

Age and Time Patterns of Mortality by Cause in Italy: A Mortality Surface Approach

Dinamica della Mortalità per Causa in Italia: Analisi delle Superfici di Mortalità

Elisabetta Barbi¹, Graziella Caselli² and Anatoli Yashin¹

¹ Max Planck Institute for Demographic Research, Konrad-Zuse Str.1, 18057 Rostock, Germany. E-mail: barbi@demogr.mpg.de; yashin@demogr.mpg.de

² Dipartimento di Scienze Demografiche, Via Nomentana 41, 00161 Rome, Italy.
E-mail: graziella.caselli@uniroma1.it

Riassunto L'obiettivo di questo lavoro è quello di analizzare la dinamica della mortalità per causa utilizzando un nuovo, semplice ed efficace strumento: la rappresentazione della principale causa di morte per età e nel tempo. Attraverso queste particolari superfici di mortalità, viene rivisitata la transizione epidemiologica in Italia. Focalizzando l'attenzione sull'ultima fase della transizione, vengono in seguito analizzati i più recenti profili della mortalità attraverso le superfici delle principali localizzazioni nell'ambito della classe dei tumori.

Keywords: epidemiological transition, mortality surfaces, leading cause of death.

1. Introduction

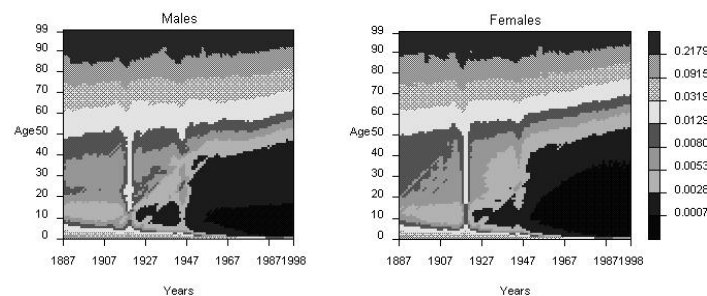
According to the theory of the epidemiological transition (Omran, 1971; Olshansky and Ault, 1986), Italy, as all other developed countries, experienced various phases in the process of modernization, totally changing the cause-specific mortality profile: acute and infectious diseases progressively disappeared while chronic and degenerative diseases as well as cancers became more and more predominant. The recent era is characterised by a shift towards older ages at death from degenerative diseases and a decline in mortality from these diseases and some types of cancer, because of early diagnosis, more healthy behaviours, and more efficient treatments.

The aim of the paper is to study trends and differentials in cause-specific mortality, in Italy, during the last century, exploiting a new simple but powerful tool: the surface by age and time of leading causes of death. Classic mortality surfaces usually represent mortality rates over age and time (Arthur and Vaupel, 1984). Here mortality surfaces are used in a different way: they describe the predominant cause of death at a given age and time. First, considering the Italian mortality data by age and sex for large groups of causes of death, we review the epidemiological transition in Italy through the mortality surfaces of the first leading cause of death from 1895 to 1994. Second, focusing on the last stage of the epidemiological transition, we analyse the new mortality profiles through the surfaces of the first and second leading locations of malignant neoplasms from 1969 to 1995.

2. Trends and Differentials in Mortality in Italy: 1887-1998

Figure 1 depicts the classic surface of age-specific death probabilities of Italian men and women over the period from 1887 to 1998. The effects of the Spanish flu and those of the two World Wars are easily traced on the maps by the elongated rays of high mortality crossing all ages. For men, these effects linger on for some years after the wars among the cohorts that were born or grew up during the war years. In the first part of the 1900s, infant and young mortality rapidly declines while the gain made at later ages is marginal. From the beginning of XXth century, Italian women experienced a steady reduction in mortality and began to enjoy a considerable advantage over men. By the 1950s, female mortality declines visibly even at older ages while male mortality rates hardly changed before the 1970s, especially at ages above 60. From the mid-1970s, a new phase took off and mortality rates started declining for all ages, even for the elderly, although at a slower pace for men than for women.

Figure 1: *Probability of dying for Italian men and women from 1887 to 1998*



A better understanding of the mortality transition and the differences in gender mortality trends are possible by looking at the patterns of cause-specific mortality by age (Caselli, 1991). Figure 2 shows the first leading group of causes of death from 1895 to 1994 for both sexes, from birth to age 99. The reconstruction of data by groups of causes of death and the features of the health transition in Italy have been discussed by Caselli and Egidi (1991). Accounting for the concept of “leading cause by age”, these maps can summarize the epidemiological transition through one sole graph. Although, here, causes of death are aggregated perhaps in too large groups, all the phases of the transition clearly emerge. The essential features and the gender differences in times and ways of the change from a situation in which infectious diseases predominated among causes of death to a more modern regime in which cardiovascular diseases and cancer are the most important causes of death are immediately understandable. Accidents among young, cancer and cardiovascular diseases for adults and the elderly are among the main causes of the gap that grew over the last century between the sexes.

3. Trends and Differentials in Mortality from Cancer: 1969-1995

By the 1960s diseases of the cardiovascular system had become the main cause of death for adults and the elderly, both in men and in women. For women, the predominant role of cardiovascular diseases very soon gives way to the influence of cancer for certain age groups. The importance of cancer progressively increases and by the mid-1980s this

disease category become the leading cause of death during the middle ages of life up to the age of 70 for both women and men (figure 2).

