



Assessing the Impact of Targeted Indoor Residual Spraying on Malaria Incidence in High-Transmission Zones of Zambia's Luapula Province: A Retrospective Analysis,

Chanda Mwansa¹

¹ Department of Pediatrics, University of Zambia, Lusaka

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Correspondence: cmwansa@hotmail.com

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Author notes

Chanda Mwansa is affiliated with Department of Pediatrics, University of Zambia, Lusaka and focuses on Medicine research in Africa.

Abstract

Malaria is a leading cause of morbidity and mortality in sub-Saharan Africa. Indoor residual spraying (IRS) is a core vector control intervention, but evidence on the impact of its targeted application in high-transmission zones remains necessary for guiding policy and resource allocation. This study aimed to quantify the reduction in malaria incidence following a targeted IRS campaign implemented in high-transmission zones of Zambia's Luapula Province. A retrospective ecological analysis was conducted using routine health surveillance data. Malaria incidence rates from zones receiving targeted IRS were compared with pre-intervention baseline rates from the same areas. Incidence rate ratios and corresponding confidence intervals were calculated. The implementation of targeted IRS was associated with a significant reduction in malaria incidence. A 42% decrease in confirmed malaria cases was observed in the high-transmission zones following the campaign compared to the pre-intervention baseline. Targeted IRS was an effective strategy for reducing the malaria burden in high-transmission areas of Luapula Province. The findings support the strategic focussing of IRS resources on zones with the highest transmission intensity. Malaria control programmes should prioritise sustained, targeted IRS in high-transmission zones as a core intervention. Complementary measures, including improved surveillance and community engagement, are essential. Further research should assess the intervention's cost-effectiveness and long-term sustainability. malaria, indoor residual spraying, vector control, disease incidence, Zambia, public health intervention, retrospective study This research provides empirical evidence on the effectiveness of a targeted IRS approach in a high-burden setting, contributing to the evidence base for strategic malaria control planning in similar regions.

Keywords: *malaria, indoor residual spraying, vector control, sub-Saharan Africa, retrospective analysis, disease incidence, Zambia*

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