

AMCA_2019 EVALUATION OF INSECTICIDE-TREATED HOUSE SCREENING ON ENTOMOLOGICAL INFESTATION AND ARBOVIRUS INFECTION OF AEDES AEGYPTI AND COMMUNITY ACCEPTANCE DURING A ZIKA TRANSMISSION PERIOD IN MERIDA, YUCATAN, SOUTH MEXICO

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IDRC Grant/ Subvention du CRDI: 108412-001-Preventing Zika disease with novel vector control approaches

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INTRODUCTION

Insecticide-treated house screening (ITS) is an innovative and promising approach, particularly for the sustained control of indoor female *Ae. aegypti* and the reduction of human-mosquito contact. Interventions ITS have been under development and evaluation as part of the project "Aedes proof-houses" in Mexico in the last recent years. Houses are provided with long-lasting insecticidal nets (LLIN), permanently fixed with aluminium frames on doors and windows. After initial RCT studies, ITS proved to confer protection and had <50% less chance of having indoor female *Ae. aegypti* in comparison with non-protected houses in urban areas of the Mexican cities of Acapulco and Merida. However, further entomological-epidemiological and impact is still needed to recommend ITS as a method to reduce the risk of transmission of *Aedes*-borne diseases (Dengue, Chikungunya and Zika) in urban areas.

OBJECTIVE

We evaluated ITS, with the installation of pyrethroid LLIN fixed as framed mosquito screens on doors and windows, on entomological infestation, arbovirus infection and community acceptance during a Zika outbreak in Merida, Yucatan, South Mexico.

MATERIALS AND METHODS

A cluster-randomised controlled trial evaluated the efficacy of the intervention "Aedes aegypti-proof houses" throughout neighbourhood Juan Pablo II of Merida, in the State of Yucatan, Mexico. Cross-sectional entomological surveys quantified indoor adult mosquito infestation at baseline (pre-intervention) and throughout two post-intervention (PI) surveys spaced at 6-month intervals corresponding to dry/rainy seasons over one year (2016-2017). The study included the detection of dengue (DENV), chikungunya (CHIKV) and Zika (ZIKV) viruses in female *Ae. aegypti* collected from the same sample of houses with the Trioplex Real time RT-PCR Assay from the CDC. Household-surveys were applied to 140 families randomly selected within intervention clusters to address the social reception of the intervention.



Figure 1. Participant families.



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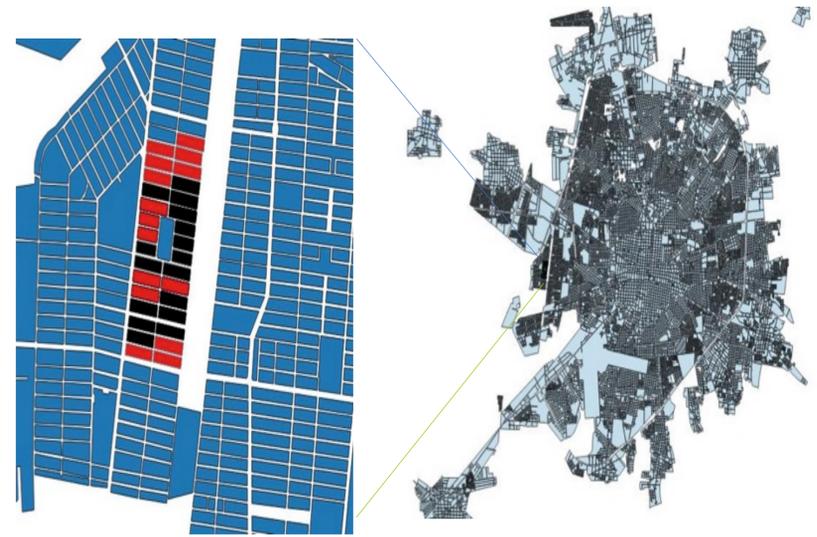


Figure 2. The city of Merida, Yucatan, Mexico and the location of the neighbourhood Juan Pablo II. Intervention clusters are coloured in black and control clusters are coloured in red.

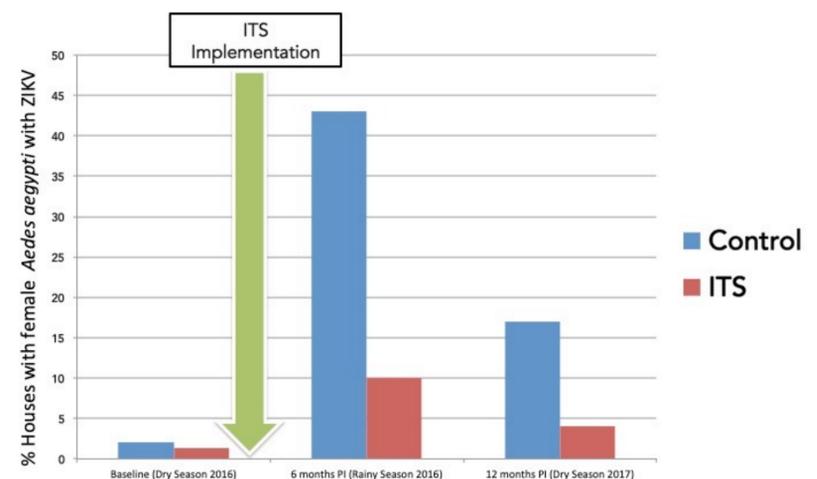


Figure 3. Comparison between treated (ITS) and untreated (control) groups and the protection against the presence of indoor female *Aedes aegypti* infected during a Zika outbreak at Juan Pablo II houses in Merida, Mexico.

RESULTS AND CONCLUSIONS

At 6 months after the installation of ITS (rainy season) 2016, the houses protected were >80% less infested with *Aedes* females than the houses of control clusters (OR females = 0.14, 95% CI = 0.08-0.26; OR blood fed = 0.18, 95% CI = 0.09-0.33). One year after intervention (dry season 2017), significant differences were still observed between houses protected with ITS and non-protected controls (OR females= 0.21, 95% CI = 0.08-49; OR blood fed = 0.24, 95% CI = 0.09-0.58). The houses protected with ITS had significantly less females infected (OR females with ZIKV=0.17, 95% CI 0.08–0.32) at the 6 months PI survey, and these differences remained significant (OR females with ZIKV==0.24, 95% CI 0.09–0.60) a year after (dry season 2017).

Social acceptance process was a key factor to understand what drove the community to get involved in the intervention. Three main reasons encouraged participation: the rationality and efficacy of the intervention on reducing of mosquito-human contact, the perception of people in the locality of the high risk for *Aedes*-borne diseases transmission, and that initial enrolled participants convinced more families through sharing their positive experiences about the effectiveness of the method. All the participants perceived an efficacy on mosquito reduction and definitively recommended the scaling-up of the intervention, because the multiple positive outcomes perceived.