

Incorporating statistical design in multivariate ecological regression studies: A real case study

Martinez Beneito, M A^{1,3}, Marí-Dell'Olmo, M^{2,3}

¹martinez_mig@gva.es, Foundation for the promotion of Health and Biomedical Research in the Valencian Region (FISABIO).

²mmari@aspb.cat, Public Health Agency of Barcelona.

³ CIBER of Epidemiology and Public Health.

Traditionally, disease mapping studies have had a descriptive aim. Health data are smoothed in order to obtain a reliable geographical depiction of the underlying risk which is responsible of the observed pattern(s). In the case that the geographical pattern found suggested a link between a risk factor and the disease, a confirmatory ecological regression study would be convenient to make inference on this hypothetical relationship. That ecological regression would have a more inferential aim, trying to evidence the relationship between the risk factor and the disease.

Multivariate disease mapping allows taking advantage of the dependence in the geographical distribution of several diseases. Thus, the information on one disease could be used by the rest of diseases in order to yield improved risk estimates. Recently, Marí Dell'Olmo and Martinez-Beneito (2014) have proposed a model making ecological regression possible in multivariate studies. This proposal allows incorporating one covariate into multivariate studies and determining its effect on some combinations of particular interest of the geographical patterns under study.

In this work, we show how to use the mentioned proposal for performing multivariate ecological regression studies with a given design on the geographical patterns considered. For example, if those patterns corresponded to the different combinations of 2 diseases for both sexes, we may want to determine the geographical differences linked to disease and sex, instead of depicting the pattern of every one of those 4 patterns. Moreover, we could also want to include a covariate on that analysis. This work explains how to perform this task and illustrates it in a real case study.

REFERENCES:

Marí Dell'Olmo, M. Martinez-Beneito, MA. (2014). A smoothed ANOVA model for multivariate ecological regression. *Stoch Env Res and Risk A*, 28, 695-706.

Keywords: Spatial statistics, Ecological regression, Epidemiology.