

Statistical study: Geographical inequalities responsible for 16 causes of death in Spain

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Miguel A. Martínez. Credit: University of Valencia

Miguel Ángel Martínez, professor at the Faculty of Mathematics of the

University of Valencia (UV) is the coordinator of MEDEA3, a statistical study on the geographical distribution of mortality from 16 causes in 26 Spanish cities of 11 autonomous communities. The initiative, which has resulted in an interactive atlas of mortality and that 13 research groups from 36 institutions have taken part, concludes that a single geographic pattern dominates the pattern of all diseases or causes of death.

The MEDEA3 project has been financed by the Carlos III Health Institute and has recently concluded its third edition. The 26 cities comprise nine of the 10 main cities in Spain by population and among them are Alicante, Castellón de la Plana and València. The 16 causes of [mortality](#) included are the most important causes of death by absolute number and others of less absolute impact, but of important social interest such as AIDS, traffic accidents or suicides. The project also proposes studying the association of the geographical distribution of each [disease](#)'s risk with socioeconomic and environmental factors.

In the case of València, to give an example of the data included, the highest mortality from AIDS occurs in the eastern area, as well as the center in the case of men. For women, regarding stomach cancer, the probability of dying from it is higher in the north of the [city](#) and also in the east, while in men it predominates with greater intensity in the east.

"Given the number of cities and causes of mortality considered, the amount of results generated by the project is enormous. As the main result of the project, it should be noted that, in general terms, it has been possible to find a unique geographical pattern for each city, with a very strong force compared to other factors, which is reproduced to a greater or lesser extent for almost all causes of mortality studied," says Miguel A. Martínez, researcher at the Department of Statistics and Operations Research.

"This result contrasts with the initial objective of the project, and

previous phases of it, such as the National Atlas of Mortality in Spain, in which it was proposed to find the geographical pattern of each disease. What has been found is that there seems to be a single geographic pattern that dominates, with more or less force, the geographic pattern of all diseases, which simply show small variations with respect to that pattern," indicates Martínez, also responsible for the Bayensians research group of the FISABIO Foundation, with which the UV Vabar research group maintains a joint research unit for the development of statistical methods on the study of health data.

Among the conclusions, it has also been found that this pattern is strongly related to social factors and presents very different mortality values according to the social typology of each section. Thus, there is an evident excess of risk for a good part of the causes of mortality studied in the most socioeconomically depressed census sections of all the cities considered.

In addition, it has been possible to determine which causes would be the most representative of the excess mortality that these areas present. In men, respiratory diseases (lung cancer and chronic obstructive pulmonary disease) and cirrhosis are the ones that show a greater excess of deaths in those areas. In the case of women, the diseases with the greatest presence in the areas that have shown a greater risk have been those of the circulatory system (ischemic disease and cerebrovascular accidents) as well as dementias.

Project

The study units used throughout the project have been the census sections of each of the cities considered. Each census section houses between one thousand and two thousand people, so its size is very small for statistical purposes. This problem has represented the main methodological challenge of the study from a mathematical point of

view, since for the data analysis it has been necessary to use estimation models in small areas that consider not only the relationship/similarity between risks of nearby census sections, but also the relationship that could exist between different causes of death.

This way, despite the small size of the census sections, it is possible to obtain the geographic pattern of the risk of each of the diseases considered in the [project](#). MEDEA3 has been a pioneer in the use of this type of methodology that integrates the simultaneous study of 16 causes of death in the same model.

Provided by Asociacion RUVID

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