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Complexity of Epidemics Models: A Case-Study of Cholera in Tanzania

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Abstract

Timely prediction of Cholera epidemics is essential for preventing and controlling the size of an outbreak. Over the past years, there have been great initiatives in the development of Cholera epidemic models using mathematical techniques, which are believed to be the most powerful tools in developing mechanistic understanding of epidemics. Despite the existence of these initiatives, the timely prediction of Cholera is still a great challenge. Recently, the World Health Organization reported that “the global burdens of waterborne epidemics from environmental factors are expected to increase over-time with an increase of epidemic size.” Due to these challenges, this paper reviewed existing Cholera mathematical models and observe that they have limitations/complexities, especially when working with many variables. The use of how machine learning (ML) can be used to overcome the limitations/complexities, such as lack of effective integration of environmental factors, such as weather are investigated. Hence, the study developed an ML reference model and its development procedures, which can be used to overcome the existing complexities. The results indicate at an average of 87% that the developed measures can integrate a large number of datasets, including environmental factors for the timely prediction of Cholera epidemics in Tanzania.

Keywords;

Cholera epidemics; Machine learning (ML); Environmental factors; Developing country