Impact and projection of 1.5^{0}C/2.0^{0}C global warming on selected climate-sensitive infectious diseases in Kelantan

B Mazni[1,3], A Norfazilah[1], H Rozita[1], L Ju Neng[2]

[1]Department of Public Health Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, [2]Department of Earth Sciences and Environment, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, [3]Sepang Health District Office

ABSTRACT

Introduction: Global warming (GW) of 1.5^{0}C/2.0^{0}C is defined as an increase in global average temperature of 1.5^{0}C/2.0^{0}C compared to the pre-industrial period (1850-1900). Malaysia is not exempted from experiencing GW. Previous studies indicate Kelantan is the most vulnerable state to the impact of GW. Variations in meteorological factors due to GW are closely related to incidence of Climate-Sensitive Infectious Disease (CSID) including dengue, malaria and leptospirosis. Studies on CSID's projection of 1.5°C/2.0°C GW according to Representative Concentration Pathway (RCP) scenario were vigorously conducted. However, local studies on this topic were scarce. **Objective:** To assess the impact of GW 1.5^{0}C/2.0^{0}C and to project the incidence of CSID based on RCP8.5("worst case scenario") and RCP4.5("moderate case scenario"). **Materials and Method:** This ecological study involves monthly data: i) CSID cases (dengue, malaria, leptospirosis) (2011-2020), ii) meteorological observation (temperature, rainfall and relative humidity) (2011-2020), and iii) climate model (validation: 2011-2020) and (projection: 2021-2040). Analysis was conducted using Generalized Additive Model to develop the best prediction model and projection of CSID's cases. **Results:** Temperature, relative humidity and rainfall have a non-linear impact on dengue, malaria and leptospirosis. Dengue cases in Kelantan are projected to increase by 242.3% at GW of 2.0°C (RCP8.5). The highest dengue incidence rate projected is 12,186 per 100,000 (2040: 2.0°C/RCP8.5). Malaria cases are projected to increase by 2.8% at GW of 1.5°C (RCP4.5). The highest malaria incidence rate projected is 5.1 per 100,000 (2026 and 2029: 1.5°C/RCP4.5). Leptospirosis cases are projected to increase by 80.9% at GW of 2.0°C (RCP8.5). The highest projected leptospirosis incidence rate is 100.8 per 100,000 (2036: 2.0°C/RCP8.5). **Conclusion:** Number of cases and incidence rates of CSID are projected to increase under specific GW and RCP. These findings can be a reference for agencies involved in formulating policies and preparedness for CSID's control on GW of 1.5°C/2.0°C.