Optimization of Critical Threshold Values for *Aedes* Mosquitoes based on Breteau Index in Kandy District of Sri Lanka

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Background: Many countries, including Sri Lanka, mainly depend upon *Stegomyia* indices,such as Premise Index (PI), Breteau Index (BI),Container Index (CI), and Pupal Index (PI) for routine entomological surveillance of dengue. Among them, BI remain as the most widely used larval index for vector management prior to and during epidemic incidences. Properly defined threshold values for BI are of essence, to assist the prediction of dengue epidemics and as a leading indicator for vector control. However, Sri Lanka still lacks effective thresholds for BI to initiate and drive dengue vector management activities. Hence, the present study attempts to define threshold values for BI based on an empirical modelling approach for the Kandy District of Sri Lanka.

Methods: Monthly larval index values of BI, for *Aedes aegypti* (BI_{agy}) and *Aedes albopictus* (BI_{alb}), in 4 selected dengue high risk Medical Officer of Health (MOH) areas in the Kandy District for the period of 2010 to 2017, were subjected to a frequency analysis aiming to define critical threshold values for dengue epidemic management. Based on the natural frequency of occurrence, larval index values corresponding to 20, 40, 60 and 85% were selected as threshold values for both BI_{agy} andBI_{alb}.

Results: Four risk thresholds were defined as Low Risk (BI_{agy}>1.77), Risk (BI_{agy}>3.23), Moderate Risk (BI_{agy}>4.47) and High Risk (BI_{agy}>6.23) for *Ae. aegypti* in Kandy district. Further, values exceeding 3.95, 5.38, 6.60 and 8.13 were recognized as Low Risk, Risk, Moderate Risk and High Risk thresholds, respectively for *Ae. albopictus.* Motivation of the community towards source reduction by elimination of dengue vector breeding sites and intensive vector surveillance are advised to be practiced in the risk phase, while target oriented chemical fogging should come into play within the Moderate Risk phase. Extensive fogging is only recommended for the High Risk phase, aiming to drive vector control activities more towards ecofriendly community- based integrated vector management with less attention on chemical- based vector management, unless essential.

Conclusions: Application of the threshold BI values for *Ae. aegypti* (primary vector for dengue) along with cutoff values for *Ae. albopictus*, could be recommended to improve the efficiency of vector control activities, aiming more towards implementation of a community based integrated vector management framework for Sri Lanka.

Keywords: Breteau Index, Threshold values, *Aedes*, Dengue

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