Drinking water systems, hydrology, and childhood gastrointestinal illness in Central and Northern Wisconsin

Author(s): Uejio CK, Yale SH, Malecki K, Borchardt MA, anderson HA, Patz JA
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Abstract:

OBJECTIVES: This study investigated if the type of drinking water source (treated municipal, untreated municipal, and private well water) modifies the effect of hydrology on childhood (aged < 5 years) gastrointestinal illness. METHODS: We conducted a time series study to assess the relationship between hydrologic and weather conditions with childhood gastrointestinal illness from 1991 to 2010. The Central and Northern Wisconsin study area includes households using all 3 types of drinking water systems. Separate time series models were created for each system and half-year period (winter/spring, summer/fall). RESULTS: More precipitation (summer/fall) systematically increased childhood gastrointestinal illness in municipalities accessing untreated water. The relative risk of contracting gastrointestinal illness was 1.4 in weeks with 3 centimeters of precipitation and 2.4 in very wet weeks with 12 centimeters of precipitation. By contrast, gastrointestinal illness in private well and treated municipal areas was not influenced by hydrologic conditions, although warmer winter temperatures slightly increased incidence. CONCLUSIONS: Our study suggests that improved drinking water protection, treatment, and delivery infrastructure may improve public health by specifically identifying municipal water systems lacking water treatment that may transmit waterborne disease.

Resource Description

Cross-cutting Themes: Adaptation, Sociodemographic Vulnerability, Vulnerable Population
Exposure: Precipitation, Water Quality
   Water Quality: Marine or Freshwater pathogen
Geographic Feature: Rural
Geographic Location: United States
Health Impact: Infectious Disease
   Infectious Disease: Waterborne Disease
   Waterborne Disease: General Waterborne Disease
Resource Type: Research Article
Adaptation: Secondary Health Impacts of Adaptation, Vulnerability Assessment, Early Warning System
**Vulnerable Population:** Children, Elderly, Low Socioeconomic Status, Pregnant Women