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INDOOR RESIDUAL SPRAYING: THE EFFECTS OF IMPLEMENTATION STRATEGIES AND RESIDUAL EFFICACY ON EFFECTIVE COVERAGE

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ABSTRACT

Background: Malaria remains one of the major public health problems in Mozambique and it is estimated that nearly 26 million people are still at risk. To achieve malaria elimination in South Africa and Eswatini, and pre-elimination in Mozambique, indoor residual spraying (IRS) has been used as a core malaria vector control tool in the previous and current regional and cross-bordering initiatives between the governments of Mozambique, South Africa and Eswatini.

Methods: This is a secondary analysis of a Goodbye Malaria cross-sectional study data collected by indoor residual spraying operators. The analysis involved household location information and the date of spraying insecticides inside eligible structures in Magude district between 2016 to 2018, from a total of 7407 spray operator's records that translated to 8855 households in 2016 and 9130 households in 2017 in Magude district. A known residual efficacy of the insecticides of 6 months was combined with the actual dates of IRS implementation to assess the level of coverage over time, during each malaria season. Additionally, data from the Malaria Indicator Survey 2018 (MIS) from the Demographic Health Survey (DHS) was analyzed using a multilevel mixed-effects logistic regression model to better understand the sociodemographic characteristics of the households that are visited for IRS, for which a sample size of 1531households were used.

Results: The estimated 2016 IRS campaign coverage was 80.8% (of all eligible structures), while in 2017 the coverage increased to 83.26%. In both years, the implementation of IRS began in August, and more than half the households were visited and sprayed by the end of September, with peak spraying occurring in September. The campaign lasted until November 21st and December 16th for the 2016–2017 and 2017–2018 malaria season, respectively. Combining these data with the residual efficacy of the product sprayed, 67.51% of the households in the district may have lost their protection from IRS during 2016-2017 by March (malaria peak transmission period), whereas during the 2017 IRS campaign the values was 60.69% for the same period. Households owned by females were less likely to be sprayed when compared to those owned by males, and households in the rural areas were more likely to be sprayed when compared to those in the urban areas (OR 1.77, 95%CI 1.47 – 2.12).

Conclusions: These study findings suggest that the implementation of IRS in southern Mozambique should be done two months before the onset of the rainy season as compared to the current operational guidelines of 3-4 months prior to the rainy season. This change in the operational guideline will ensure that the IRS chemical has at least 80% efficacy to kill the mosquitoes throughout the malaria season. This study also recommends future research on this topic, and that an in-country advisory group, including epidemiologists, entomologists, and modelers, work together to optimize the timing of spraying considering environmental events and work with local communities to increase acceptance rates, further increasing IRS coverage in those communities.

Keywords: Indoor residual spraying, implementation strategies, effective coverage, Mozambique.