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CONTROL ID: 3388271
PRESENTER: Tomas Goicoa
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TITLE:
Assessing the association between socio-demographic covariates and dowry deaths in Uttar Pradesh
ABSTRACT BODY:
Abstract Body: One of the main objectives of spatial and spatio-temporal disease mapping has been to discover spatial patterns of certain diseases, and their evolution in time, with the final goal of identifying potential risk factors that may be related with the disease. If such risk factors are known and measured, they can be included in the model in what is known as ecological regression. The inclusion of such covariates allows quantifying their relationship with the response of interest, conferring an inferential perspective on spatio-temporal areal models.

Assessing associations between a response and a set of covariates in spatial and spatio-temporal areal models is crucial in some fields, such as crimes against women, where the complexity of the problem makes it difficult to establish associations between certain forms of crime and economic or socio-demographic covariates, which in turn could help to understand the problem and protect women. However, the estimation of fixed effects becomes a challenge in spatial areal models in the presence of spatially correlated random effects due to confounding effects. In brief, spatial confounding can be defined as the impossibility to dissociate covariate effects from spatial random effects, and though potentially very harmful, they have been often ignored in practice leading to wrong conclusions about the underlying associations between the response and the covariates.

In spatio-temporal areal models, the problem may be accentuated as fixed effects may be also confounded with the temporal random effects. In this work, we propose two procedures to deal with both model identifiability and spatial or spatio-temporal confounding. On one hand we consider restricted spatial regression and its application to a spatio-temporal setting, and on the other hand, we propose the use of constraints to deal with both, identifiability and confounding. Both methods solve the confounding issue, but they may lead to notably different fits. In this work, we unravel why this happens. The methods are adopted to assess the association between dowry deaths and some covariates such as sex ratio, population density, female literacy rate, per capita income, murder rate, and burglary rate in the districts of Uttar Pradesh, India, in the period 2001-2014.
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CONTROL ID: 3389183

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TITLE: Mitigating Unobserved Spatial Confounding when Estimating the Effect of Supermarket Access on Cardiovascular Disease Deaths

ABSTRACT BODY:

Abstract Body: Confounding by unmeasured spatial variables has received some attention in the spatial statistics and causal inference literatures, but concepts and approaches have remained largely separated. We aim to bridge these distinct strands of statistics by considering unmeasured spatial confounding within a formal causal inference framework, and estimating effects using modifications of outcome regression tools popular within the spatial literature. This approach is motivated by and used to estimate the county-level effect of the proportion of households with limited access to supermarkets on the rate of cardiovascular disease deaths in the United States. First, we show that using spatially correlated random effects in the outcome model, an approach common among spatial statisticians, does not mitigate bias due to spatial confounding. Motivated by the bias term of commonly-used estimators, we propose an affine estimator which addresses this deficiency. We discuss how unbiased estimation of causal parameters in the presence of unmeasured spatial confounding can only be achieved under an untestable set of assumptions which will often be application-specific, and provide one set of assumptions that is sufficient for identification of the causal effect based on the observed data. These assumptions describe how the exposure and outcome of interest relate to the unmeasured variables.

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TITLE: Projection-based approach to alleviating Spatial Confounding in Spatial Frailty models

ABSTRACT BODY:

Abstract Body: Spatial Confounding is the name given to the confounding between fixed and random effects in Generalized Linear Mixed Models. It has been widely studied and it gained attention in the past years in spatial literature, as it may generate unexpected results in modeling. The projection-based approach (also known as restricted models) appears like a good way to work around the Spatial Confounding in such kind of models. However, when the support of fixed effects is different from the spatial effect one, this approach can no longer be applied directly. Spatial Frailty models are able to incorporate spatially structured effects and it is common to observe more than one sample unit per area which means that the support of fixed and spatial effects differs. In this work, we introduce a projection-based approach for Spatial Frailty models where the support of fixed and spatial effects (areal data) do not match. To provide a fast inference for the parameters we used the Integrated Nested Laplace Approximation (INLA) methodology. The Restricted Spatial Frailty model is applied to modeling cases of Lung and Bronchus cancer in California state and the results prove the methodology efficiency.

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