Risk assessment to identify Dengue hot spots for early interventions

Kien Quoc Do[1,2]✉, Thi Thanh Thao Nguyen[1,2], Wala Areed[1], Van Huy Nguyen[3,4], Quang Vinh Bui[5], Dang Khanh Linh Vien[2], Chan Quang Luong[2], Hong Le[1], Trinh Manh Hung[1], Sinh Nam Vu[6], Tran Nu Quy Linh[1], Duc Thinh Nguyen[6], Ngoc Hai Phung[7], Dan Weinberger[8], Dung Phung[1]

1: School of Public Health, the University of Queensland, Australia. 2: Dengue unit, Pasteur Institute in Ho Chi Minh City, Vietnam. 3: St.Luke's International University, Japan. 4: UMass Chan Medical School, USA.

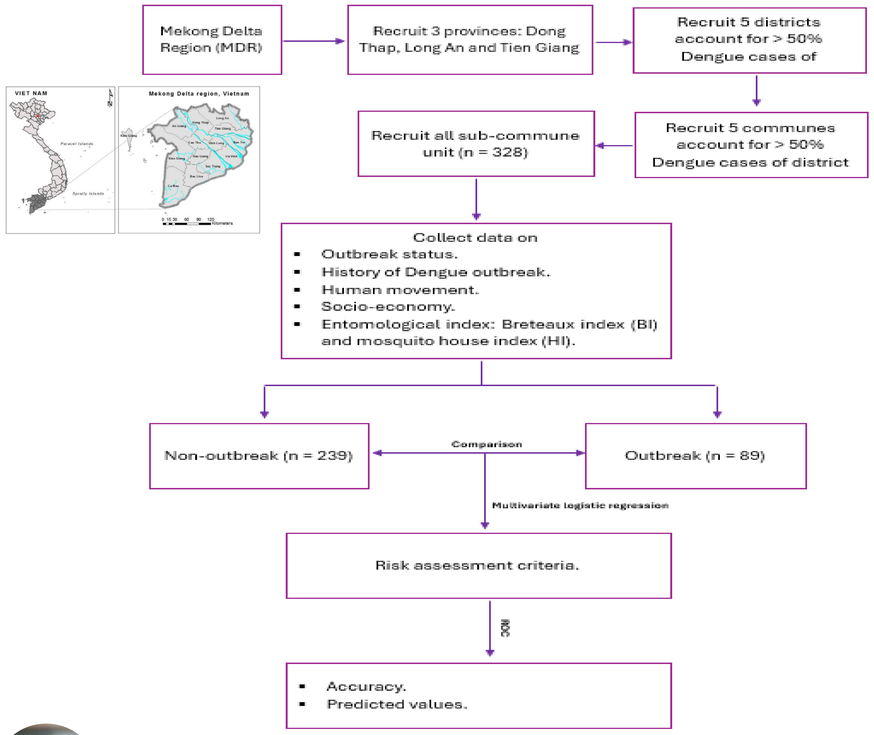
5: Southern Cross University, Australia. 6: National Institute of Hygiene and Epidemiology, Vietnam. 7: Griffith University, Australia. 8: School of Public Health, Yale University, USA.

Rationales

Dengue is posing Public Health concerns globally due to significant burden of health and economic losses. Current intervention measures are late and insufficient. Early warning tools have been developed for proactive prevention but not yet reached sub-commune level leading to the infeasibility and challenging the interventions in the context of resources limitation. Our study aims to determine the associated factors then to develop risk assessment for determining Dengue hotspots for early intervention at the sub-commune level.

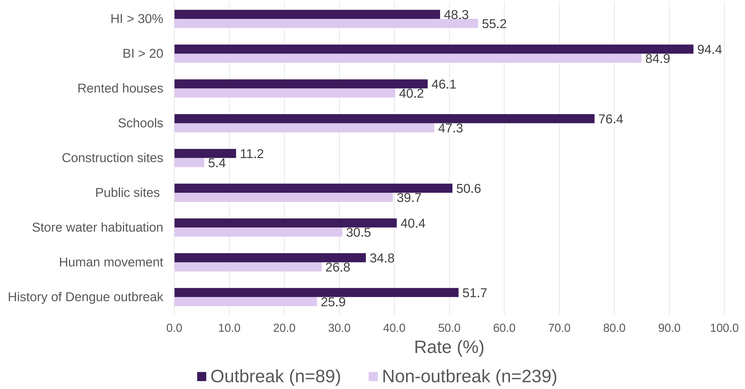
Methods

Cross-sectional study was conducted in Mekong Delta Region, Vietnam in 2024. We recruited 328 sub-commune units for this survey.



Results and discussion

Factors associated dengue outbreak at sub-commune level

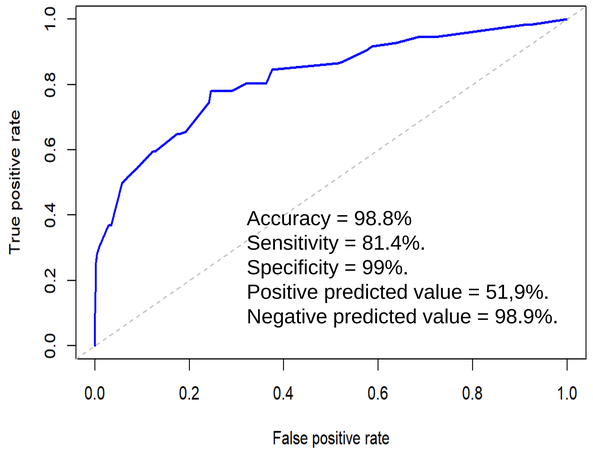


Time-series analysis of factors associated Dengue outbreak at sub-commune level (n=328)

Associated factors	OR	95%CI
History of outbreak	2.6	2 - 3.3
Schools	4	2.9 - 5.7
Public sites	1.4	1.1 - 1.8
BI > 20	5	3.5 - 7.3
Dengue lag 4 weeks	6	4.4 - 8.1

- ❑Distribution of potential risk factors were different significantly between outbreak and non-outbreak sub-commune units.
- ❑Multivariate logistic regression of time-series data depicted that the lag in 4 weeks of Dengue cases, BI > 20, places having schools, having history of dengue outbreak at sub-commune level and having public sites including churches, markets, pagodas, parks associated to Dengue outbreak at sub-commune level.

ROC Curve



- ❑Risk assessment criteria having accuracy of 98.8%.
- ❑Notably, the specificity of 99% and Negative Predicted Value of 98.9% indicated high level of confidence of not having dengue outbreak in places where these criteria wase absent.
- ❑This is crucial in dengue prevention and control as outbreak will not be missed for response at sub-commune level.

Conclusions and recommendations

- ❑Risk assessment criteria to identify dengue outbreak hotspots at sub-commune level was determined with high level of accuracy and predicted values.
- ❑These criteria should be validated in prospective studies and could be incorporated with early warning tools to drive the intervention in finest scale.

kienquoc.do@uq.edu.au
d.phung@uq.edu.au

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

HEAL Global Research Centre

E-DENGUE A user-friendly tool to help control dengue spreads

wellcome