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Short abstract 200-words

Analysing the Contribution of Causes of Death to Sex Differences in Life Expectancy at Birth in 20th-Century Italy and Greece

Michail Raftakis, *University of Bologna*
Gabriele Ruiu, *Università degli Studi di Sassari*
Lucia Pozzi, *Università degli Studi di Sassari*

Numerous studies have explored the mortality disadvantage among females, often attributing it to "natural conditions," but biological factors alone do not explain the fluctuating male disadvantage observed over the past century. This paper examines the changing patterns of sex differences in life expectancy at birth in 20th-century Italy and Greece. While Italy has been extensively studied, Greece remains relatively unexplored. The study aims to analyse the impact of different causes of death on life expectancy at birth, shedding light on the reasons behind the overall male disadvantage and how these factors have evolved over time. Using various decomposition methods, the study examines the sex gap by age group and cause of death, utilizing aggregate mortality statistics from 1901 to 1981 for Italy and from 1921 to 1938 and 1956 to 1981 for Greece. Causes of death are categorized into 14 distinct groups to ensure comparability across populations and time. The approach allows a detailed analysis of age, causes of death, and gender disparities in life expectancy within these Mediterranean populations. The study expects to identify shifts in factors contributing to male disadvantage, from early-life disparities and infectious diseases to issues emerging in older age, such as neoplasms and circulatory diseases.

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Numerous studies have sought to explain the mortality disadvantage observed among females in the past (Beltrán-Sánchez et al., 2015; Maiolo & Reid, 2020; Oksuzyan et al., 2018; Rogers et al., 2010; Zarulli et al., 2021). The disparity in male and female mortality can be attributed to both biological and non-biological factors. Biological explanations include inherited risks, with higher male mortality observed in infants and children due to genetic factors, such as the vulnerability associated with having only one X-chromosome (Luy, 2016; Naeye et al., 1971). Studies show a consistent 25% higher male mortality rate up to age 5, regardless of ethnicity or medical systems (Mage & Donner, 2015). Adult health differences are also influenced by sex hormones, which impact the risk of ischemic heart disease and hazardous behaviour (Gjonça et al., 2005; Maas & Appelman, 2010). However, many researchers argue that non-biological factors, such as behavioral, cultural, and environmental influences, play a significant role, with gender-specific behaviors like smoking and violence contributing to male excess mortality (Pampel, 2003; Preston & Wang, 2006). Cardiovascular diseases have become the leading cause of male excess mortality in industrialized countries, with increasing contributions to the sex disparity since the mid-20th century (Beltrán-Sánchez et al., 2015). Understanding these factors requires careful analysis of age-class contributions and leading causes of death.

This paper examines the changing patterns of sex differences in life expectancy at birth in 20th-century Italy and Greece. While Italy has been extensively studied (for instance, Caselli, 2007; Del Panta & Pozzi, 2011; and for recent years Nigri et al., 2022), the Greek context remains relatively unexplored. The paper's primary objective is to analyse the implications of various causes of death on life expectancy, shedding light on the reasons behind the overall male disadvantage and how these factors have evolved over time. The analysis aims also to identify any disparities in timing and trends between these two Mediterranean European populations.

Data and Methods

We utilize aggregate published mortality statistics around the census years between 1901 and 1981, along with data from period life tables provided by the Human Mortality Database for Italy. For Greece, we use annual aggregate published mortality statistics from 1921 to 1938 and 1956 to 1981 as well as constructed life tables for the purposes of this study, as similar calculations to Italy are not yet available. For both countries, death counts by cause of death from 1956 to 1981 were extracted from the WHO mortality database, while data for earlier years were obtained from official publications by ISTAT (Italy) and NSSG (Greece).

Initially, we employ decomposition methods to analyse the total sex gap by age. To determine the most appropriate decomposition method for examining changes in life expectancy at birth, we will rely on standard methods widely used in literature (namely Horiuchi et al., 2008; Pollard, 1982; Ponnapalli, 2005; United Nations, 1982). Subsequently, we will break down each age-specific contribution by cause of death using the method developed by Preston et al. (2009, p. 291). This methodology has recently been applied in studies in England and Wales (Maiolo & Reid, 2020) and Norway (Maiolo et al., 2023).

Comparing causes of death over time is challenging due to a decline in deaths attributed to vague or unknown causes, a result of improved medical knowledge and higher autopsy rates. This makes it difficult to maintain consistent categories for reported causes of death. While aggregating causes may work for short periods, it can produce categories that lack meaningful distinctions over longer timescales. Redistributing deaths with unknown causes into other categories introduces further complexity, as it relies on assumptions that may not hold true over time. In this study, causes of death are grouped into 14 distinct categories — Infectious, Tuberculosis, Neoplasm, Circulatory, Nervous System, Respiratory, Digestive, Genitourinary, Childbirth, Perinatal and Congenital, External, Other, Ill-defined, and No Cause Given — to facilitate comparability across populations and time periods. This approach allows for a comprehensive analysis of the complex interplay between age, causes of death, and gender disparities in life expectancy at birth in the Italian and Greek contexts.

Expected findings

The study is expected to reveal that the male disadvantage in life expectancy initially stemmed from higher mortality rates in the first year of life, likely due to biological factors such as increased male susceptibility to prematurity, respiratory issues, and foetal distress. With advancements in obstetric and neonatal care and the subsequent decline in infant mortality, the early-life contribution to the male disadvantage is expected to decrease gradually over time.

As mortality patterns evolve, the male disadvantage in life expectancy is anticipated to become more pronounced in middle and older age groups, largely due to higher male mortality rates from circulatory diseases, cancers, and respiratory illnesses. These findings are expected to reflect the broader epidemiological transition in both Italy and Greece, marked by a decline in infectious diseases and a rise in non-communicable diseases — such as cardiovascular diseases and neoplasms — that disproportionately affect men.

The study is also expected to show that while improvements in working conditions during industrialization may have somewhat reduced deaths from external causes, men continued to experience higher mortality rates due to occupational hazards, smoking-related illnesses, and lifestyle factors. Differences in smoking behaviour, particularly the earlier adoption and higher prevalence of smoking among men, are anticipated to significantly contribute to the observed sex gap in mortality from respiratory and circulatory diseases.

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