
## Presenter

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## Investigating the relationship between weather and acute gastrointestinal (AGI) illnesses in North Carolina

Background: Climate change has been predicted to impact and increase the incidence of future water- and food-borne illnesses diseases, including gastrointestinal or diarrheal diseases. However, the relationship between weather/climate and gastrointestinal diseases is complex and can vary by pathogen and geographically. Variation between study and analytical methods in different settings makes between-study estimates more difficult to compare. An improved understanding of the historical relationships and sources of variation between weather and gastrointestinal diseases is critical for better predictions of the likely impacts of climate change.

Methods: This dissertation research uses a daily time series of emergency department (ED) visit data from North Carolina (2008-2015) to investigate the relationship between acute gastrointestinal (AGI) illnesses and antecedent temperature and rainfall. First, we compare multiple temperature and rainfall exposure variable definitions and constructions, including measures of relative and absolute temperature and rainfall and compare AGI incidence following heavy rain events after dry versus wet periods. Second, we use multiple statistical time series models and data mining techniques to compare the sensitivity of estimates to model type and specification. Third, we include sociodemographic, environmental, and geographic covariates, such as poverty, water supply source, and proximity to emergency departments and livestock facilities, to investigate potential effect modifiers and identify vulnerable populations or geographic variation across North Carolina.

Results & Discussion: We investigate three hypotheses. First, that AGI incidence increases with increased temperature for all-cause and bacterial diarrhea, but decreases with viral diarrhea and AGI. Second, that AGI incidence increases after heavy rain events following wet periods compared to dry periods. Third, we hypothesize that populations with increased vulnerability to AGI incidence are those with lower socioeconomic status, private well users compared to those with municipal water supply connections,

and populations living closer to concentrated animal feeding operations (CAFOs). We discuss the relative risk estimates for temperature-AGI and rainfall-AGI in North Carolina and the sensitivity of these estimates to weather exposure definitions, model type and specification, and sociodemographic and environmental factors.