

## The ABCDR project in Tanzania – dissemination of final results

Hans J. Overgaard, April 2018



**April 2018 marks the end of the ABCDR project, which started in 2013 with funds from the Research Council of Norway. The project set out to determine the useful life of Long Lasting Insecticidal Net (LLINs) for malaria control in Tanzania by assessing Attrition (net loss; A), Bioefficacy (B), Chemical content (C), and Damage (D). The project also assessed insecticide Resistance (R) in malaria mosquitoes. April is a suitable month to end this project as it coincides with the World Malaria Day held on 25 April every year.**

Malaria causes more than 400,000 deaths annually and is most serious in Sub-Saharan Africa. Malaria is transmitted by mosquitoes that bite indoors during the night and can therefore be prevented by sleeping underneath bed nets. During the Millennium Development Goal period (2000-2015), malaria mortality declined by 60%, corresponding to approximately 6.2 million lives saved. The main cause for this reduction was the increase of malaria control interventions, such as insecticide treated nets, indoor residual spraying and medicines. It is estimated that approximately two thirds of the cases averted were due to insecticide treated nets.

The ABCDR research team consisted of scientists from Ifakara Health Institute, National Institute of Medical Research, the National Malaria Control Program, London School of Hygiene and Tropical Medicine, and the Swiss Tropical and Public Health Institute. The principal investigator was Hans Overgaard of Realtek, NMBU. The project consisted of a retrospective study of nets distributed by the Tanzanian Government in 2009 and 2011, and a prospective study of three different net brands over three years. More than 10,500 nets were distributed to 3,400 households in 76 villages in eight districts across Tanzania, making this the largest mosquito net study carried out so far. Apart from determining the ABCD and R components, one important objective was capacity building, resulting in two Tanzanian PhD students being trained.

The main findings were presented to an international audience in a symposium held at the 7<sup>th</sup> Multilateral Initiative on Malaria (MIM) Panafrican Conference in Dakar, Senegal during 15-20 April 2018. Results were also disseminated to health personnel at town, municipal, and district councils in the eight districts where the project was carried out. This was done at a dissemination meeting held at the Royal Norwegian Embassy in Dar es Salaam, Tanzania on 23 April, 2018.

The most important results were as follows:

- 31% of the nets given by the project in 2013 were still present in the households in 2016.
- One third of the remaining nets are “unserviceable”, i.e. too torn as defined by WHO.
- Most holes are located at the bottom of the net.
- Mosquitoes mainly enter the net at the roof.
- There was variation between the three LLIN products for all ABCD components.
- New methods to measure net durability were developed, e.g. the Ifakara Ambient Chamber Test (I-ACT).
- LLINs are still protective against mosquito bites, even when they have some holes.
- The insecticide on the net reduces the number of mosquitoes that enter through holes and continue to kill mosquitoes for many years.
- Pyrethroid resistance in malaria mosquitoes is widespread in Tanzania and may have impact on the effectiveness of insecticide-treated nets.

- Pirimiphos-methyl was introduced for indoor residual spraying in 2014 and in 2015 mosquito resistance to this insecticide was detected for the first time.

The recommendations to net users are

- If the only choice is between using a net with holes, or not using a net at all, use the net with holes.
- Use all nets available in the household.
- Take care of the net.
- Tuck in the net carefully.
- Tie up the net after use.
- Avoid net being damaged by bedframes, animals, children, etc.
- When small holes occur, repair them straight away to avoid them from becoming larger.

The ABCDR project will have important policy implications. The results may affect policy decisions on net procurement, timing of distribution campaigns, cost-effectiveness, content of behavioural change campaigns, investments in more durable and stronger nets. The study has clearly shown the importance of routine net durability monitoring. The project has also developed new methods to simplify the monitoring of durability. However, further research is needed to determine the relative importance of physical vs chemical barrier, e.g. when does a net stop being protective against mosquito bites and malaria transmission. Another important question is how to design behavioural change communication effectively to extend the perceived lifespan of nets by the end users, i.e. the sleepers in malaria-endemic countries.



Fig. 1. Study districts.



Fig. 2. Hans Overgaard, the principal investigator of the project, shows the difference between a new net (left) and a 1-year old used net (right). Photo: Jason Moore.



Fig 3. Counting holes. Photo: Dennis Massue.



Fig. 4 Malaria mosquitoes on a net. Photo: PixelBase.

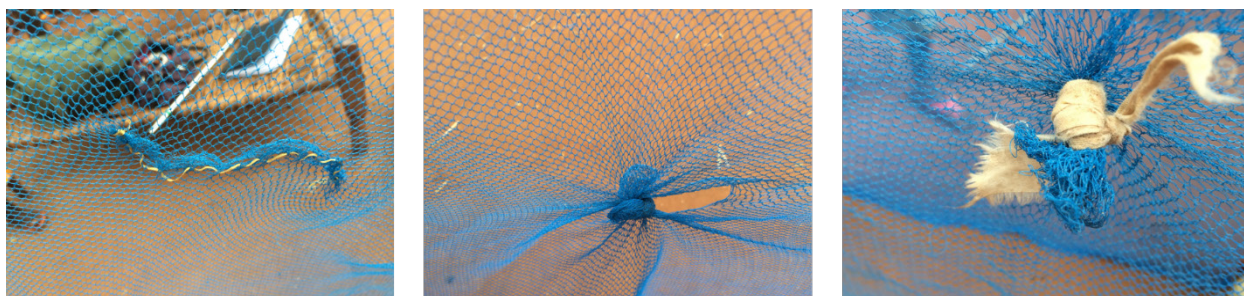


Fig. 5 Repair your net! Photo: Zawadi Mboma.



Fig. 6. The final dissemination meeting to district health personnel in Tanzania. The meeting was held on 23 April 2018 at the Royal Norwegian Embassy in Dar es Salaam, Tanzania.

World Malaria Day 25 April 2018: <http://www.who.int/campaigns/malaria-day/2018/en/>.

#### ABCDR Publications

- Dissemination brochure: [Add link to brochure here.](#)
- Study protocol: <http://www.biomedcentral.com/1471-2458/14/1266>.
- Retrospective study: <https://doi.org/10.1186/s12936-016-1225-6>.

- Mosquito net coverage: <https://doi.org/10.1186/s12936-018-2247-z>.