

Reducing continued *Aedes aegypti* production among residents with a history of mosquito breeding

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Introduction

Analysis of property inspection data from 2017 to 2019 showed that 33% of properties with a history of *Aedes aegypti* (L.) production continue to produce mosquitoes in a subsequent year.¹ These properties risk re-infesting the surrounding areas and contribute to the continued spread of *Ae. aegypti*.² Reducing the number of properties that produce mosquitoes across multiple years would aid in the control of *Ae. aegypti*.

To sustain long term behavior change, people often need cues-to-action that serve as reminders to practice a behavior.^{3,4} Effective homeowner behaviors to control *Ae. aegypti*, while not complex, require weekly maintenance for approximately seven months during the mosquito season followed by a break in behavior during the cooler, winter months. Developing an effective cue-to-action for residents with a prior history of *Ae. aegypti* sources may trigger weekly breeding source inspections on their properties, resulting in lower mosquito abundance and more effective control.

This study examined the effectiveness of a pre-mosquito season door hanger as a cue-to-action to reduce continued *Ae. aegypti* production among residents with a history of mosquito production.

Materials & Methods

Study Assignment

In 2019, larval sources were found on 406 unique properties across the District. These properties were considered for inclusion in the study and those that were already inspected prior to the start of the study were excluded (Figure 1).

The remaining properties were blocked by their location in 2.6 square kilometer sections of the U.S. Public Land Survey System. Blocks that had only one property with a history of breeding were excluded from the study. Properties within each remaining block were randomly assigned to control or intervention.

Intervention

The intervention group received a color door hanger in May 2020. The door hanger reminded residents to empty key water holding containers weekly and scrub them with bleach to remove any eggs. The control group did not receive a door hanger. Study properties that contacted the District for an inspection prior to receiving a door hanger were excluded from the study.

Inspections

Properties in both control and intervention groups were inspected for larval breeding sources when a service request was received or when at least 10 female *Ae. aegypti* were caught in a single trap night within their block. Vector control technicians were unaware of property assignment to control or intervention groups.

Analysis

Results were analyzed using the Mantel-Haenszel (MH) adjusted relative risk with 95% confidence interval (CI).

