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Community-driven vector control for dengue prevention in the Greater Mekong Subregion

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Introduction

An estimated 390 million dengue infections arise annually,[1] with most outbreaks in Southeast Asia.[2] Transmission is mainly by *Aedes aegypti*. With no vaccine or drug treatment available, vector control is the primary means to reduce dengue outbreaks. We worked with the Cambodian Ministries of Health, Education, Youth and Sport, and others to test whether a package of community-implemented self-help tools delivered alongside social and behaviour change interventions could successfully reduce dengue vector populations.

Methods

- Cluster randomised controlled trial in Kampong Cham, Cambodia (May 2018 – Apr 2020).
- Three experimental arms, each covering 10 villages:
  1. Full – deployment of vector control tools, plus social engagement
  2. Partial – deployment of vector control tools, but minimal social engagement
  3. None – control.
- Interventions:
  - production of 9,528 home-made mosquito autocidal traps
  - distribution of 26,400 larvivorous guppy fish
  - frequent removal of empty containers
  - training of 100 teachers to deliver an enhanced dengue-awareness curriculum
  - community engagement.
- Household surveys of intervention tools uptake.
- Focus group discussions.

Results

- 71 percent reduction in adult *Aedes* mosquitoes in the full intervention arm.
- A strong reduction in all four *Aedes* immature stage indices confirm the success of interventions on dengue vectors.
- Households' usage of larvivorous guppy fish increased from 11 to 75 percent (Aug 2018 – Feb 2020).
- Community support for interventions achieved.

Conclusion

Our results demonstrate that inexpensive, community-driven vector control interventions can substantially reduce dengue vector populations. As social acceptance and retention of control practices were high, similar campaigns could be introduced elsewhere in the Greater Mekong Subregion. Nevertheless, studies are required to determine whether such reduction also decreases dengue cases and/or outbreak risk; one is planned for Myanmar. The use of indigenous predaceous fish in place of exotic guppies should also be explored.

References

1. Bhatt S, Gething P, Brady O, et al. The global distribution and burden of dengue. Nature, 2013; 496: 504–507.
2. Guo C, Zhou Z, Wen Z, et al. Global Epidemiology of Dengue Outbreaks in 1990-2015: A Systematic Review and Meta-Analysis. Frontiers in Cellular and Infectious Microbiology, 2017; 7:317.

Simple, inexpensive, community-driven interventions, accompanied by effective uptake-support messaging, can lead to a strong reduction in dengue vector populations

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http://bit.ly/MC-ASTMH-dengue

Supplementary visuals

Figure 1: Adult index
(Mean number of adult female *A. aegypti* and *A. albopictus* per house)

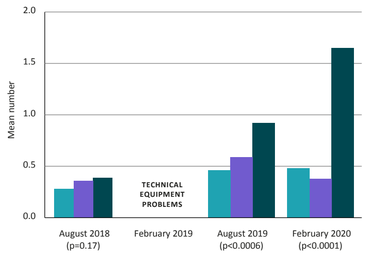


Figure 2: Breteau index
(Number of containers infested with mosquito larvae and/or pupae per 100 houses inspected)

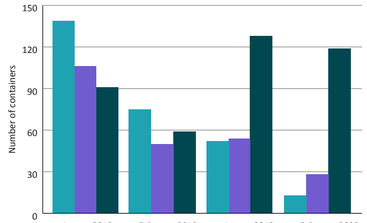


Figure 3: Container index
(Percentage of water-holding containers infested with mosquito larvae and/or pupae)

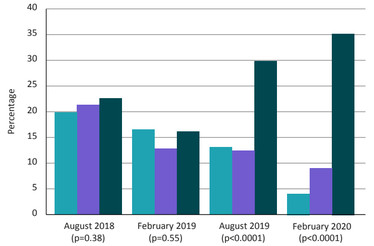


Figure 4: House index
(Percentage of houses with containers infested with mosquito larvae and/or pupae)

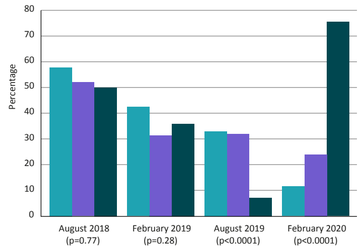
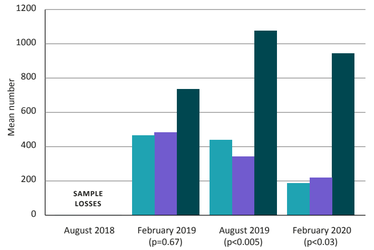


Figure 5: Pupal index
(Mean number of *A. aegypti* and *A. albopictus* pupae per 100 houses)



Acknowledgements

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