Sex, survival and subsistence
A mediaeval Danish perspective

Genre, survie et subsistance -
Une perspective médiévale danoise

Svenja Weise
Max-Planck-Institute for Demographic Research
Syddansk Universitet Odense (ADBOU)
Paleodemography

[...] attempts to identify demographic parameters from past populations derived from archeological contexts

R. Hoppa
Male-Female Mortality Paradox

“The lives of females are shorter than the lives of men, in most cases”

*(Moses Maimonides, 1135-1204)*

“Being male is now the single largest demographic risk factor for early mortality in developed countries”

*(Kruger & Nesse, 2004)*
Differential mortality over time

Mortality differences between the sexes

(Estimated from skeletal collections)

Conditional survival

(approximated in the “adultus” skeletal age category [20–40 years])

Bentley, Paine et al. 2001
What shapes differential mortality?

**Biology, behaviour, and availability of resources**

- Males show higher mortality in most animal species
- In humans male disadvantage during pregnancy: Male:female ratio 1.3:3 at conception, but 1.06:1 at birth
- Men are more vulnerable to infections and parasites
- Level of oestrogen influences immune system and susceptibility for coronary heart disease
- ‘Dangerous fertile years’: higher female mortality due to childbearing or maternal depletion
What shapes differential mortality?

Biology, behaviour, and availability of resources

• Shorter inter-birth intervals increase maternal morbidity
• Hormones can determine behaviour:
  - Testosterone can increase risk-taking behaviour in young males
    & plays a role in modulating aggressive behaviour
  - Oxytocin in fertile women induces ‘tend and befriend’-strategies
What shapes differential mortality?

Biology, behaviour, and availability of resources

Behaviour:

• Women's role includes
  - cooking (susceptible to respiratory diseases),
  - caring for sick (more often exposed to bacteria and viruses),
  - herding the animals (potential source of infections)

• Immigration exposes varying groups to new diseases

• Violence (combat or inter-group aggression)

Resources:

• Unequal distribution of nutrition and health care inside families

• Urban/rural differences in nutrition and housing
Hypothesis

The general level of economic and social development of a historical community shaped the mortality regimes of the individuals living in it.
Mediaeval Period

- Dating from around A.D.1050 to A.D.1536
- Defined by Catholic faith as dominant religious belief

Source: Hellesen & Tuxen 1988
Demographic changes

- After period of growth reduction in population size

<table>
<thead>
<tr>
<th>Year A.D.</th>
<th>1050</th>
<th>1300</th>
<th>1400</th>
<th>1660</th>
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<tr>
<td>Population (Mil.)</td>
<td>0.5</td>
<td>1 - 2</td>
<td>0.25 - 0.5</td>
<td>0.49</td>
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</tbody>
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New structures in society

• Social mobility

From manorial systems with self-sufficient farmers, living as tenants, to a feudal society, divided in 4 states:

Nobility, clergy, burghers and peasants

• Immigration from countryside to towns
Data

Nordby
1050-1250
Early Middle Ages
(N = 145)

Sct. Mikkel, Viborg
1050 - 1530
Middle Ages
(N = 182)

Sweden
1751 - 1759
Early Modern
(Human Mortality Database)

Tirup
1150-1350
High Middle Ages
(N = 213)

S:t Jörgen, Malmö
1300 - 1530
Late Middle Ages
(N = 986)
Age at death distribution

Norby, Tirup, Sct. Mikkel & Sweden

(Conditioned on survival to age 16)
Distribution of deaths

Ages at death according to sex (Tirup & Malmö)
(Conditioned on survival to age 16)
Survival

Survival curves for males and females (Tirup & Malmö)
Conditioned on survival to age 16
Possible explanations

Biology, behaviour, and availability of resources

Biology:

• Competing for mates causes increase in male risk-taking behaviour
• Lower "immunocompetence" - disadvantage in case of immigration

Behaviour:

• Late marriage leads to fewer children and reduced risk of dying due to childbirth in women

Resources:

• Equal distribution of resources for males and females
Summary

Epidemiological transition in mortality patterns over time

Partly market integrated agriculture
Increased female mortality during reproductive years

Urban (partly) market integrated agriculture
Period of equal risk of dying for both sexes

Urban (fully) market integrated agriculture
Excess male mortality
Outlook

'Sex and survival - Mortality differences in the past'

• Sub-project in the framework of 'Demography of Sex Differences in Health and Survival'

• 20 000 skeletons

• Timeframe: Mesolithic to Late Middle Ages

• Geographically located around the Baltic Sea

• Age estimation using *Calibrated Expert Inference*

• Recording of age, sex, tuberculosis, osteoporosis, work-related changes and violent or activity related fractures