National Institute of Environmental Health Sciences

Heavy rainfall events and diarrhea incidence: The role of social and environmental factors

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Year: 2014
Journal: American Journal of Epidemiology. 179 (3): 344-352

Abstract:

The impact of heavy rainfall events on waterborne diarrheal diseases is uncertain. We conducted weekly, active surveillance for diarrhea in 19 villages in Ecuador from February 2004 to April 2007 in order to evaluate whether biophysical and social factors modify vulnerability to heavy rainfall events. A heavy rainfall event was defined as 24-hour rainfall exceeding the 90th percentile value (56 mm) in a given 7-day period within the study period. Mixed-effects Poisson regression was used to test the hypothesis that rainfall in the prior 8 weeks, water and sanitation conditions, and social cohesion modified the relationship between heavy rainfall events and diarrhea incidence. Heavy rainfall events were associated with increased diarrhea incidence following dry periods (incidence rate ratio Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 1.39, 95% confidence interval: 1.03, 1.87) and decreased diarrhea incidence following wet periods (incidence rate ratio Euro Surveillance (Bulletin Europeen Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.74, 95% confidence interval: 0.59, 0.92). Drinking water treatment reduced the deleterious impacts of heavy rainfall events following dry periods. Sanitation, hygiene, and social cohesion did not modify the relationship between heavy rainfall events and diarrhea. Heavy rainfall events appear to affect diarrhea incidence through contamination of drinking water, and they present the greatest health risks following periods of low rainfall. Interventions designed to increase drinking water treatment may reduce climate vulnerability.

Source: http://dx.doi.org/10.1093/aje/kwt279

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Quality, Precipitation

Extreme Weather Event: Flooding

Food/Water Quality: Pathogen

Geographic Feature:

resource focuses on specific type of geography

Freshwater, Rural

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Central/South America

Foodborne/Waterborne Disease: Other Diarrheal Disease

Population of Concern: A focus of content

Population of Concern: ☒

populations at particular risk or vulnerability to climate change impacts

Low Socioeconomic Status

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified