

Title: Numerical Modeling of the Dynamics of Vector –Borne disease transmission due to climate change over highly endemic region of India: A time series Analysis

Abstract

In this study, we have used a numerical mathematic dynamical model, VECTRI, developed by International Centre for Theoretical Physics and based on various climatic and non-climatic parameters simulations to predict the future Vector borne diseases (malaria) dynamics over a Odisha region. Bias-corrected temperature and rainfall simulations from the CCSM4 global climate model are used to compare the metrics of VECTRI model for three future projection periods 2020s, 2050s, and 2080s. We have evaluated four Model outcome parameters: temperature, rainfall, vector density and entomological inoculation rate (EIR) across the model outputs to predict the future malaria transmission over endemic Region at regional levels owing to climate change. The malaria projections are based on CCSM4 under RCP8.5 emission scenario. Our results show an overall decrease in malaria transmission of 20 to 40% (reduction in EIR) with an increase in temperature of 3.5 to 4 °C and rainfall of 20 to 35 % over the Odisha as a whole by the end of the century, particularly during the monsoon season (June-Sept). Furthermore, malaria transmission is likely to reduce in future over most of the odisha regions with the increase in future warm and cold nights. Such kind of statistical models can help public health authorities, given monitoring Malaria spread, learning the climate impacts of outbreaks, and ensuring timelier health services.