**UNM INSPIRES-CEC GIS Tutorial**

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**Title:** Introduction to Spatial Regression Methods and Geographic Information Systems Tools in Environmental Health

**Location:** Department of Communication and Journalism, Bld 115, PC Lab Rm. 134 **Time:** September 17th from 4 pm – 6 pm **ABSTRACT**

**Background:** Geographic Information Systems (GIS) provide versatile tools for uncovering spatial patterns of public health and environmental justice (EJ) at multiple scales within the exposome. There are numerous open-source GIS platforms that allow for cost-effective and equitable integration of GIS tools into data analysis workflows such as R, an open-source language for statistical computing and data visualization platform. With open-source GIS, public health and EJ researchers can effectively collaborate and easily share reproducible methodologies and findings, helping to foster more inclusive and innovative approaches to cross-cutting health challenges to address public health and EJ.

**Objectives:** In this workshop, you will be introduced to open-source GIS using R, as well as techniques for leveraging GIS tools and spatial data to advance public health research related to the plural environmental health effects of climate change in communities with environmental injustices. By participating in this workshop, you will learn the fundamentals of GIS data-structures, loading and visualizing spatial data, and spatial relationships in regression analyses using R.

**Content:** This is a guided workshop in which participants will follow along in setting up and performing spatial-statistical analysis in R. The workshop will begin with a brief introduction and discussion on geographic concepts and GIS, with a focus on spatial data types, and an overview of GIS applications in public health and EJ. The introduction is followed by a guided tutorial comparing non-spatial and spatial multivariate models using provided data to explore associations between potential environmental exposures from the Toxic Release Inventory (TRI), sociodemographic covariates from the Social Vulnerability Index (SVI), and low birthweight averages aggregated to the census tract statistical subdivision. We will also cover tests for spatial autocorrelation such as Moran’s I and basic cartographic visualization.   
  
An R Markdown file and sample data will be provided to participants on lab computers. For participants using their personal computer, all workshop materials will be provided in a GitHub repository. Participants will be given detailed instructions on installing R, R Studio, and some R libraries for use on their personal computer, if desired. No previous GIS or coding experience is required.

**NOTE**: The PC Lab will have all materials downloaded for the workshop. But if you want to work on your personal computer, please download and install all materials before the workshop. Below are the links for all documentation:

GitHub Repository: <https://github.com/Theodros-Woldeyohannes/INSPIRES-SpatialReg-workshop>

R Markdown File: <https://theodros-woldeyohannes.github.io/SpatialReg_Workshop.html>

R and R-Studio: <https://posit.co/download/rstudio-desktop/>

Note: If using your own computer and you already have an R environment set up, ensure that **R is updated to at least 4.4.1.** We also recommend using a clean R environment as pre-installed packages could cause conflicts.