’What do you do for a living?’ - Sex-specific mortality in historical times

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Introduction

The main goal in the field of paleodemography is the identification of factors that influenced the development of historical populations, especially in terms of overall life expectancy, health or disease. Mortality data derived from human skeletons can help to reconstruct the survival patterns that are fundamental to our understanding of the living conditions that human populations had to face in a historical and developing ecosystem.

For most ancient populations there is a clear difference between male and female mortality regimes. These sex-specific patterns have changed markedly over time. In ancient samples, women from their early twenties until the end of their fertile period usually showed higher mortality rates than men. Around age 50, male mortality started to exceed female mortality. Since the middle of the 18th century – at the latest – higher life expectancy for females can generally be observed, and was associated with lower female mortality for most age groups.

The observed differential mortality between the sexes might be shaped by a combination of biological and cultural factors, such as higher female mortality due to childbirth or maternal depletion, women’s role in daily life or limited access to resources.

Therefore the general level of economic and social development of a historical community must have influenced the mortality regimes of the individuals living in it. To test this hypothesis, mortality patterns for three populations with different subsistence forms are compared. Horticulture and foraging, partly market integrated agriculture and urban (fully) market integrated agriculture lifestyles are expected to show significantly different mortality schemes between the sexes.

Methodological approach and data

The populations contrasted stem from geographically similar, but temporally different locations in southern Scandinavia. The region around the southern Baltic coast was culturally and economically strongly connected. Three populations, from the early and

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late Medieval and Early Modern respectively, are chosen to represent the different subsistence forms.

Tirup (AD 1150 -1350), a village in Jutland, Denmark, was a rural settlement with an estimated average number of 75 inhabitants at any time[1]. This kind of village was typical for the horticultural and foraging way of living in early medieval times in northern Europe. During excavations in 1984, 622 skeletons came to light, of which 155 individuals are used for this analysis.

The late medieval cemetery S:t Jörgen in Malmö was in use from approximately 1320 to 1530 AD, when the Swedish province of Scania still belonged to the kingdom of Denmark. It was a period of growth and economic well-being for the city, mainly caused by the herring trade with the Hanseatic League. This time period represents the cultural phase of partly market integrated agriculture, when first towns were established. The whole collection includes general information for 4182 individuals. However, only individuals with an age estimated by Transition Analysis (TA) are chosen for this study, since TA operates according to the rules of the "Rostock Manifesto"[2]. The estimates are given as point estimates, the Maximum Likelihood Ages (MLA), and 95% confidence intervals. Ages for a total number of 973 skeletons could be estimated by this method.

The Early Modern as a period of urban (fully) market integrated agriculture is represented by period life table data for Sweden (AD 1751-1759)[3].

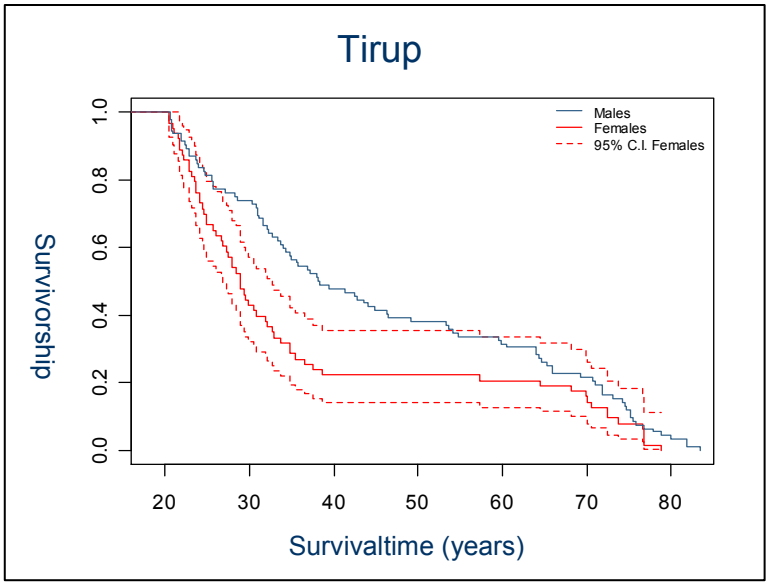
For methodological reasons concerning age estimates from human skeletal remains, only individuals older than 16 and with known sex were included from all datasets. This is reasonable, since it can also be considered as the onset of the reproductive age in humans.

The differences by sex are compared across ages at death for Tirup and Malmö, where absolute number of deaths for each year of adult life is known. For the comparison between the different mortality schemes, survival curves were plotted for all three datasets. Additionally, the Male/Female Mortality Ratio (M/F MR) was calculated and divided into two age groups, 20-40 and 40+. The M/F MR for the skeletal samples was estimated based on 5 year groups for ages 20 to 75 years.

