TITLE: Territorial Socioeconomic Indicators and Mortality in Italian Municipalities: A Panel Data Analysis for Monitoring Territorial Inequalities

ABSTRATCT

**Background**: Reducing territorial disparities in health is a crucial yet unresolved public health concern in several countries. Italy has important territorial variations in mortality rates, which could be partly explained by the different distribution of socio-economic indicators in the country. This study aims to assess the relationship between territorial socio-economic indicators and total mortality in Italian municipalities.

**Methods**: The study relies on panel data including daily mortality counts disaggregated by sex, age and municipality of residence, along with data on the resident population in Italian municipalities for the period 2011-2022. Two socio-economic indicators were used in the analysis, namely the average income and the percentage of residents with a low level of education, defined by an educational qualification below a high school diploma. The municipalities were divided into groups according to the deciles of the socio-economic indicators. To measure inequality in both relative and absolute terms, we estimated two regression-based indices: the relative index of inequality (RII) and the slope index of inequality (SII), using generalized estimating equations.

**Results**: In 2011, the RII related to educational inequality was 1.13 (95% CI [1.11;1.13]) in men and 1.07 (95% CI [1.05;1.09]) in women, while the RII linked to income inequalities is 1.18 (95% CI [1.16;1.20]) in men and 1.16 (95% CI [1.14;1.18]) in women.   
During the same year, the education-related SII (deaths per 100,000 person-years) was 47.91 in men and 16.65 in women, whereas the income-related SII was 45.83 in men and 19.91 in women. Educational inequality increased in relative terms (annual percentage changes in the RII: 0.97% among men and 1.24% among women), while decreased in absolute terms (annual changes in the SII: 2.46 deaths per 100,000 person-years among men and 1 death per 100,000 person-years among women). Similarly, income inequality increased in relative term and decreased in absolute terms (annual changes in the SII: 2 deaths per 100,000 person-years among men and 1 death per 100,000 person-years among women).

**Conclusions**: Area-level socio-economic indicators are important determinants of spatial differences in mortality in Italian municipalities. This study indicates that despite a noticeable reduction in absolute socioeconomic disparities in mortality, in relative terms, mortality rates remain higher in areas where individuals have lower income and education levels.