate communication within the region.
2. Establish systematic monitoring of residual transmission and how they are changing.
3. Develop and assess new options for tackling residual transmission.
4. Build entomology capacity for residents African to ensure sustainability.

Discussion/African setting

- Repellent clothes could be another effective prevention tool, particularly for pregnant women and for protection in the early evening, before people go under the bednets.

South East Asia

Malaria and vector control interventions in Greater Mekong Region: Thailand as a case study - Theeraphap Chareonviriyaphap

Presentation summary

- Residual/outdoor transmission is a challenge for malaria elimination regarding the diversity in vector behavior but also human activities.
- We have quite a lot of information on mosquitoes: bionomics, species, behaviors, sporozoite infection rates as well as human details but research program on where the transmission actually takes place is rarely investigated.
- Besides the surrounding issues, mosquito behaviors and human activities (risk groups) are the key factors influencing the residual transmission. Research on the link of malaria vector's behavior and human's behavior in the transmission areas are completely important and needed to be done to understand the outdoor/residual transmission.
- Establish networking.

A challenge of residual transmission in Great Mekong Subregion (GMS)- Siv Sovannaroth

Presentation summary

The current attempt in the GMS:

- To develop/design the effective tools for *P. falciparum* malaria elimination in order to eliminate malaria parasite resistance. GMS's initiative through the WHO's Emergency Response to Artemisinin Resistance (ERAR).
- ERAR/ Regional Artemisinin Initiative (RAI) initiative: provide intense vector control where the artemisinin resistant evidence.
- Need more initiative beyond these; lacking the coordination/guidance → regional and global networks.

Discussion/South East Asian setting

- Different opinions on the effectiveness of repellents. In an area of Cambodia with high LLIN coverage a cluster randomized trial showed that there was no additional impact of topical repellent on malaria endemicity. Accessibility, acceptability and reported use of topical repellent was very high, however consistent use was too low to achieve a community protection (impact on the remaining vector population). Effective topical repellent when used properly can still provide a personal protection against malaria. Some people say that one should use all methods and tools available.
- Difference between personal and community protection needs to be made. Personal protection will protect the user if used properly. The aim of community protection is to provide a protection to non-users, resulting from a mass effect on the vector population. This can be compared to coverage of vaccination which is high enough to protect also non-vaccinated persons (herd immunity). However this will require a large coverage of use with good adherence which is less obvious when dealing with product such as topical repellent requiring a daily application in the evening. The NMCP focus mainly on community protection, however promoting personal protection for target groups (forest workers, rubber plantations) should also be considered.
- Insecticide treated clothing: There is little evidence that it protects a person against malaria. In Asia clothes are washed every day compromising the residual effect of the treatment. It would be useful to have more evidence on the effectiveness of repellent on clothes. Suggestion to measure a specific group as opposed to a whole community. Also the differentiation needs to be made between communities in the countryside and in the cities, as people in the cities are more opposed to spraying their clothes.

South America

Current state of residual malaria transmission in the Amazon region: knowledge gaps and control strategies - Gissella Vasquez

Presentation summary

- In 2012: 469,000 malaria cases in the Americas, 91% in Amazonian countries, >70% *Plasmodium vivax* (WHO 2013).
- Highly mobile populations at increased risk of residual transmission.
- Development of new tools for controlling residual transmission
 - Continuous, cost-effective vector surveillance: odorant-based traps, treated fence barriers, vector exposure biomarkers.
 - Novel control strategies: spatial repellents, toxic sugar baits, durable wall liners, transgenic mosquitoes, new drugs.
 - Models to quantify residual transmission.
 - Alternative to insecticides (chemical and biological) to reduce development of insecticide resistance.
 - Rapid, reliable diagnostics and effective treatment for asymptomatic cases.
 - Acceptability and cost-effectiveness of new tools.

Outdoor and early human-vector contact: a challenge for malaria elimination in Latin America - Martha Quinones

Presentation summary

- Tendency for an early and outdoor biting behavior of the malaria vectors in Latin America, together with the habits of the human communities – a challenge for malaria control or elimination.
- Larval habitats are usually far away from houses, difficult to reach, often human-made (to rear fish, to provide water, etc.), difficult to eliminate.
- Local research is needed, as well as evaluation of possible strategies, besides the main malaria vector control measures IRS or LLINs.

Discussion/South American setting

- All the information in these presentations should be reflected in the NMCP strategies as well as Global Malaria Action Plan 2 (GMAP2) and similar programs.
- Regarding the finding that in the Latin America region 60% of the population could be protected by LLINs, the question arose as to which method would be used to protect the remaining 40%. Increasing the amount of LLINs would not be a solution; this method is not as successful in Latin America as it is in Africa. Alternative measures need to be taken, what these will be is not yet clear.

General

Which interventions really work? IVCCs development portfolio for outdoor biting - Tom McLean

Presentation summary

- Bednets and IRS are highly effective for indoors, what about outdoor?
- IVCC and WHO Vector Control Advisory Group (VCAG) work with the end users in disease endemic countries and industry to define and validate new vector control paradigms, and their associated target product profiles.
- Four topics to be developed to full proposal:
 - Attractive toxic sugar baits.

- Mating swarms.
- Push-pull strategies.
- Repellent clothing.

Discussion

- The amount of the grant was not stated by the speaker; however the recommendation was made to purely think about “What do I need to get the job done?” instead of asking for a certain amount. Also grants are only given to projects that sufficient evidence to justify a large-scale trial.
- Sugar baits could be seen as push strategies, clothes could be seen as pull strategies.
- Recommendation not to evaluate individual products, but a class of products that has an effect.
- Recommendation to partner with local economically-vested stakeholders (i.e., oil, mining and/or gas companies) as these companies are financially autonomous and often willing to provide support towards public health product evaluations as this also contributes to labor workforce benefit.

Wrap up and work stream priorities for action - Mike Reddy, Marc Coosemans, All

See summary at the top of this document.