Targeted IRS Trial Research Brief

September 2018

Attn: The District Managers for Chadiza, Katete, Lundazi, Mambwe, Nyimba, and Vubwi districts

BACKGROUND

Indoor Residual Spraying (IRS) is a commonly used intervention in malaria-endemic countries, and one of the key strategies supported by the President's Malaria Initiative (PMI) in Zambia to reduce the prevalence of malaria. However, relative to Insecticide Treated Nets, IRS is an expensive intervention that needs to be used selectively. The high cost of IRS set against finite IRS budgets mean that there are usually more houses in target areas than resources to spray houses[1]. IRS managers must determine which houses should be prioritized or "targeted: for spraying. The criteria used to determine where to spray may influence the effectiveness of IRS, but, to-date, no studies have been conducted in any PMI-funded countries to determine what these criteria should be. For example, during the 2015 and 2016 spray seasons in Luapula Province, IRS managers used the mSpray®[2] tool to guide IRS resources within the province to areas where the incidence of malaria was reported to be the highest. Although they used a targeting strategy (facility targeting), they did not conduct rigorous analysis of this targeting strategy against other strategies, nor did they evaluate the reduction in malaria incidence against comparable geographic areas[3].

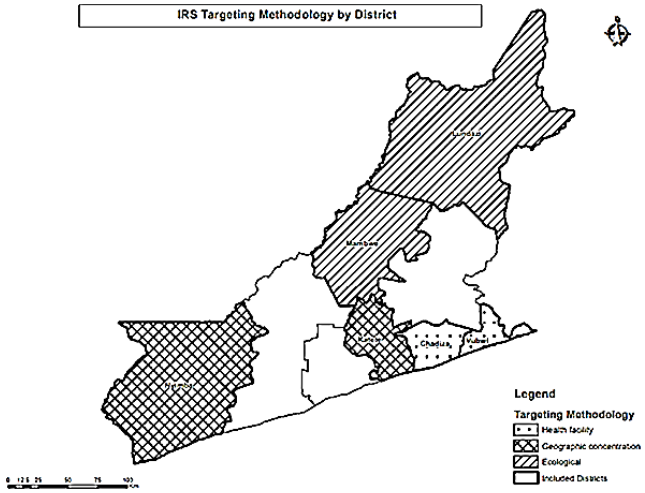

Figure 1. Depiction of the IRS targeting strategies used during the 2017 spray season in Eastern Province.

In 2017, Akros received resources from PMI to support the examination of three different targeting strategies during the 2017 spray season in Eastern Province, Zambia. Akros designed the study described herein, to examine which targeting strategy has the greatest impact on malaria incidence. The three targeting strategies used were:

1) Geographic or "blanket" targeting: spray all houses within a geo-political area
2) Facility targeting: use health facility data to prioritize houses for spraying based on malaria burden
3) Ecological targeting: use ecological risk data to identify mosquito habitats and prioritize houses for spraying based on ecological risk

For this comparison-control trial, Akros worked with the Government of Zambia (GRZ), PMI and the Africa Indoor Residual Spraying project 2 (AIRS2) to identify and divide six districts into three groups, as depicted in Figure 1. In each group, AIRS1 spray operators used a different targeting strategy. To ensure comparability between study arms, spray operators used the geospatial monitoring tool, mSpray® to target houses for spraying, guide spray operations, and monitor spray coverage down to the village level.

[1] White M, Conteh L, Cibulskis R, Ghani A. Costs and cost-effectiveness of malaria control interventions - a systematic review. Malar J. 2011;10: 337. doi:10.1186/1475-2875-10-337

[2] mSpray® is a geospatial tool developed by Akros using PMI resources used to identify structures based on satellite imagery, target houses for spraying and guide spray operations down to the household level.

[3] Pinchoff J, Larsen DA, Renn S, Pollard D, Fornadel C, Maire M, et al. Targeting indoor residual spraying for malaria using epidemiological data: a case study of the Zambia experience. Malar J. 2016;15: 11. doi:10.1186/s12936-015-1073-9

This trial was funded by USAID PMI. For more information please contact Anne Martin at ACMARTIN@AKROS.COM

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RESULTS

In 2017, IRS spray operations targeted 2,083 communities across the six districts. Of these communities, 80% were primary targets selected based on targeting strategies, and 20% were secondary or "buffer" communities to be sprayed if resources were still available. Adherence to the prescribed targeting methods was high across all districts. **The results of this trial showed that the ecologically targeted arm of the trial saw the largest decrease in confirmed malaria incidence**, showing 13% better than using geographical concentration, and 63% better than targeting using health facility incidence data[4]. Figure 2 depicts the study analysis. The slope of each line represents the change in malaria incidence. This change is the most drastic for the ecological arm. This ultimately suggests that targeting based on ecological risk is most effective for reducing malaria burden. The full coefficient table is included as Annex A[5].

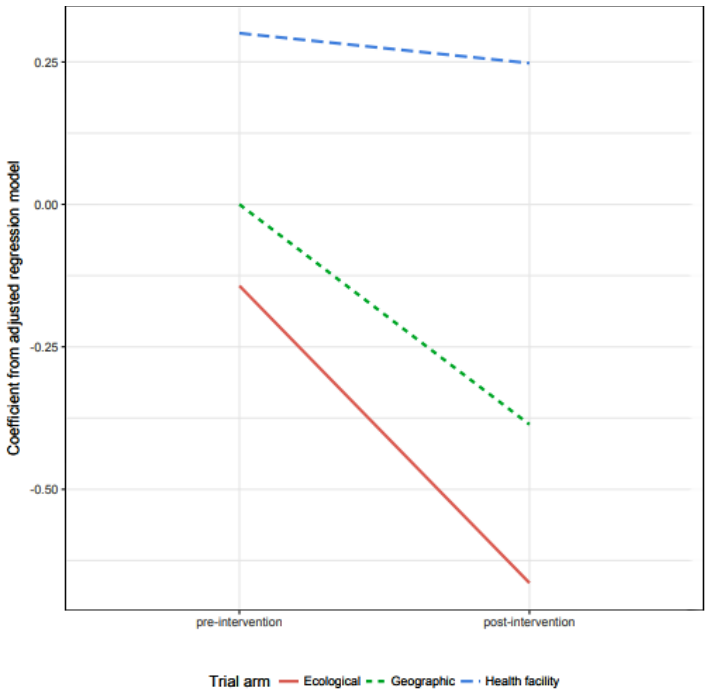

Figure 2. Adjusted coefficients of a difference-in-differences analysis showing change in malaria incidence between pre- and post- periods and by trial arm.

WAY FORWARD

- Malaria control programs should consider using ecological targeting methods to determine allocation of IRS resources. Contact Akros for more information on applying these methods in your area.

- Where possible, make widely available locally-calibrated risk maps for malaria vectors in Eastern Province, Zambia for concise ecological targeting. These maps can be ecologically-derived to align with the results of this trial and maximize the effectiveness of IRS in limited capacities.

- Targeting at the village or community level can maximize effectiveness of IRS interventions, allowing implementing partners to measure community-level coverage and define impact much more accurately.

4 Larsen et al. Guiding spray operations with maps of Anopheles funestus abundance to control malaria : results from a comparison-controlled study, 2018. (Manuscript forthcoming).
5 Ibid.

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