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Distribution, delivery and allocation strategies for mass campaigns to achieve universal coverage with insecticide treated nets Which work best? A multi-country comparison

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Introduction

Even if malaria transmission significantly decreased in recent years, mortality remains unacceptably high in countries with high rates of extreme poverty. The use of insecticide treated nets (ITNs) is widely recognised as one of the main interventions to prevent malaria.

In order to reduce the mosquito density and thus the malaria burden, high ITN coverage is needed to ensure every individual has access to a treated net. Mass distribution campaigns are the best approach to rapidly scale up ITN coverage. However, the best strategy to distribute ITNs to households is still under debate. In Nigeria, ITNs were distributed through mass campaigns, giving out the fixed number of two ITNs per households and, in some states, the ITN campaign was integrated into child health activities, namely the delivery of oral polio vaccine, DPT and measles immunisation, as well as distribution of vitamin A to all children under five years of age. In other countries, such as Ghana or Senegal, ITNs were allocated based on universal coverage needs (i.e. one ITN for every two people or one ITN per sleeping place, or better). Some mass ITN campaigns used a fixed point delivery strategy through distribution sites, while in some cases a house to house ITN distribution was implemented.

This paper presents results from 14 post campaign surveys to assess whether the campaign strategy had any impact on the distribution outcome.

Methods

Data from 14 post campaign household surveys conducted in Nigeria, Ghana, South Sudan, Senegal and Uganda were merged. These campaigns used a variety of strategies, such as stand-alone versus integrated distribution, fixed point versus house to house delivery and targeted or limited versus universal coverage ITN allocation. These mass ITN distributions were followed by an evaluation conducted approximately 6-12 months after the campaign to assess the ITN coverage achieved. All the evaluations used similar methods.

The design was a cross-sectional household interview survey using a two-stage cluster sampling design. The sampling methods focused on obtaining a representative sample of the state or region population, allowing inclusion of any village or household that was not included in the campaign.

Data were collected using a standard and pre-tested questionnaire administered to one household respondent. Interviewers were carefully selected so that they were culturally and socially acceptable. A one-week workshop including pilot-interviews was held prior to the field work.

All information collected was double entered using EpiData software, version 3.1. Final analysis used Stata version 10.1 (StataCorp LP, College Station, TX, USA) and included 13,901 households. The main outcome indicators were the proportion of households that received at least one ITN from the campaign and the proportion of households reaching universal access on the survey day.

Statistical analysis used logistic regression modelling technique to assess potential associations between background characteristics and ITN ownership. Wald tests for significance were calculated. All analysis accounted for sampling weights and any potential clustering effect using the 'svyset' command in Stata.

Results

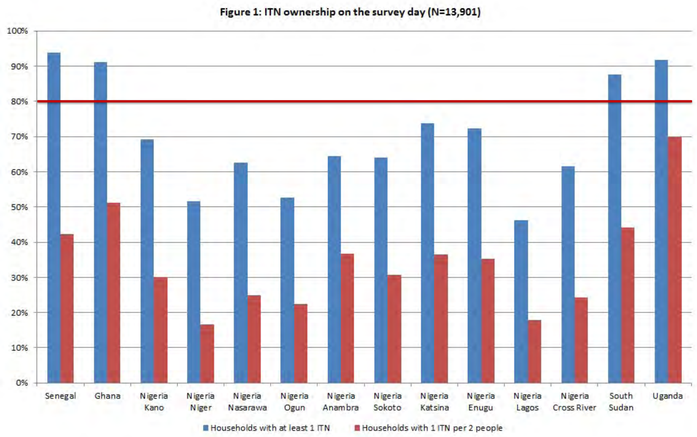


Figure 1:
None of the ITN campaigns had increased coverage to the expected target of 80% of households with sufficient ITN (one ITN for every two people) on the survey day.

