

RELATIONSHIP BETWEEN AIR POLLUTION AND DENGUE IN KULAI DISTRICT

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ABSTRACT

INTRODUCTION: The epidemiological triad—Host, Agent, and Environment—provides a framework for understanding the transmission of dengue fever, where human susceptibility, the dengue virus, and environmental factors such as climate and urbanization play crucial roles. In Malaysia, vector control, primarily through fogging, is widely utilized; however, its effectiveness may be diminished by air pollution. OBJECTIVES: This study investigates the relationship between air pollution, as measured by the Air Pollution Index (API), and dengue cases in Kulai, Malaysia, to propose improved vector control strategies during periods of high pollution. METHODOLOGY: A cross-sectional analysis was conducted using secondary data from epidemiological week 1 of 2016 to week 40 of 2023. This study analyzed all confirmed dengue cases in Kulai, along with air pollution data from the Larkin Continuous Air Quality Monitoring Station and meteorological data from the Senai Meteorological Station. A Generalized Additive Model (GAM) with a Poisson distribution was employed to assess the relationship between API and dengue cases. RESULT: Between 2016 and 2023, 3,497 dengue cases were reported in Kulai, with 33.8% occurring during outbreaks. The API ranged from 30 to 180, with a notable spike in mid-2019. The analysis revealed that API accounted for 34.4% of the variance in dengue cases, demonstrating a linear relationship between increased API levels and a rise in dengue cases, even after controlling for rainfall and wind. CONCLUSION: This study emphasizes the necessity of adapting current vector control strategies in response to air pollution. Integrating air quality monitoring and alternative methods, such as larviciding, could enhance the effectiveness of dengue prevention, particularly during high pollution periods.

Keywords: Air pollution; Dengue; Epidemiology, Generalized additive model
