The effects of early life conditions on female later life outcomes: Southern Sweden 1830-1968

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The importance of early-life factors for later life health

- Conditions in early life influence the development of:
  - cardiovascular diseases
  - respiratory and allergic diseases
  - diabetes, hypertension and obesity
  - breast and testicular cancers
  - neuropsychiatric diseases (Ben-Shlomo and Kuh 2004)
- Respiratory tuberculosis, haemorrhagic stroke, and bronchitis, which have accounted for two-thirds of the total decline in mortality in ages 15-64 years from 1850 to 1910 in Britain, are influenced by conditions in infancy and childhood (Lindström and Smith 2007).

Why sensitivity in early life?

- Development of organs and cells are fastest during the foetal stage and early in life.

- Individuals are therefore most sensitive to disturbances during these stages. Possible critical period.

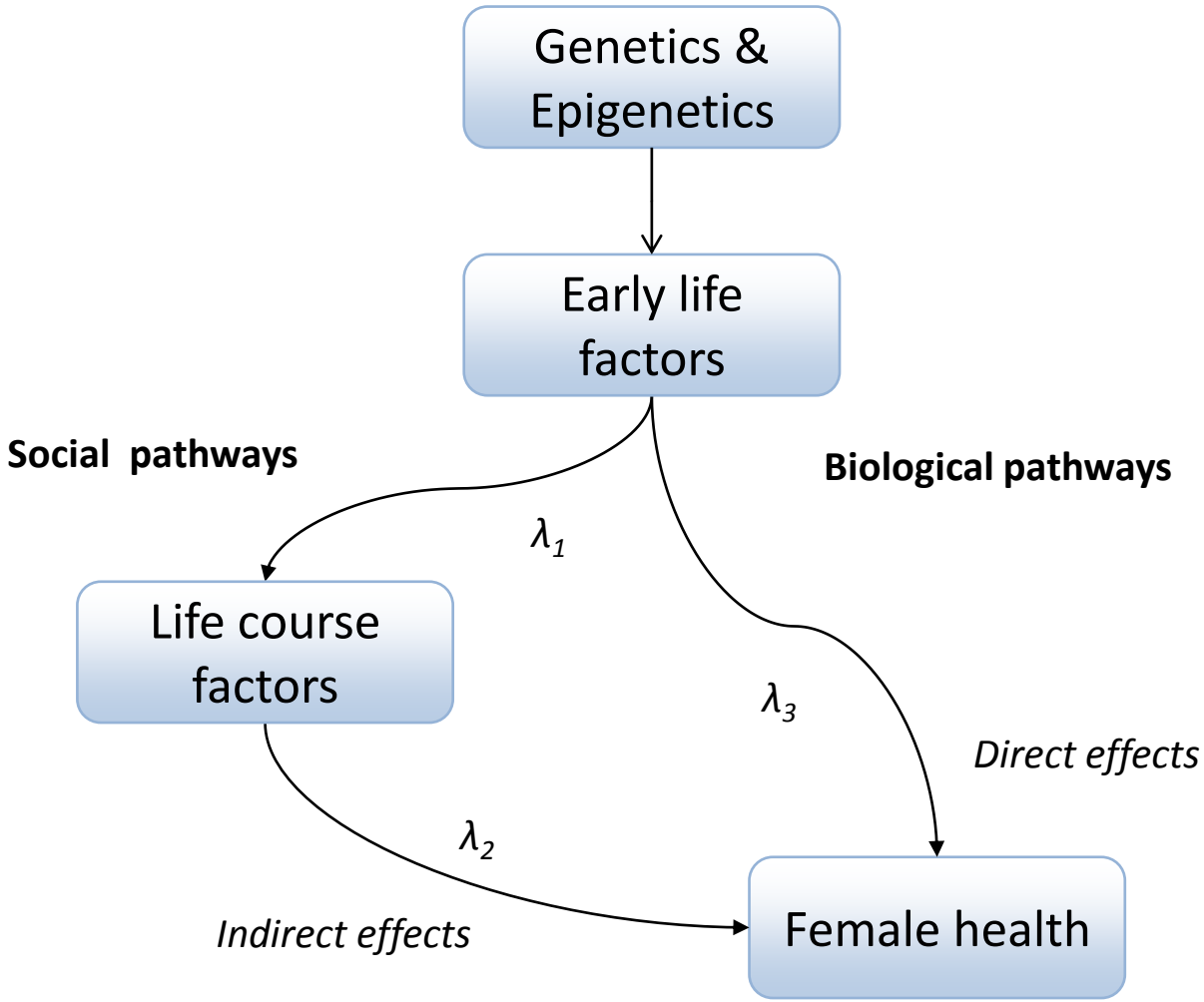
Biological pathways

Scarring (permanent damage that shows up later in life):

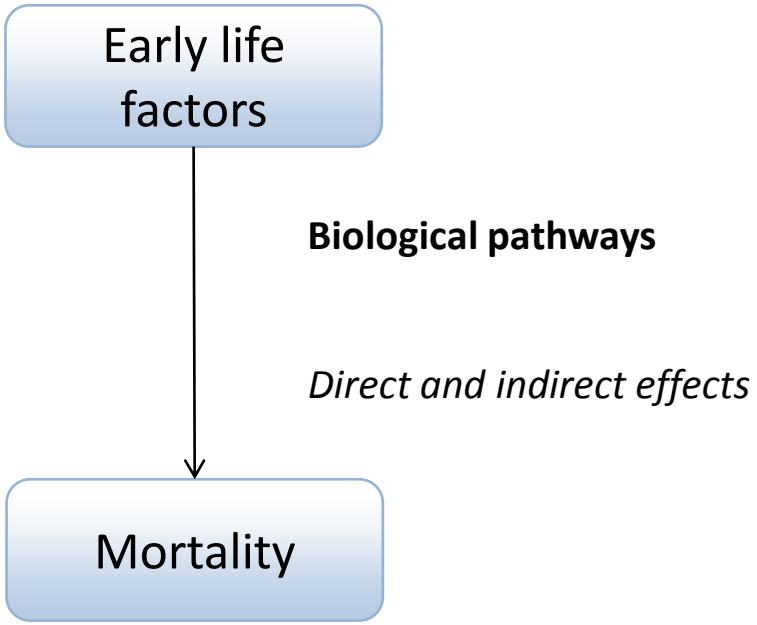
- Problems during foetal stage: Drugs, malnutrition, etc giving biological disorders and/or low birth weight and hypertension (Barker 1995).
- Problems in first years of life: Inflammation (Liuba 2003; Finch and Crimmins 2004) and malnutrition (Fogel 1993).

Selection:

- Survival of the fittest
- Immunity (Fridlizius 1989)



Total effect on female health = $\lambda_1 * \lambda_2 + \lambda_3$


Early life factors
Biological pathways
Direct and indirect effects
Mortality

Aims of this work and hypotheses

- Price series to evaluate the impact of nutrition during the foetal stage:
  - Nutritional programming (or foetal origins) hypothesis (Barker 1995): inadequate nutrition during the second and third trimester of the pregnancy increases risk of cardiovascular diseases later in life. Possible interaction with SES.
- $CDR_{20\text{-}50}$ during the foetal stage to evaluate the health of mother.
- Infant mortality rates to evaluate the impact of exposure to disease during the first year of life:
  - Inflammation early in life affects arterial system (arterial sclerosis) and therefore the transfer of oxygen, protein, etc to all organs.
  - Exposure to certain diseases in the first years after birth reduces immunity to other diseases throughout life and increases the risk of contracting other infectious diseases in later life (Fridlizius 1989).
  - Distinction between total IMR and IMR due to airborne infectious diseases.

