NIEHS Summer Internship Program 2021
Poster Session Abstracts

Title: **Effects of Flood Risk and Climate Change on Census Tract-Level Health Outcomes**

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Background: Floods have been linked to various health outcomes such as mental disorders and chronic diseases. This is likely due to psychosocial and posttraumatic stress caused by natural disasters and inadequate responses to them. We estimate the effect of the flood risk at a given census tract on the prevalence of coronary heart disease (CHD) among adults. We also estimate the effects of several social vulnerability indices (SVIs), air pollution, and prevalence of smoking among adults on this health outcome. We focus on census tracts of states in the Southeastern United States, consisting of North Carolina, South Carolina, Tennessee, Georgia, Alabama, Mississippi, and Florida.

Methods: We fit a Bayesian hierarchical model where the CHD prevalence at a census tract is a function of several flood risk measures, SVIs, air pollution concentrations, and smoking prevalence in the tract. To account for the spatial correlation among census tracts, we use a latent Gaussian conditional autoregressive (CAR) model. Data included 21 flood risk measures provided by the First Street Foundation, 6 air pollution concentrations from a land use regression model made by the Center for Air, Climate and Energy Solutions, and CHD and smoking prevalence as well as 16 SVIs provided by the Centers for Disease Control and Prevention.

Results: If a covariate's 95% credible interval did not contain zero, we determined it to be significant. We used the posterior median to estimate the coefficients for the covariates. The only significant flood risk measure was the percent of properties with any risk of flooding in 2050 (climate-adjusted future); a 10% increase of this measure is associated with a -5.6% change in CHD prevalence (95% credible interval [CI]: -11, -0.60). All but one of the SVIs were found to be significant; for instance, a ten-unit increase in the poverty index is associated with a 0.35% change in CHD prevalence (CI: 0.32, 0.38) and a ten-unit increase in the uninsured population index is associated with a 0.13% change in CHD prevalence (CI: 0.095, 0.17). All but one of the air pollution concentrations were found to be significant; for instance, a 10 microgram per cubic meter increase for PM2.5 is associated with a 4.3% increase in CHD prevalence (CI: 3.5, 5). A 10% increase in smoking prevalence is associated with a 1.1% increase in CHD prevalence (0.97, 1.2).

Conclusions: We were not able to detect a harmful effect of flooding on cardiovascular health. This is likely because other covariates in the model already explain most of the variability in CHD prevalence. However, we were able to verify that many of the SVIs and air pollutants are associated with a net increase in CHD prevalence.

Last year's academic level of presenting author: Graduate Student