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# Toward Cholera-Free Nations: Predicting Cholera in near real time using earth observations.

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Climate variability and extreme events (natural or anthropogenic) along with lack of access to clean water and sanitation infrastructure led to the emergence of new pathways for pathogens that have affected human health. In these population vulnerable regions, disease prevalence and infectious pathogen data is sparingly accessible. Unavailability of continuous data hinders the traditional time series approaches. Cholera, a signature water borne disease is transmitted by drinking water contaminated with Vibrio cholerae. Despite significant advances in etiology of pathogenesis, we are still lacking ability to predict when and where an outbreak of cholera infection will occur. Bacteria's emergence and growth is associated with the climatic processes which can be mathematically modeled to determine the infection risk to human population. Here, using satellite derived data on precipitation, temperature, population density and available water and sanitation infrastructure, we will show that the model predicted high risk of cholera, at least four weeks in advance, in Yemen in June 2017. A new real time algorithm using only satellite remote sensing data was developed and implemented in Yemen for year 2018. We will also present a case study on practical applicability of the algorithm.