Figure 2: *First leading cause of death by age and sex in Italy from 1895 to 1994*

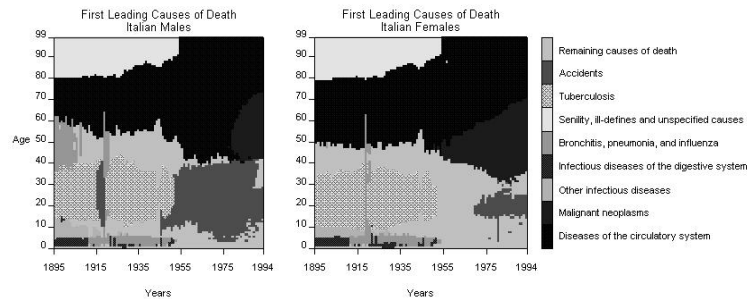
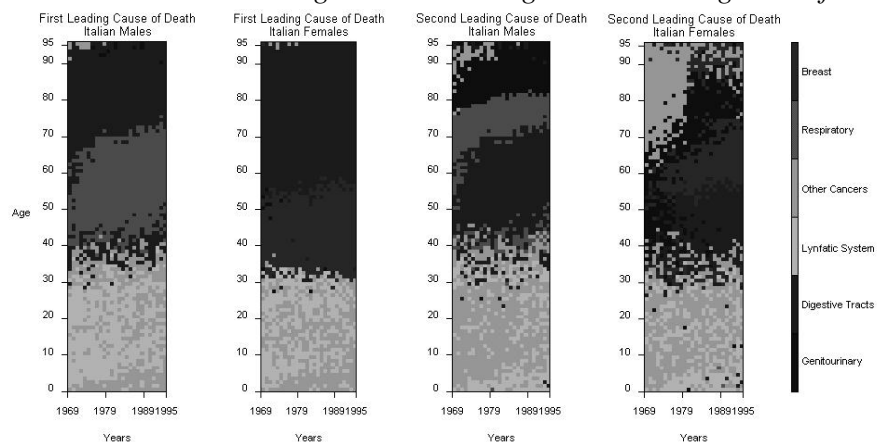
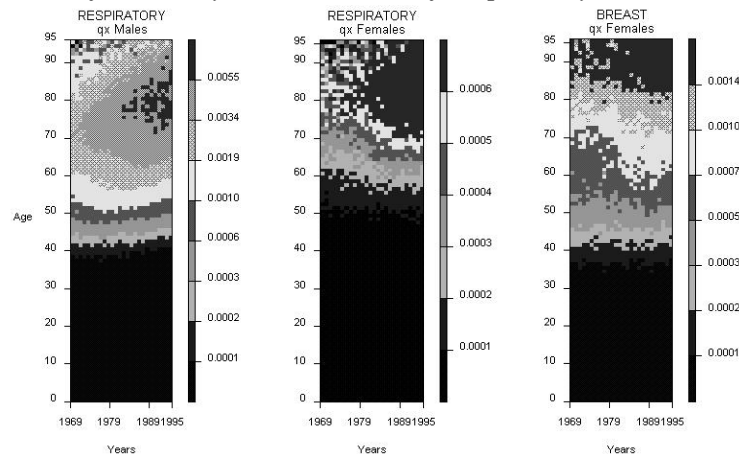


Figure 3: *First and second leading location among the main categories of cancer*



A more in depth analysis is possible when distinguishing between the main locations of a disease category. Figure 3 shows the first and the second leading location among the main categories of cancer, for men and women, from 1969 to 1995. Here malignant neoplasms have been classified into 6 categories of tumours for women and 5 for men. The picture shows the predominant role of cancer of the respiratory tract for men from age 40 to 70, that of breast cancer for women from age 30 to 55, and that of cancer of the digestive tract at older ages for both sexes. It is interesting to notice that, for men, the predominance of cancer of the respiratory tract shifts over time towards older ages whereas for women the predominant category (breast cancer) concerns a larger age range over time, including both older and a bit younger ages. Considering the second leading location, the two sex-specific categories of tumour continue to shift towards older ages. For men, cancer of the respiratory tract, after an implacable resistance, entered a diminishing phase at the end of the 1970s. For women, on the contrary, although values are much lower, mortality from cancer of the respiratory tract is increasing especially at old ages. This negative trend may be linked to the spread of harmful, traditionally male behaviours among women and may contribute to a possible future reduction of the mortality gap between men and women. Breast cancer also has continued to increase (especially for the elderly) until very recent years but then, by the end of 1980s, has begun to decrease and has contributed to the general reduction in female mortality due to cancer (figure 4).

Figure 4: *Evolution of mortality due to cancer of respiratory tract and breast cancer*



4. Concluding Remarks

At this stage of the research we have completed the collection of data to update the analysis of mortality from cancer to more recent years, and to perform the analysis also with respect to cardiovascular diseases. Different classifications of the various categories of the two groups of diseases should be also explored. Such a detailed analysis is of crucial importance for the discussion on future mortality trends: the course of these two predominant causes of death will more and more govern the overall mortality pattern and the differences between sexes and countries. In this context, the approach followed in this study seems very promising. Following the principle of Chinese boxes, it enables us to easily single out the underlying mechanisms of much more complex systems. The full and detailed picture can help then to direct the public policy towards more suitable and prompt interventions. The recent and accelerating reduction of mortality from breast cancer is a good example of the positive effects of a more widespread screening among women. In the future, for instance, mortality due to cancer of the respiratory tract in women may benefit from similar measures and come to a halt of its negative trend. As a consequence, the expected reduction of the male-female mortality gap might be negligible or not confirmed at all.

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