

Assessing Spatial Associations of Mortality Patterns in Municipalities of the Czech Republic

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Abstract : Regional differences in mortality in the Czech Republic (CR) may be moderate from a broader European perspective, but important discrepancies in life expectancy can be found between smaller territorial units. In this study territorial units are based on Administrative Districts of Municipalities with Extended Powers (MEP). This definition came into force January 1, 2003. There are 205 units and the city of Prague. MEP represents the smallest unit for which mortality patterns based on life tables can be investigated and the Czech Statistical Office has been calculating such life tables (every five-years) since 2004. MEP life tables from 2009-2013 for males and females allowed the investigation of three main life cycles with the use of temporary life expectancies between the exact ages of 0 and 35; 35 and 65; and the life expectancy at exact age 65. The results showed regional survival inequalities primarily in adult and older ages. Consequently, only mortality indicators for adult and elderly population were related to census 2011 unlinked data for the same age groups. The most relevant socio-economic factors taken from the census are: having a partner, educational level and unemployment rate. The unemployment rate was measured for adults aged 35-64 completed years. Exploratory spatial data analysis methods were used to detect regional patterns in spatially contiguous units of MEP. The presence of spatial non-stationarity (spatial autocorrelation) of mortality levels for male and female adults (35-64), and elderly males and females (65+) was tested using global Moran's I. Spatial autocorrelation of mortality patterns was mapped using local Moran's I with the intention to depict clusters of low or high mortality and spatial outliers for two age groups (35-64 and 65+). The highest Moran's I was observed for male temporary life expectancy between exact ages 35 and 65 (0.52) and the lowest was among women with life expectancy of 65 (0.26). Generally, men showed stronger spatial autocorrelation compared to women. The relationship between mortality indicators such as life expectancies and socio-economic factors like the percentage of males/females having a partner; percentage of males/females with at least higher secondary education; and percentage of unemployed males/females from economically active population aged 35-64 years, was evaluated using multiple regression (OLS). The results were then compared to outputs from geographically weighted regression (GWR). In the Czech Republic, there are two broader territories North-West Bohemia (NWB) and North Moravia (NM), in which excess mortality is well established. Results of the t-test of spatial regression showed that for males aged 30-64 the association between mortality and unemployment (when adjusted for education and partnership) was stronger in NM compared to NWB, while educational level impacted the length of survival more in NWB. Geographic variation and relationships in mortality of the CR MEP will also be tested using the spatial Durbin approach. The calculations were conducted by means of ArcGIS 10.6 and SAS 9.4.

Keywords : Czech Republic, mortality, municipality, socio-economic factors, spatial analysis

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