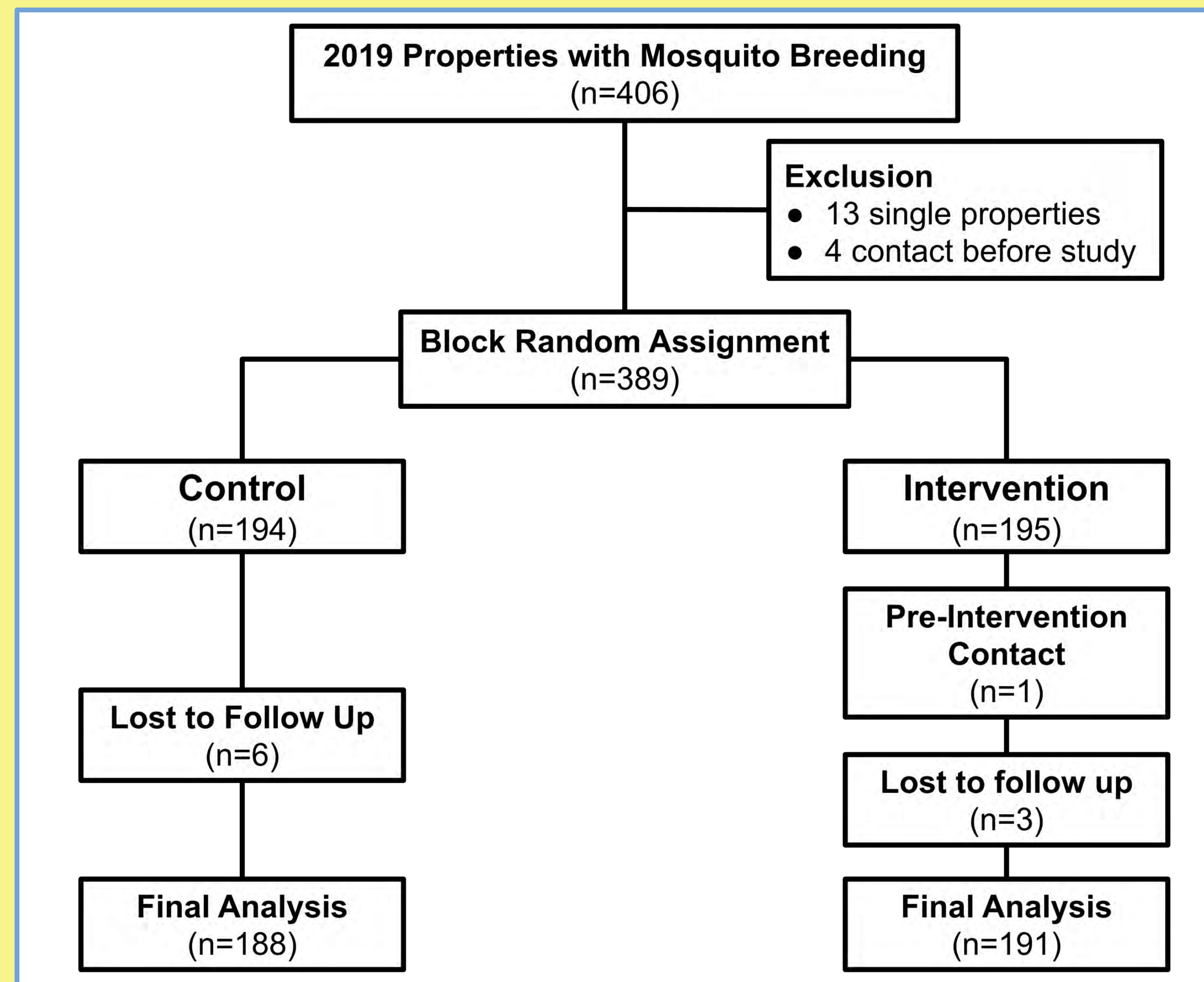


Figure 1. Study design and group assignment. Properties lost to follow-up are properties where no inspections took place.

