

Understanding the effectiveness of indoor based malaria control

Dr. Tom Churcher

Indoor residual spraying (IRS) and long-lasting insecticide treated nets (LLINs) are together contributed to the success of reducing malaria since 2000. However, the substantial reduction in global malaria rebounded in 2016, mainly due to increasing mosquito resistance to pyrethroid insecticides, which are the widely-used class of insecticide for LLINs and IRS. A potential solution is the next-generation bednets and IRS products, piperonyl butoxide (PBO), a synergist that can inhibit specific metabolic enzymes that can detoxify pyrethroid. What's more, several IRS products have recently become available. Novel products need not only show epidemiological impact but also should be recommended based on safety, quality and entomological efficacy data. Hence, Tom's talk outline how to combine entomological data with mathematical models to understand the optimum set of interventions needed to control malaria in a setting.

In Tom's talk, they systematically characterise different IRS product efficacies against mosquito by experimental hut data. Lab trials, hut trials and village trials all demonstrated the pyrethroid-PBO bednets is superior than the traditional pyrethroid bednets. Besides, he investigated the mosquitoes' diel behaviour and host diel behaviour and quantify the timing and geographic pattern of mosquito biting activity, and demonstrate the association between host activity and mosquito activity. Overall, they provided a potential effective solution to control malaria with increasing insecticide resistance, though their benefit depends on local factors including bednet use, seasonality, endemicity and pyrethroid resistance status of local mosquito populations.

The screening of formulations does require a lot of trials, Tom's research is a good combination of experimental trials data, statistical analysis and model fitting, truly provided a good standard to help decision makers evaluate IRS product effectiveness.