UNIVERSITI TEKNOLOGI MARA

SPATIAL STATISTICAL ANALYSIS OF DENGUE CASES IN SHAH ALAM

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ABSTRACT

Dengue fever one of the most dangerous and contagious tropical diseases has become an enormous problem. It has now become a public health concern. One of the ways of controlling the disease is by taking stern action against the disease. Therefore, this research is undertaken to analyse the widespread of dengue by integrating Geographical Information System (GIS) into spatial statistical analysis. The aim of this research is to study the spatial pattern of dengue cases in the Petaling District of Selangor. Using data on dengue cases reported in the locality in 2003 and 2004, current dengue cases are analysed. A new approach is proposed to include monitoring of dengue surveillance, the spatial distribution of the dengue occurrence by using GIS, and examining the spatial pattern of dengue distribution by using spatial statistical analysis. In evaluating and controlling current dengue events, the study utilises on information provided by officials of the health authority by way of personal interviews as well as scrutinising official records on surveillance and prevention activities including work procedures. The descriptive statistics are used for analyzing spatial distribution. Several techniques are used to identify cluster are nearest neighbour analysis, detection cluster analysis, space-time analysis, density and hotspot analysis and space-time outbreak investigation. With better information on disease onset, mosquito breeding sites, clusters of breakout, among others, the authority is able to develop a better and more effective surveillance and control programmes to mitigate the threat of dengue, not only in the study area but in nearby areas. Analysis of geographical distribution of the dengue cases provides quantitative data on victims by gender, age, location and land use. It has provided visual representation of actual cases. The result shows that male residents aged 13 to 24 are more likely to be infected by dengue than the other members in socio-demographic groups. The analysis has identified areas (sections) in Shah Alam that are seriously infected in 2003 and 2004. For 2003 and 2004, the clustered areas are Section 9, Section 24, Section 18, Section 16 and Section 20. Considering the total of population and the number of cases, the clustered areas are Section 18 and Section 17. The space-time analysis reveals that the critical time in dengue outbreak is ten (10) days and it affects those residing in areas within 400-meter radius of the first incidence. This information suggests that fogging work should be performed at least weekly to cover the affected areas. In conclusion, the study recommends that the health authority maintains timely and accurate records of dengue cases, giving particular attention to each patient's travel history during the one weak prior to contracting the disease. It also recommends that GIS be used in surveillance and control works as explained in this study.

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CHAPTER 1

INTRODUCTION

1.1 Background

Dengue is a very complex disease that includes Dengue Fever (DF), Dengue Haemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). It is the most important human viral disease transmitted by an arthropod vector. This disease caused by a virus that was spread by mosquitoes, namely genus *Aedes* which can contributes to illness and death. The spreading of the disease can be caused by many factors, such as uncontrolled urbanisation, migration people to urban area, lacking of cleanliness in environmental area etc (Gubler, 1998).

Looking at the current situation, disease surveillance in many countries such as Bangladesh (Ali et al. 2003), Rajasthan (Bohra & Adrianasolo 2001), Trinidad (Chadee & Kitron 1999) are focused on the monitoring populations with high incidence of disease, detecting outbreaks of diseases with the potential to cause epidemics or measuring the success of eradication programs for endemic diseases which many public health epidemiological tools are only used once an outbreak has been reported (Wiafe & Davenhall 2005).

The virus is now found in over 100 countries worldwide, mostly in tropical areas of Africa, Southeast Asia, South America, the western Pacific, and eastern Mediterranean. It has become a nightmare to everybody as the vaccine of this disease still has not been found yet. Figure 1.1 shows the reported cases dengue fever and dengue haemorrhagic fever to WHO.