

Monitoring intimate partner violence against women with spatio-temporal hierarchical structures

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Intimate partner violence against women (IPVAW) is the most common form of violence experienced by women, with a global prevalence estimated between 22% and 30%. In Spain, according to the latest national survey on IPVAW conducted in 2019, 14.2% of all women aged 16 or older have suffered physical and/or sexual IPVAW at some point in their lives. Despite the wide range of measures that have been taken at the international and national levels to reduce the high prevalence of IPVAW, progress in the reduction of IPVAW is still slow and insufficient. Therefore, new approaches and more advanced tools are needed for more effective responses to reduce the prevalence of IPVAW in our society. We propose the development and implementation of an advanced epidemiological monitoring system for the surveillance and risk prediction of IPVAW in Spain.

The analytical framework underpinning the proposed epidemiological monitoring system for the surveillance and risk prediction of IPVAW is based on the application of Bayesian spatio-temporal models to analyze geographic patterns and temporal trends of risk in small area ecological studies. A software package based on such an analytical framework and using geocoded national-level data on reported IPVAW cases would allow the continuous analysis and visualization of the relative risk of IPVAW and its evolution over time in Spain, taking into account as a minimum unit of analysis all the census block groups in which the country is divided (36,382), as well as their aggregation into broader geographical units (municipalities, regions and autonomous communities). This tool would also make it possible to analyze the relationship between IPVAW risks and the socio-demographic characteristics of the geographical areas analyzed (e.g., urban vs. rural, demographic indicators, socioeconomic indicators) as well as the prediction of future risks at different geographical levels of analysis, and in different time frames (e.g., monthly, quarterly, annual).

A Bayesian spatio-temporal autoregressive model to account for the spatial and temporal dependence of IPVAW risks, allows to deal with issues such as spatial and temporal autocorrelation, overdispersion, or small counts. The impact of various real and simulated social intervention scenarios can be assessed through the application of the monitoring system, by establishing the temporal, geographic and demographic scope affected. Spatio-temporal analysis provides short-term predictions for the next time periods. The usefulness of these predictions is linked to the accuracy of the predictions and the magnitude of their uncertainty, which in turn will depend on the geographical and temporal scale used.

Keywords: Spatio-temporal models, Bayesian inference, IPVAW, Short-term prediction.