



# Bayesian Spatial Multilevel Modeling of Demographic and Health Surveys Data

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**Day/Time:** Friday, Nov 4<sup>th</sup>: 2-3pm ET

**Location:** PSTC Seminar Room 205, Mencoff Hall



**Abstract:** The Demographic and Health Surveys (DHS) Program has been collecting and disseminating valuable demographic and health information for over 90 countries for decades. These data have been augmented with spatial information in recent years. There has been a growing interest in the use of the spatial information of DHS to investigate how population and health outcomes are affected by environmental or geographical factors. However, most papers are limited in their spatial analysis capabilities due to the inherent hierarchy (membership) of the data and the absence of geo-coordinates at the household level. To this end, this study aims to fit a set of multi-level spatially explicit models to take into account the inherent data hierarchical structure and spatial autocorrelation in DHS data. We find evidence that a multi-level spatial model with differing urban-rural within-cluster variances achieves the best performance. The residual diagnostics of clusters also indicate that modeling spatial autocorrelation at the cluster level and recognition of differing urban-rural within-cluster variances can alleviate the presence of spatial residuals. We, therefore, advocate for a multi-level framework that simultaneously considers samples' membership, spatial autocorrelation, and differing urban/rural within-cluster variances. Such a framework provides a better model fitting, yields less biased estimates, and provides valuable insights into the understanding of demographic and health outcomes.

**Bio:** Guixing Wei is a senior GIS Developer and Spatial Scientist at Spatial Structures in the Social Sciences (S4) of Brown University. He holds a Ph.D. degree from Texas State University, where he was honored as an outstanding doctoral student in the College of Liberal Arts. Dr. Wei graduated in 2018 and has broad expertise in the field of GIS and spatial statistics. Wei's research interests include human mobility analysis, health geography, and spatial epidemiology. He has published research papers in Computers, Environment and Urban Systems, Annals of GIS, and other conference proceedings. Wei's most recent collaborative work, "Mobility Analysis for Pandemic Prevention Strategies (MAPPS)," has been funded by NSF.

