Analyzing Age at Death from Roman Epitaph Inscriptions

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Introduction

Thousands of inscriptions from epitaphs of the Roman Empire that record the age at death of the individual have been collected.[1] The life expectancy at age x is calculated as the ratio of the sum of total years lived to the total number of individuals of that age. It has long been thought that this number reflects the life expectancy of Roman men and women. However, since Durand's (1959) and Hopkins's (1966) work it has been known that these epigraphic samples are not representative of the mortality in the Roman Empire, even if one assumes a stationary population. Infant mortality is always underestimated, and old age mortality is generally underestimated. Epitaphs of elderly deceased individuals are sometimes evidence of a remarkable longevity. Even in the middle age groups of, say, 10 to 60 years, the tombstone inscriptions do not, in general, give an accurate record of mortality.[2] Other sources of error and bias are mentioned by Clauss (1973), who offers the most detailed demonstration, or Parkin[3]: age rounding by multiples of five, gender bias, as men are more likely than women to have an epitaph with an age inscription, which is reflected by a high sex ratio, and a serious class bias – not all classes are represented, because inscribed tombstones were not cheap. Burn (1953) states that tombstones with ages were found primarily in the middle-class and lower middle-class urban population, whereas members of the upper classes generally did not give ages on tombstones.[4] The distributions of age at death in the castrum Mogontiacum, a military camp, precursor to the German city of Mainz is very different from the shape of the distribution in Rome, because of the high proportion of soldiers (88%) in the age information.[5]

In this presentation Roman funerary data of European and African provinces of the Roman Empire is re-examined. Detailed analyses, results, statistics, and figures can be found in Pflaumer (2018).

European Provinces of the Roman Empire

The inscriptions amount to 24,854 (15,173 males, 9,681 females), and were collected by the Hungarian scholar Szilágyi (1961, 1962, 1963). The data comes from 48 cities and provinces of the European part of the Roman Empire between the first and the seventh centuries. Minor addition errors in Szilágyi's data were corrected. The age at death distributions were smoothed, because the dominance of ages that are multiples of five hides the essential shape of the distributions. The smoothing function was the Gompertz distribution,[6] which was fitted to the corresponding survivor functions by non-linear least squares. As a result, we can represent the age at death distributions by a two-parameter

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function. It can be seen that the survivor functions can be well represented by survivor functions of the Gompertz distribution. Age at death distributions are analyzed and categorized. We have distributions that are skewed to the left, symmetrical distributions, and distributions that are skewed to the right. The mean age at death ranges between 21 and 47. The shapes of the distributions are determined by the two parameters of the Gompertz distribution. We can identify three groups or clusters of similar parameters. We get distributions for males with a very high proportion of military persons (slightly negative skew; mean age at death: 34,5 years), distributions with a medium proportion of military persons (slightly positive skew; mean age at death: 36,8 years), and distributions with mostly civilians (positive skew; mean age at death: 29 years). The mean age at death of the distributions of the females ranges between 22,5 and 26,4 years. All these distributions show a positive skew.

African Provinces of the Roman Empire

The inscriptions amount to 18,056 (10,410 males, 7,646 females), and were collected by the Hungarian scholar Szilágyi (1965, 1966, 1967). The data collection comes from 31 cities and provinces of the African part of the Roman Empire between the first and the seventh centuries. Minor addition errors in Szilágyi's data were corrected. The age at death distributions were smoothed, because the dominance of ages that are multiples of five hides the essential shape of the distributions. The smoothing function was the Gompertz distribution,[7] which was fitted to the corresponding survivor functions by non-linear least squares. As a result, we can represent the age at death distributions by a two-parameter function. Age at death distributions are analyzed and categorized. In Africa, the distributions of age at death have higher means and variances than those in Europe. "Roman North Africa is altogether different. Although the African epitaphs underrepresent youth and old age mortality, they show credible mortality rates for males and females in the middle age classes. Unlike in Europe, African epitaphs almost invariably give decedents' age at death".[8] It was customary in Rome to record the age at death of young decedents, but the age of elderly decedents was not recorded so often.[9] These differences in the practice of commemoration are one reason for the much higher mean ages of death in the African provinces. The distributions and their parameters depend on the three factors: Mortality, commemorative processes, and growth rate of the population. Using the Gompertz distribution, we find that the general mortality parameter is much lower in Africa than in the European provinces. Thus, the higher mean in the distributions reflects a higher life expectancy in the African provinces, without contesting the influence of commemorative processes. The reasons are speculative: better climatic conditions, fewer pandemic diseases, or fewer famines. The skewed distribution of Carthage indicates an influence of the population growth rate due to migration, which could also be observed in other populous cities, e.g., Rome.[10]

