

# An early warning surveillance system for predicting hand, foot and mouth disease outbreak in Kelantan

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## ABSTRACT

**Introduction:** Early warning systems play a crucial role as a proactive mechanism to identify and respond to potential disease outbreaks. It enables public health officials to implement preventive measures, allocate resources efficiently and make informed decisions promptly. This study aims to know the effectiveness of using a threshold line with a 5-year moving and static means for early prediction of an outbreak in monitoring HFMD in Kelantan for the years 2022 and 2023. **Materials and Methods:** Descriptive observational method was used to analyse the data of HFMD from the electronic surveillance system (e-Notifikasi) from 1st January 2014 to 11th June 2023 and outbreak reports using Microsoft Excel 365. For the threshold line, data from the past five years, excluding years with exceptionally high case numbers or outbreaks or the minimum values were used. Only years with the number of cases that did not exceed the third quartile were selected. The 5-year static mean threshold line was obtained by calculating the mean over the entire five years duration. The 5-year moving weekly mean was calculated by summing the number of cases for the current week, the two weeks preceding and the two weeks following the current week, for a total of five preceding years. Following the Cullen method, the alert line was established by increasing the mean value by one standard deviation (SD), whereas the epidemic threshold or action line was defined as two SD above the mean. The trend when the cases crossed the epidemic thresholds and the occurrence of an outbreak in which epidemiology week (EW) were observed. **Results:** Until EW23 2023, it was observed that the trend of HFMD cases in Kelantan surpassed the 5-year moving mean epidemic threshold line at EW18. Subsequently, four HFMD outbreaks were recorded in EW19, 20, and 21. Comparatively, the trend of cases only crossed the 5-year static mean epidemic threshold line at EW20. Similar observations were made in the Kota Bharu district HFMD threshold line. In the Bachok district, the trend of cases surpassed the 5-year moving mean epidemic threshold at EW17. While the 5-year static mean epidemic threshold line, it surpassed later at EW19, coinciding with the outbreak. In the Pasir Mas district, the trend of cases crossed the 5-year moving mean epidemic threshold line at EW19. While the 5-year static mean threshold line, the trend of cases also crossed later at EW21. Despite a tenfold increase in the magnitude of HFMD cases in 2022, the utilization of double vertical axes still exhibited a similar pattern in 2023. **Conclusion:** The 5-year moving means threshold line demonstrated superior sensitivity in predicting early outbreaks in Kelantan compared to the static 5-year means approach. These findings have important implications for improving public health surveillance systems, enhancing preparedness and response strategies for HFMD outbreaks in Kelantan, and potentially benefiting other regions facing similar challenges.