

# Analysing Contributions of Ages and Causes of Death to Gender Gap in Life Expectancy using Functional Data Analysis

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## Abstract

On average, women live longer than men and absolute difference between male and female mortality risk reaches its maximum at old ages. Although numerous studies have decomposed the sex gap in life expectancy according to age and causes of death, they did not study the main contributing components of the distributions of the age-specific contributions from a functional perspective, which is a more informative approach. To fill this gap, we study absolute and relative contributions of age and causes of death to the gender gap in life expectancy in 14 European and non-European countries, between 1998 and 2016, using the Functional Data Analysis (FDA) and the Functional Principal Component Analysis (FPCA). Causes-of-death data and life tables were retrieved from the Human Causes-of-Death Database (HCD) and from the Human Mortality Database (HMD), respectively. Findings confirm that neoplasms, heart diseases and external causes of death made the largest contributions to the gender difference in all countries, together explaining more than two-thirds of the overall gap. Furthermore, for each cause of death, the analysis reveals two main components that capture most of the variability of the age-specific contributions. The first component captures the extent of the cause-specific gender differences, while the second component captures the age pattern. Over time, an increase in the most relevant contributions is observed, especially around the modal age and a shift of the contributions towards older age. On the one hand the study allows to identify country-specific patterns in the context of the epidemiological transition, which suggest the opportunity for further investigation, and on the other hand it illustrates the demographic application of FDA, which could prove useful to deepen our understanding and knowledge of complex demographic phenomena.

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