[1] Boldsen, 2005
[2] Hoppa & Vaupel (eds), 2002
[3] Human Mortality Database

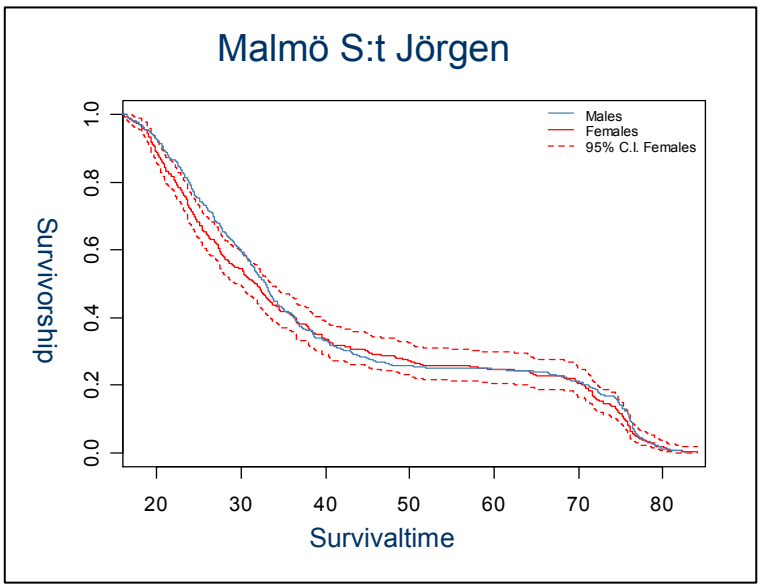
Results

The survival curves of Tirup and Malmö show a clear difference in the mortality regimes in early adulthood. In the rural community of Tirup, the expected excess mortality is clearly visible for females in the childbearing years (Fig. 1). However, although nearly 50% of the deaths in Malmö occurred in the adult age group from 20 to 40 years, there is no evidence for higher female mortality in this age group (Fig. 2). The survival curve for Early Modern Sweden displays higher survival for females for all age groups.



In the community of Tirup the lower survivorship for women compared to men is apparent for the ages from 20 to 38. After the childbearing years, it remains nearly constant up to age 65, when it falls again.

Fig. 1: Survival curve conditioned on survival to age 16 for males and females from Tirup



The survival curves for Malmö show no significant difference between the sexes. Female survivorship is only slightly lower in the years from age 20 to 35. Male survival lies in the female 95% confidence intervals from age 30 upwards

Fig. 2: Survival curve conditioned on survival to age 16 for males and females from Malmö

The Male/Female Mortality Ratio in Tirup shows excess female mortality in the reproductive years (Ages 20 to 40 M/F MR = 0.66), before it changes to higher male mortality around age 38. In S:t Jörgen, the M/F MR indicates an even slightly lower female than male mortality for the ages 25 to 43 (Fig. 6). From 45 to 65 the mortality rates are very low which can exaggerate the relative risk. The Early Modern parishes from Sweden display a higher male mortality for all age groups.

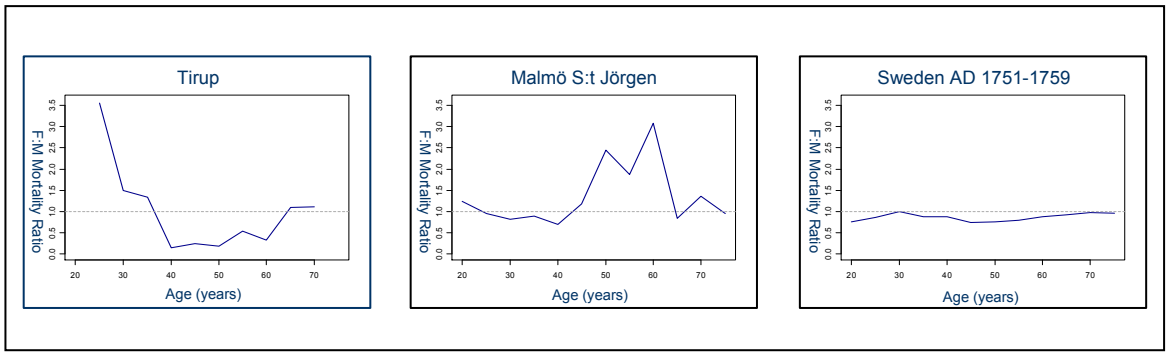


Fig. 3: Ratio of female to male probability of dying by age (q_x) for Tirup, Malmö and Sweden.

Conclusion:

There is an epidemiological transition in young adult mortality patterns during the Middle Ages and Early History: from an increased female mortality during the reproductive years through a period of nearly equal risk of dying for both sexes to a surplus mortality of young males. This transition runs parallel to important changes in the subsistence patterns between the analyzed communities: from horticulture and foraging to an urban life and fully market integrated agriculture.

For Scandinavia, the late Middle Ages can be considered to be the turning point between the different mortality schemes. The data analyzed here support the hypothesis that the level of social and economic development of a community influences the shape of sex-specific mortality.

References:

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Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany) (data downloaded on 08/04/2007).