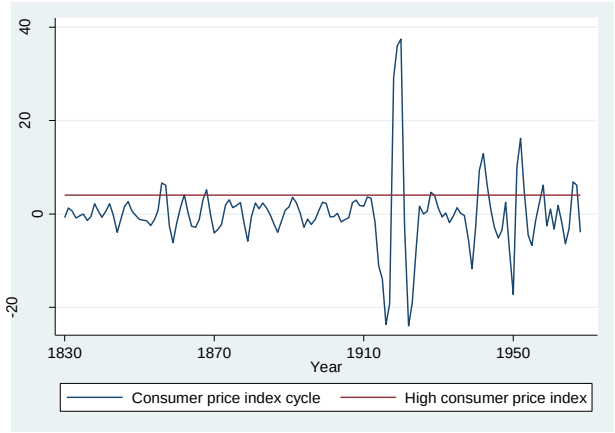
Data

SDD - the Scanian Demographic Database.

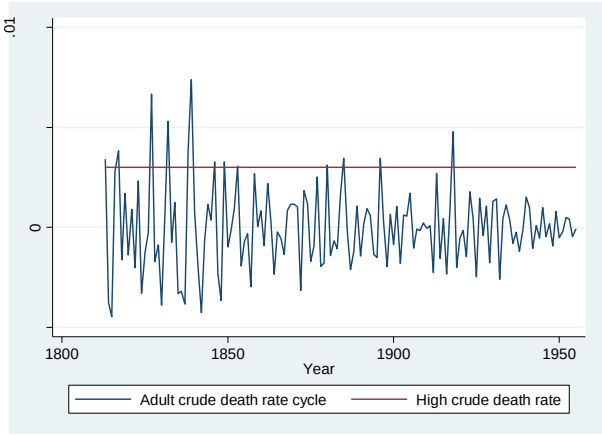
- Information on demographic events at individual, household and community level in continuous time 1813-1968.
- IMR and $CRD_{20\text{-}50}$ calculated for the local area.
- Consumer price indices for Sweden, 1830-2009.

