

A hierarchical spatial model for small area estimation of survey-based ordinal variables

Miguel Ángel Beltrán Sánchez¹, Miguel Ángel Martínez Beneito², Ana Corberán Valler³

¹angel.beltran@uv.es, ²miguel.a.martinez@uv.es, ³ana.corberan@uv.es
Departamento de Estadística e Investigación Operativa, Universitat de València

Geographical studies in small areas are an excellent epidemiological tool. Most studies aim to monitor health problems from specific events, such as death counts or disease incidence. Usually, these studies are based on the analysis of information from disease registries or health databases. However, the use of alternative data sources, such as Health Surveys which are periodically collected, allows exploring other health indicators such as mental health, limitations, social support, health habits... These features are usually coded as ordinal variables and their analysis is an important topic in Public Health. Nevertheless, the complex sampling design of many surveys, specifically Health Surveys, makes it impossible to directly apply commonly used models in disease mapping. Hence, it is fundamental to adapt these models for the analysis of survey data, which are usually ordinal.

The methodology proposed here is based on Bayesian hierarchical models, where a categorical likelihood is used at the first level of the hierarchy to describe ordinal data. We apply these models to the analysis of the Health Survey of the Valencian Community in 2016 (HSVC2016) to describe the geographical distribution of different health indicators of interest in this region. Specifically, this work presents and interprets the maps for the main health habits. Through the proposal and mapping of synthetic measures for each question of the survey, the data can be easily summarized and exploited to a greater extent. These results can be used by health agencies to make better decisions or intervene specifically in those areas of the region with lower health levels.

Keywords: Disease mapping; survey analysis; ordinal data analysis.