

# Success and failure: a firsthand look into Uganda's most recent bednet distribution campaign

With the mounting cost of the global fight against malaria to reach the 2015 Millennium Development Goal targets, there is an ever increasing need for evidence-based malaria control programming. A main intervention for vector control efforts involves the use of long-lasting insecticidal nets, which when used properly can decrease *Plasmodium falciparum* episodes by 50% in areas of stable transmission.<sup>1</sup>

Despite this protective capacity, a recently published study by Katureebe and colleagues<sup>2</sup> calls into question the effectiveness of a national universal long-lasting insecticidal net distribution campaign implemented in Uganda from 2012–14, where 21 million long-lasting insecticidal nets were distributed to roughly 35 million people.<sup>3</sup> Using data from three locations in Uganda that represent different geographies and transmission settings, significant decreases in malaria test positivity rates were only recorded at one site, reduced incidence at another, and no difference in mosquito human biting rates seen across sites.<sup>2</sup>

In view of the established efficacy of long-lasting insecticidal nets as a malaria control intervention, why was there not more of an effect? There are several potential reasons, including insecticide resistance, vector behavior change, incomplete campaign coverage, and non-compliance to long-lasting insecticidal nets.<sup>2</sup> Although all possible explanations need to be examined, our work in rural Uganda suggests that non-compliance, including lack of use and misuse of mass distributed long-lasting insecticidal nets might have been an important contributing factor.

Our organisation Soft Power Health (SPH) has been doing malaria outreach programmes that include malaria education and prevention sessions, along with heavily subsidised sales of long-lasting insecticidal nets across rural Uganda since 2004. The nets we sell cost 3000 Ugandan shillings (about US\$0.90), which is well below cost and within reach for most individuals in the community,<sup>4</sup> and all sales include interactive instruction on proper net use as well as education about malaria transmission. Roughly 6 months after each session, we do follow-up visits to assess knowledge retention and to inquire about self-reported malaria burden. We also visually inspect homes of net purchasers for proper net usage. Up to now, we have done more than 10 000 follow-up visits on the 50 000 nets sold thus far. During follow-ups between 2011 and 2014, 91% of respondents reported daily long-lasting insecticidal net use and 81% reported that their net was hanging correctly (ie, above the main sleeping area), although this was only confirmed upon visual inspection in 51%. Consequently, while the most recent national Malaria Indicator Survey for Uganda from 2014–15 estimated that 79% of individuals within households

had access to an insecticide-treated net and 69% reported sleeping under one the night before the survey,<sup>5</sup> as suggested by our data, it is very likely that the self-reported insecticide-treated net or long-lasting insecticidal net use is much higher than actual use.

Equitable access to long-lasting insecticidal nets is without a doubt a crucial component to successful malaria control, which is the driving notion behind the promotion of universal coverage campaigns.<sup>6</sup> However, most of Uganda's population has primary school education or no education,<sup>7</sup> thus the potential for resultant improper net usage is immense. Moreover, there are also very real alternative uses for durable mesh material, and competing interests may prevail particularly in marginalised populations(appendix).<sup>8,9</sup>

How could mass distribution campaigns of long-lasting insecticidal nets be improved? First and foremost, education about the how and why of proper net use, which was limited in the universal coverage campaign, is essential because it increases compliance.<sup>10,11</sup> Additionally, further study of the reasons behind non-adherence to long-lasting insecticidal nets in Uganda should occur as knowledge of the benefits of long-lasting insecticidal nets and net ownership does not always result in use. Another important consideration is attaching a nominal fee to nets during distribution campaigns.<sup>12,13</sup> Although controversial and potentially at odds with the notion of intervention equity, nets from free distribution campaigns are six times more likely to be given away than nets purchased or obtained through other means.<sup>8,14</sup> Finally, although difficult to achieve, obtaining accurate bednet use information is central to monitoring and evaluation. Long-lasting insecticidal nets are completely ineffective for the individual and community if not used properly. Investing the time and energy necessary to better understand the intended beneficiaries at the local level is paramount to ensure correct, sustained use of nets, and should serve as the cornerstone of future long-term malaria prevention policies.

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## References

1. Lengeler C. Insecticide-treated bed nets and curtains for preventing malaria. *Cochrane Database Syst Rev* 2004; 2: CD000363.
2. Katureebe A, Zinszer K, Arinaitwe E, et al. Measures of malaria burden after long-lasting insecticidal net distribution and indoor residual spraying at three sites in Uganda: a prospective observational study. *PLoS Med* 2016; 13: e1002167.