Indicators of early life conditions

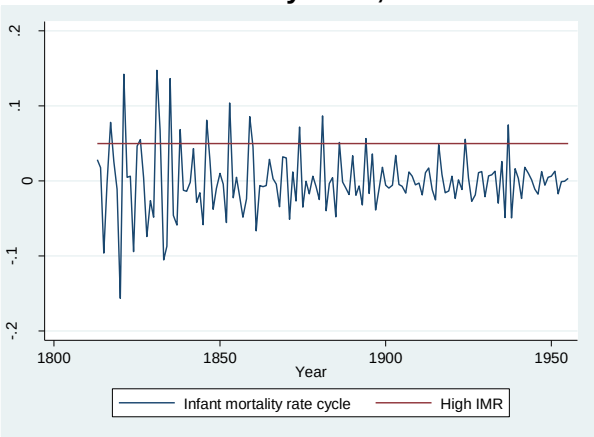
Consumer price index, Sweden



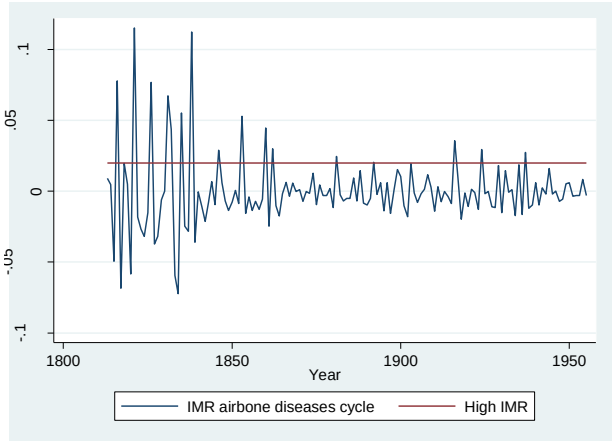
Adult crude death rates, Scania



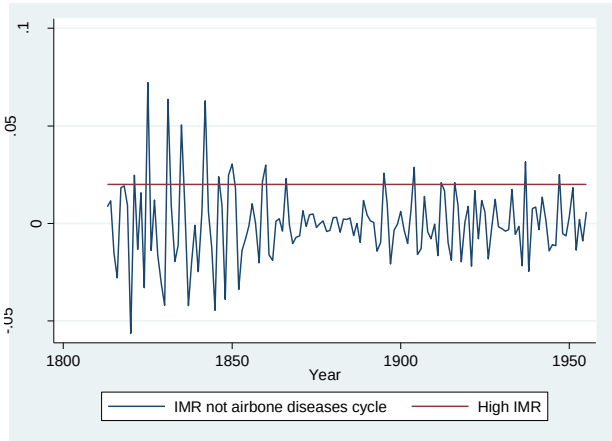
Infant mortality rates, Scania



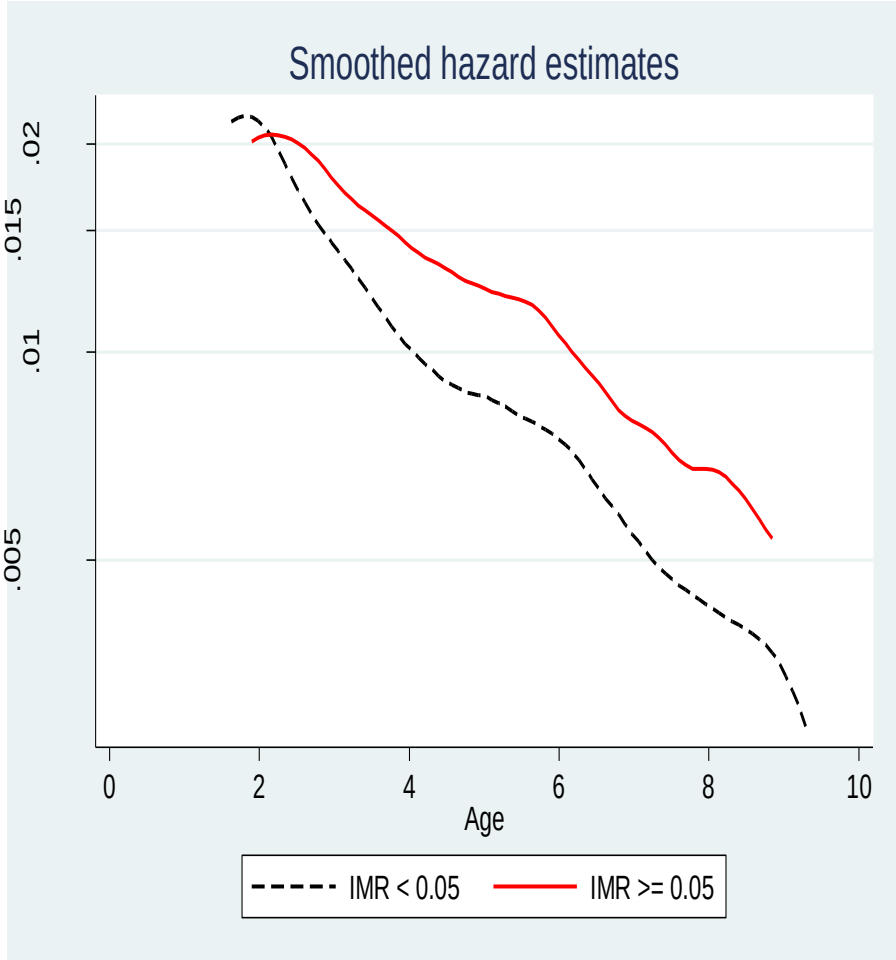
IMR airbone infectious diseases, Scania



IMR non airbone infectious diseases, Scania



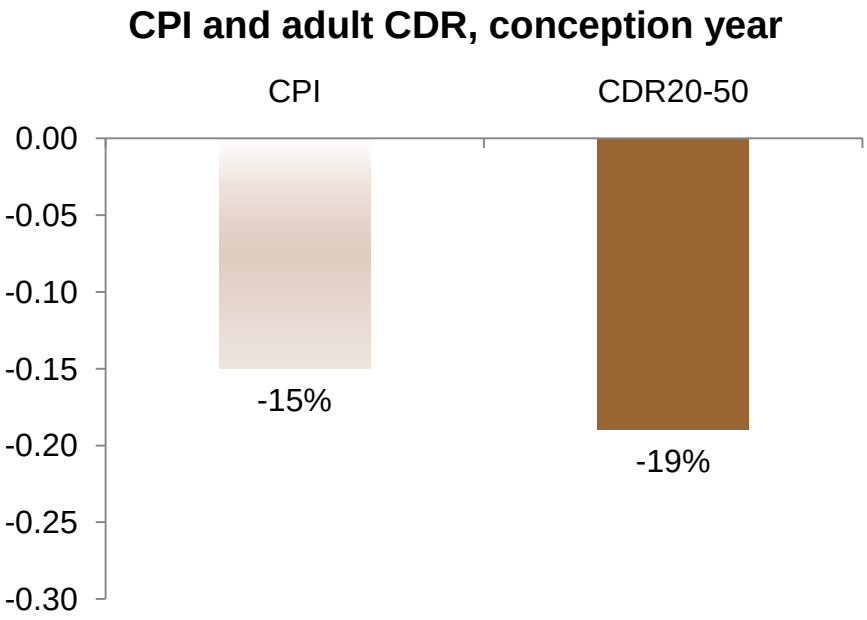
