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The main causes of death contributing to absolute and relative socio-economic inequality in Italy



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ABSTRACT

Objectives: Monitoring socio-economic inequality has become a priority for many governments, especially after the socio-economic changes that followed the 2008 financial crisis. This study aimed at detecting the causes of death with the largest socio-economic inequality in relative and absolute terms in Italy.

Study design: This is a historical cohort study.

Methods: We used two regression-based measures of socio-economic inequality, the relative index of inequality (RII) and the slope index of inequality (SII), to rank the causes of death with the highest relative and absolute socio-economic inequality. We obtained these measures on a large census-based cohort study with more than 35 million individuals and 452,273 deaths registered in the period 2012–2014.

Results: The causes with the highest relative socio-economic inequality were the following: laryngeal cancer (RII: 6.1, 95% confidence interval [CI]: 4.8–7.78), AIDS/HIV (RII: 4.8, 95% CI: 3.1–7.4), chronic liver disease (RII: 4.8, 95% CI: 3.2–7.3), and chronic lower respiratory diseases (RII: 4.8, 95% CI: 3.5–6.5) in men, and diabetes (RII: 6.2, 95% CI: 4.8–7.9), AIDS/HIV (RII: 4.5, 95% CI: 2.7–7.7), genitourinary system (RII: 3.8, 95% CI: 2.6–5.4) and chronic liver diseases (RII: 3.6, 95% CI: 2.9–4.5) in women. In absolute terms, lung cancer and ischemic heart diseases contributed more to the overall socio-economic inequality in men, whereas diabetes and ischemic heart diseases accounted for most of the socio-economic inequality in women.

Conclusions: Our findings call for effective policies to reduce the disparities in mortality from ischemic heart diseases, lung cancer, and diabetes taking into account the sex-specific pattern of inequality.

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Introduction

Socio-economic inequality in mortality has been observed in many European countries, with generally greater inequality in North and East Europe compared with southern European countries.^{1,2} In Italy, less educated people have higher mortality³ and lower life expectancy⁴ compared with university graduates, with a gap of 5.2 years among men and 2.7 among women.

In absolute terms, socio-economic inequality in all-cause mortality has decreased in Europe, mainly due to the remarkable reduction in mortality from cardiovascular diseases.^{5,6} However, the decreasing trend has been proportionally higher among people in the highest socio-economic status, resulting in a considerable widening in relative inequality in many countries.^{5,6}

Concerns have been raised that the 2008 financial crisis could have increased disparities in health outcomes among socio-economic groups in Europe.⁷ In five Western European countries most severely hit by the crisis (Ireland, Spain, Portugal, Greece, and Cyprus), trends in self-reported health outcomes have been less favorable after 2008 compared with the 2002–2008 period.⁸ However, mortality has sharply declined from 1980 to 2014 in most European countries, both in highly and in less educated individuals, and this trend was not arrested by the financial crisis.⁸ In Italy, a survey based on a representative sample of the resident population reported a worsening of mental health status in 2013 compared with 2005.⁹ These findings suggest that the financial crisis could have long-term effects on health status that may be more deleterious among vulnerable groups of the population and in countries that has not fully recovered from the financial crisis. Thus, monitoring socio-economic inequality has become a priority for most governments that need reliable data to detect potential areas of intervention.

Some researchers have developed a series of measures to quantify socio-economic inequality in health outcomes in absolute and relative terms. Among these measures, the relative index of inequality (RII) and the slope index of inequality (SII) are those more suitable to make comparisons within the same population or between countries showing different distributions of the socio-economic variables.¹⁰ They summarize the socio-economic inequality for a given health outcome in a unique measure. The RII was previously used to compare the magnitude of inequality in mortality across 22 European cohorts including the Italian cohort of residents in the city of Turin.¹ The RII and the SII were used in another study based on the same cohort to assess long-term trends (1971–2011) in relative and absolute educational inequalities in mortality in the city of Turin.⁶

Our study aimed to identify the causes of death contributing the most to socio-economic inequality in Italy in absolute and relative terms by using a large cohort of more than 35 million Italians.

Methods

We carried out a historical cohort study by linking the archives of mortality for the period 2012–2014 to the 2011

census in Italy. From the census, we retrieved the level of education, while from the archive of mortality, we obtained the date of death and the cause, coded according to the International Classification of Diseases, 10th Revision. Further details about this study can be found elsewhere.^{3,11} All people aged between 30 and 74 years on 1 January 2012 were considered in this study. Younger subjects were not included because they may have not completed their educational course, while older subjects were excluded because education is not a good proxy of socio-economic status at older ages.

This study is part of an extensive project of the Italian National Institute of Statistics. The project is included in the National Statistical Program, which was approved by the Italian Data Protection Authority.

We computed age-standardized mortality rates (ASMRs) by causes of death using the 2013 European standard population as standard.¹²

We used the level of education as a proxy of the socio-economic status, considering four levels: no education or primary school, middle school, high school, and university.

The computation of the RII and the SII requires the calculation of the socio-economic rank, namely the proportion of the population with a higher level of education, as a measure of exposure to adverse socio-economic position. The median socio-economic rank was included in Poisson regression models instead of the original socio-economic variable to obtain the RII and the SII. We estimated the RII by fitting a multiplicative Poisson regression model with log-link function. The model included 5-year age categories and the median socio-economic rank as predictors and the person-years as offset variable. The RII was derived by exponentiating the parameter of the median socio-economic rank. We estimated the SII by fitting an additive Poisson regression model with identity-link function.¹³ We computed the overdispersion parameter from the Chi-squared statistic and, in case of values greater than unity, the standard error was inflated by the square root of the overdispersion parameter. Given the exponential relationship between age and mortality, we adjusted the estimate of the SII for age obtaining an age-standardized SII as described in Moreno-Betancur et al.¹³ For this computation, we derived the weights from the 2013 European standard population.¹²

The RII and SII were calculated separately for men and women and for each group of causes of death. We selected the groups of causes among those reported in the European Shortlist for Causes of Death, a tool giving a categorization of the most relevant causes of death for the European Union. It covers 65 causes of death selected on the basis of relevance with respect to the European Union mortality patterns and to national and subnational health programmes. Viral hepatitis and other chronic liver diseases were pooled in the analysis because most of the death coded as chronic liver diseases is attributable to viral hepatitis.

The RII expresses socio-economic inequality in relative terms, i.e. the ratio between the mortality rate of people in the lowest level of the socio-economic hierarchical scale divided by that of people in the highest one. An RII equal to 1 indicates that there is no inequality, whereas RII >1 indicates a higher mortality among people in the lowest socio-economic level, and an RII <1 indicates a higher mortality among those in the

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