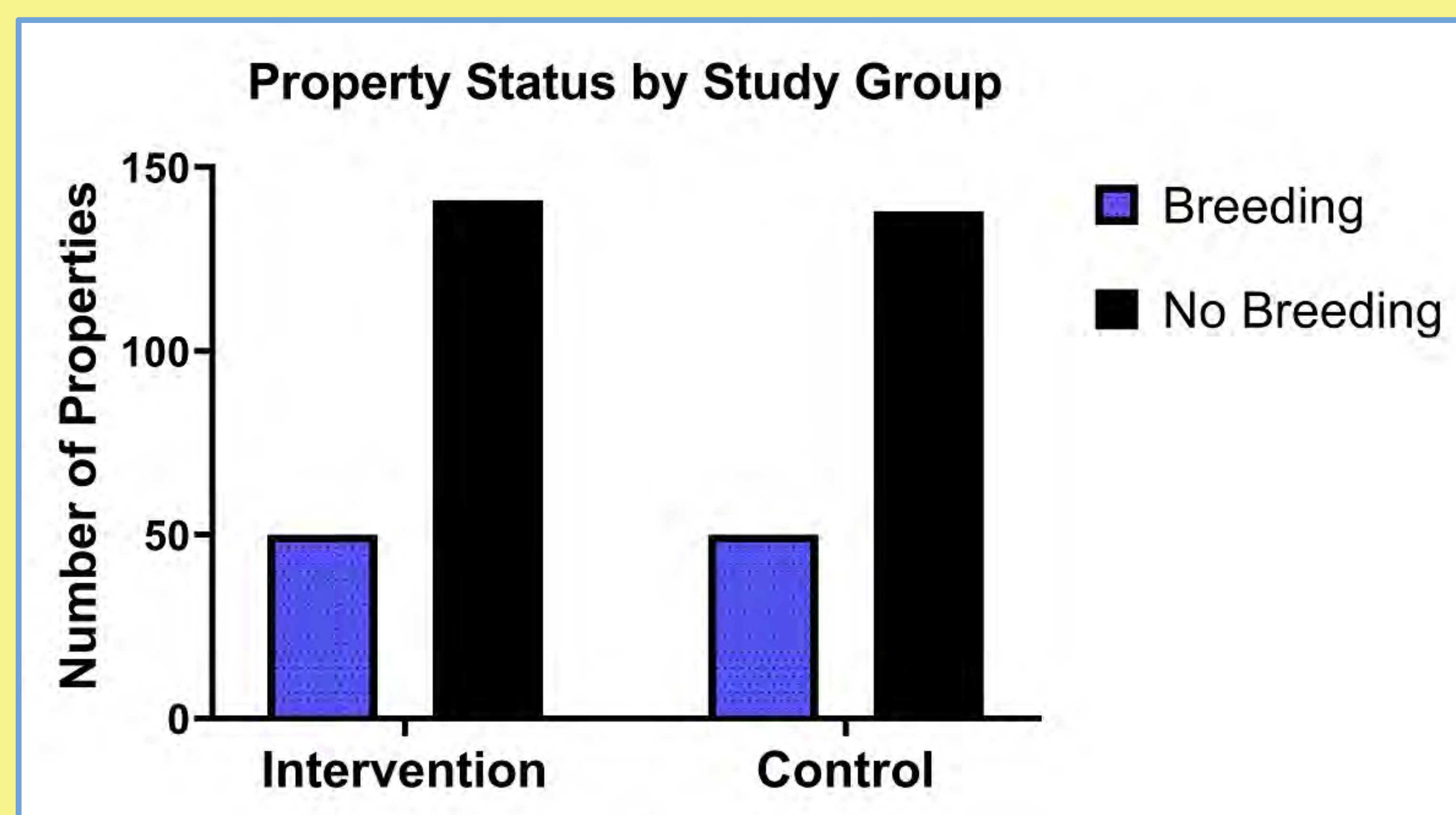


Figure 2. Property status by study group. Properties with immature mosquito sources were classified as breeding.

Results & Discussion

A total of 406 unique properties had immature *Ae. aegypti* sources in 2019. Of those, 17 were excluded for being the only property within the 2.6 square kilometer area or for having already been inspected before the study began (Figure 1). Of the remaining 389 properties, 194 were assigned to the control group and 195 to the intervention group. One additional property was excluded from the intervention group after random assignment because of contact with the homeowner before the intervention door hanger could be placed. A total of 6 properties in the control group and 3 in the intervention group had no inspection results and were considered lost to follow-up. Inspections did not take place at the properties because (1) the property could not be found, (2) the door hanger was placed at the wrong address, or (3) the resident was never reached to arrange an inspection. Final analysis included 188 properties from the control group and 191 from the intervention group.

The house index for properties that received the door hanger was 26.2% (n=191) compared to 26.6% for the control group (n=188; Figure 2). There was no significant difference in the relative risk of *Ae. aegypti* production between intervention and control groups (RR=0.968, 95% CI: 0.692 – 1.354). These results agree with other findings that passive education is unlikely to reduce mosquito larval sources in residential areas on a community-wide scale.⁵ Door hangers are a form of passive education that, although targeted to households with a history of mosquito production, is still very general in the source types listed and control methods recommended.

Conclusion

Resident participation in mosquito control is critical to the success of integrated vector management programs.^{2,5} However, few published studies exist on successful behavior change programs in the United States.^{6,7} Understanding which outreach interventions work will help districts design more successful outreach programs at the residential and community level.

Further studies are needed to identify what individual, environmental, and community factors play a role in continued mosquito production across multiple mosquito seasons. With this information, better behavior change interventions can be developed.

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Further Information

For more information, please contact Crystal Grippin at cgrippin@deltavcd.com or (559) 732-8606 extension 114.

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