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Bayesian hierarchical models for road acidents in small-area

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Abstract.
Several factors which affect road safety have a spatial dimension. Therefore roadway accidents have been studied in different spatial units from point events to area levels, such as road sections, zip code or county level. The availability of transportation and socioeconomic data in county level is an important advantage for the use of county level models. However these spatial units presents scarse data, with low, even zero, counts of events in many areas. Consequently, classical modelling techniques produce estimates with higher variance and therefore, unreliable standard errors. Spatial modeling techniques recently developed have enabled to accommodate these non-standard characteristics. [1],[3], [7]

Recent studies show that Bayesian hierarchical models with spatial effects have advantages over traditional methods to investigate important issues related to estimation, unmeasured confounding variables, and spatial dependence, particularly for small areas. Still others show that Bayesian hierarchical models, which are being vigorously researched for use in disease mapping, can also be used to build model-based risk maps for road accidents in a area level. [5], [6], [8], [10].
Bayesian hierarchical models, particularly those based on generalized Poisson models with random spatial effects, are indicated as able to capture the variability of estimates in the areas of small population, while revealing trends and spatial patterns as they allow to incorporate the spatial dependence through priori information thus producing more stable estimates. [4], [9] .
In this work Bayesian hierarchical models with spatial effects are applied to road accident data at a county level, in Portugal from 2000 to 2007.

Keywords. *Bayesian models; Small Area Estimation; Road Safety.*

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