Reviewer's report

Title: Spread pattern of the first dengue epidemics in the City of Salvador, Brazil

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Reviewer: Goro Kuno

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General

Scope of the study
The authors investigated the pattern of dengue spread by means of a spatio-temporal analysis of the georeferenced cases in the city of Salvador, Brazil. The main objective was to identify the spreading characteristics.

Methods and assumptions
Very little is described as to who did clinical diagnosis of those georeferenced patients and how the data were transmitted to the Information Technology Laboratory (ITL) for compilation and analyses. As often is the case, patients from the economically low class are seen by the physicians in the public clinics or hospitals, while more affluent classes are seen by the physicians in private clinics or hospitals. Were both groups of physicians and health care providers in Salvador obligated to report to ITL? If not, the database is already biased and does not demographically represent the study area. If all physicians were indeed obligated, what were the rate of compliance and qualities of clinical diagnosis? How much or frequently was laboratory diagnosis (serologic and virologic tests) performed to confirm the cases?

Three groups of factors regulate dengue transmission in urban areas: human (size of susceptible population, movement into or within the study area, probability of contact with infectious mosquito, and proportion of humans immune) vector (density and movement, and probability of contact with viremic humans), and virus (proportion and absolute number of virus-infected mosquitoes and of humans, and frequency of virus introduction during the study period). Because this report is focused only on human factors, for a purpose of simplicity, variations in other factors are not considered. A few questions are raised with respect to human factors. Is the assumption of homogeneous mixing of people in this city realistic? For example, do people in the western part (epicenter) freely mix with the residents in more affluent eastern parts of the city? By car, through the elevator connecting the two areas, or by something else? In this type of study, the answer must be yes. It is noted that the epicenter (low area) near the Bay is separated from the eastern communities (high area). Is the daily human traffic common between the two contrasting areas? How can the authors assure that once virus is introduced into a study area, during the remainder of the study period (1 year) no more introduction from outside the study area occurs? As shown repeatedly, in many studies in endemic locations, repeated introduction of virus brought by infected (viremic) humans is quite common.

Results
Remarkably, the Arcview data, with an exception of several weeks, consistently identify western part of the city as epicenter throughout the epidemic. This immediately raises a question. Normally, unless an epicenter has a huge size of human population, after an intense transmission, the size of susceptible human population drops to the level below threshold. Then, epicenter shifts to other locations where epidemic transmission can be supported. Why did not this expected shift occur during this 1995 Salvador outbreak? Is the size of population in the epicenter area enormously huge? Or, is the consistent location of epicenter artifactual because such a microfocused analysis tends to miss much greater shift in epicenter that is detected in more macroscopic analysis designed for much larger geographic areas (see the article by Cummings, DA, et al. [2004] Nature 427[6972]: 344)?

The weekly data are presented in 52 figs. The number of figures is too many. Reducing the number figures to only the essentials is recommended.

Interpretation of the utility of GIS
The inadequacy of vector control anywhere in dengue-endemic tropical locations is well recognized. As shown in this report, the time lag between infection and GIS analysis is too long to be useful for preventing further dengue spread. If GIS does not provide data to prevent further spread of dengue, what is the utility o
this approach? In turn, this question affects the objectives of the study. If, nonetheless, there are merits in performing GIS-based monitoring of dengue spread, what are they? For example, is there any predictive capability to identify the unaffected areas that will be hit by dengue next so that the residents in the next areas can be better protected with vector control or other preventive measures?

Vector control
The inadequacy of vector control is described, but why does it take very long (60 days) to complete one cycle of vector control? It would help puzzled readers, if the authors provide briefly the method used by the City in mosquito control.

Discussion
First, the discussion should be better focused on the advantages (or utilities) and problems of current GIS-based monitoring methods for dengue in urban areas, with an emphasis on public health. Second, discussion should be enriched by referencing and discussing the past GIS studies for dengue published earlier. There are more than 25 such articles on dengue worldwide; and yet, none from outside Brazil is cited in the discussion.

Miscellaneous comments

English: Authors must improve the quality of English. For example, in Abstract (Background), the last sentence is missing the main subject and the sentence that follows. The title has “epidemics”, when singular “epidemic” is correct. There are many more areas to correct.

Page numbering: This reviewer is puzzled that there is no page numbering. If that is the style of manuscript preparation for this journal, it is highly unusual.

References: Not all references are alphabetically arranged. Example, Goh, et al., 1995.