Roman Mortality and Epitaph Data

The survivor functions are compared with that of the Suessmilch life table, which represents mortality in the eighteenth century.[11] Johann Peter Suessmilch (1707–1767), one of the founding fathers of demography in Germany, published a life table with a life expectation at birth of about 29 years. The comparison with the force of mortality function of the different epitaph clusters shows that the epigraphic sample is not representative of the mortality in the Roman Empire. Infant mortality is always underestimated, but old age mortality is also underestimated. Epitaphs of elderly deceased individuals sometimes describe a remarkable longevity. We observe age rounding by multiples of five, and a gender bias, as men are more likely than women to have an epitaph with an age inscription, and this is reflected in a high sex ratio. We can summarize our findings and, of course, those of Hopkins with a concise quote from Scheidel[12]: "The resultant statistics merely reveal the average death [or more general the mortality pattern] of those individuals who happened to be commemorated in stone: far from generating demographically representative samples of actual populations, commemorative practices were shaped by a variety of factors such as geographical provenance, class, religion, language, gender and, most crucially, age. Because of these manifold distortions, age distributions derived from epigraphic samples do not normally match any demographically creditable pattern, except very occasionally by chance."

Conclusion

Typical patterns of death density functions calculated from Roman epitaph data are shown in Figure 1, and compared with the death distribution of the historical Suessmilch life table from the 18^{th} century. The comparison shows that we cannot use the epitaph data to calculate demographic parameters, such as life expectancy or death probability, of the Roman population. Nevertheless, the data are not worthless. They can be used to show and to explain the differences in the burial and commemorative processes. For example, the considerable preponderance of boys points to the high value attached to male offspring in a male-oriented society.[13] "The ages reflect something of the structure of these societies, and attitudes towards age and the life course. They reflect the way, in which different age groups are judged differently, and the interplay between age and gender".[14]

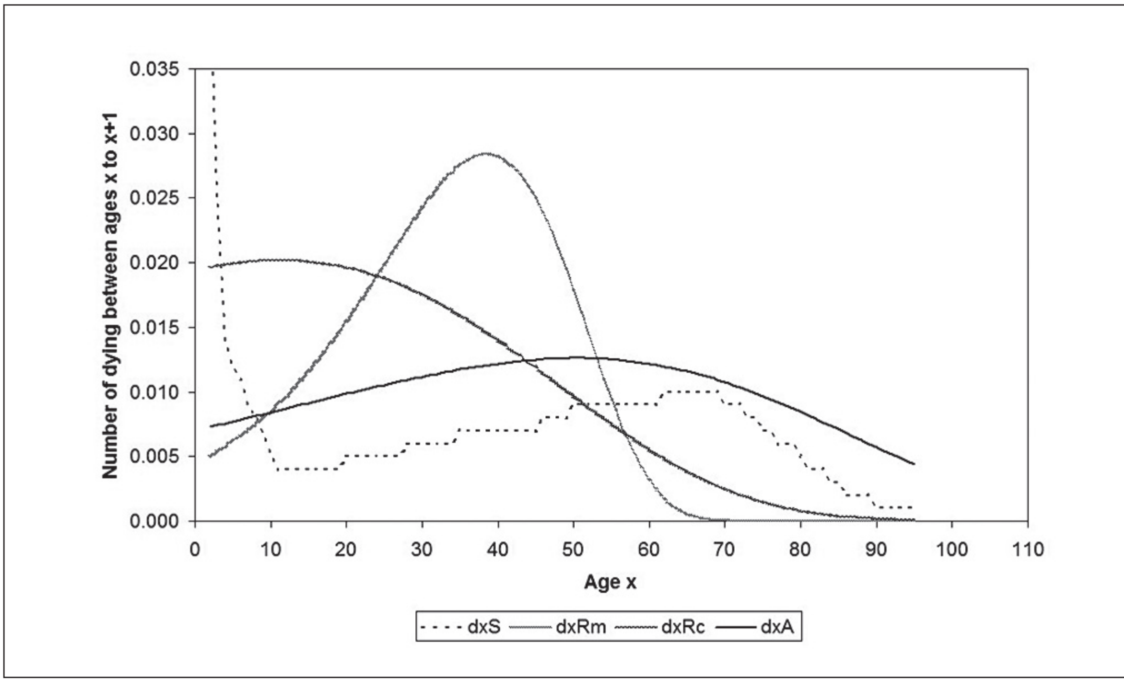

Fig. 1: Typical smoothed death density functions (males and females) calculated from Roman epitaph data compared with the histogram of deaths from Suessmilch's life table (dxS: Suessmilch; dxRm: European Provinces (military); dxRc: European Provinces (non military); dxA: African Provinces).

Notes

[1] E.g. Beloch 1886; Harkness 1896; Macdonnell 1913; Russell 1958; Szilágyi 1961; 1962; 1963; 1965; 1966; 1967.

[2] Parkin 1992, 7.

[3] Parkin 1992, 6–18.

[4] Burn 1953, 7.

[5] See Clauss 1973, 399.

[6] See, e.g. Pollard 1991.

[7] See, e.g. Pollard 1991.

[8] Frier 2000, 791.

[9] Parkin 1992, 9.

[10] See Durand 1959.

[11] Suessmilch 1775.

[12] Scheidel 2007, 8.

[13] Laes 2007, 33.

[14] See Revell 2005, 46.

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Fig. 1: Table by J. P. Suessmilch.

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