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Temporal association of major waterborne disease outbreaks and heavy precipitation events

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Background: Long term climate change models predict more frequent heavy precipitations events (PEs). Numerous waterborne disease outbreaks (WBDOs) have been associated with heavy rainfall and runoff. We examine the temporal association between major WBDOs and major PEs in the United States from 1992-2004.

Methods: We constructed a detailed database of WBDOs from CDC MMWR biennial summaries for 1992-2004, and supplemented existing outbreak data with news and public health department reports. In many cases we were able to identify outbreak dates with better temporal resolution than would otherwise be available, allowing for more detailed analyses. We obtained daily weather data from NOAA for the continuously operated major weather station nearest each outbreak. We then linked time series of daily precipitation totals for the years 1973-2007 to the appropriate outbreak data and assessed temporal associations with indicator variables for major PE in 1, 2, or 6 months previous to outbreak initiation.

Results: CDC summarized 309 WBDOs in association with untreated recreational water (n=109, 35.3%) and drinking water (n=200, 64.7%), with 9 and 11 major WMDOs, respectively. Among the 20 major WBDOs, 9 (45%) had a major single day PE during the 30 days prior to the outbreak. 3 (15%) had a single week major PE during the 8 weeks prior, and 4 (20%) had a single month major PE during the 6 months prior.

Conclusion: Previous work has suggested that major PEs precede WBDOs more often than expected, but temporal analysis was limited by the detail of existing public data

sources. Supplementation of existing data to improve this temporal detail will allow for testing of more complex research questions and hypotheses.