Figure 2:
Households targeted by an ITN campaign integrated with child immunisation benefitted equally from the distribution, compared to households targeted by a stand alone ITN campaign (adjusted OR: 1.07; 95%CI: 0.82 to 1.39). Large households (five people or more) were 1.42 times more likely to receive at least one net from the distribution (adjusted OR: 1.42; 95%CI 1.23 to 1.64), accounting for the effects of other confounding variables, including the distribution strategy. On the other hand, households in urban areas had less chance of benefitting from the campaign compared to rural households (adjusted OR: 0.69; 95%CI: 0.54 to 0.86). Also, households in Nigeria were significantly less likely to receive any net than in other countries (adjusted OR: 0.19; 95%CI: 0.14 to 0.26).

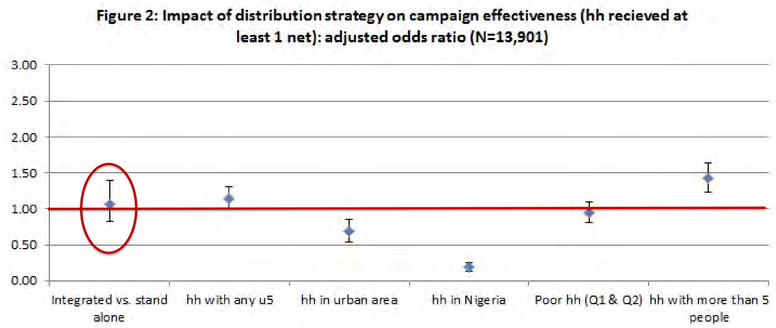
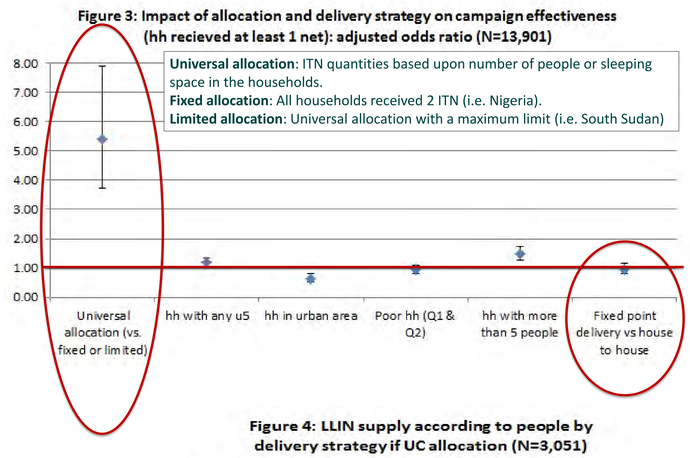


Figure 3:
Campaigns opting for a universal coverage allocation strategy were substantially more effective than campaigns using fixed or limited allocation strategies (adjusted OR: 5.42; 95%CI: 3.72 to 7.89). However, the choice of delivery strategy (fixed point versus house to house delivery) had no impact on campaign effectiveness (adjusted OR: 0.96; 95%CI: 0.79 to 1.17).

Figure 4:
Campaigns with a universal coverage allocation strategies resulted in substantial discrepancies between ITNs delivered and quantity needed in relation to the number of people. House to house delivery was more likely to result in undersupply compared to fixed point delivery.



Discussion and conclusions

Although mass campaigns significantly raised ITN ownership in all surveyed regions or states, the quantities of ITNs distributed were systematically insufficient to reach universal coverage. The distribution strategy did not have an impact on the distribution success; integrating ITN campaign and child immunisation mass campaigns did not affect the outcome of the distribution, compared to a stand-alone distribution. However, ITN allocation aiming at universal access significantly increased campaign effectiveness compared to a fixed or limited allocation strategy. Lastly, substantial discrepancies were found between the number of ITNs distributed to householders and the number of ITNs needed for universal access. This was true independent of the delivery strategy with an overall tendency to undersupply households. Therefore, success depends on the quality of implementation rather than on the details of the procedure on the ground. If universal coverage is the target, the most important element for success is to give out enough mosquito nets. Setting up a robust follow-up continuous distribution system soon after the mass ITN campaign is recommended, not only to maintain the achieved ITN ownership level but also because of the inability of mass distribution campaigns to get the requirements of each family exact.

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