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Understanding the seasonality of Cholera transmission in South Asia: Role of Hydroclimatology

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Cholera, an acute waterborne illness caused by pathogenic *Vibrio cholerae*, remains a major public health issue in the developing world, mainly in coastal areas around the tropics. Cholera incidence shows significant bi-annual peaks and strong inter-annual variability in the Ganges-Brahmaputra-Meghna basin region of South Asia. The first peak of the year occurs in spring during low water availability and a larger second peak occurs after the region's monsoon season. Preliminary results suggest the role of two distinct sets of drivers behind each seasonal peak. Increasing water temperature and phytoplankton blooms during the spring low flow season increases the concentration of pathogenic *V. Cholerae* in the coastal Bay of Bengal region. Sea water intrusion during this time of the year provides favorable conditions for the first outbreak of cholera. Cholera incidence decreases during peak monsoon precipitation period when most of the region undergoes flooding and open mixing of water networks and reservoirs. The second peak is triggered in late monsoon and has shown strong links with above average floods. A high 3-month lag correlation is observed between JJAS (June, July, August, and September) streamflow and the winter peak of cholera incidence. The role of fecal contamination of open water and flood extent during peak monsoon precipitation is investigated. Cholera epidemics have been historically linked to climate variables and more recently with El Nino-Southern Oscillation; however, the role of hydroclimatology and the regional ocean-atmospheric processes is poorly understood. We will explore the role of these processes to identify predictors that have significant memory on a seasonal or longer time scale.