Effects of IMR on childhood mortality

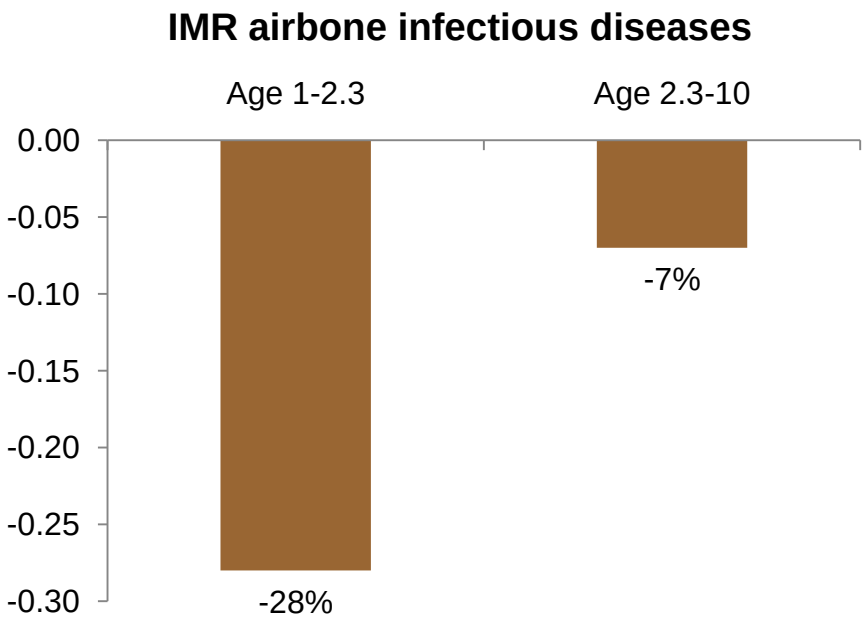


- Age 1-2.3:
  - 24% lower risk of dying if born during years with high IMR.
  - Selection effects dominates.
- Age 2.3-10:
  - 5% higher risk of dying if born during years with high IMR.
  - Scarring effects dominates slightly.

The models also control for SES, year and parish of birth, and $CDR_{20\text{-}50}$ and CPI during year of conception.

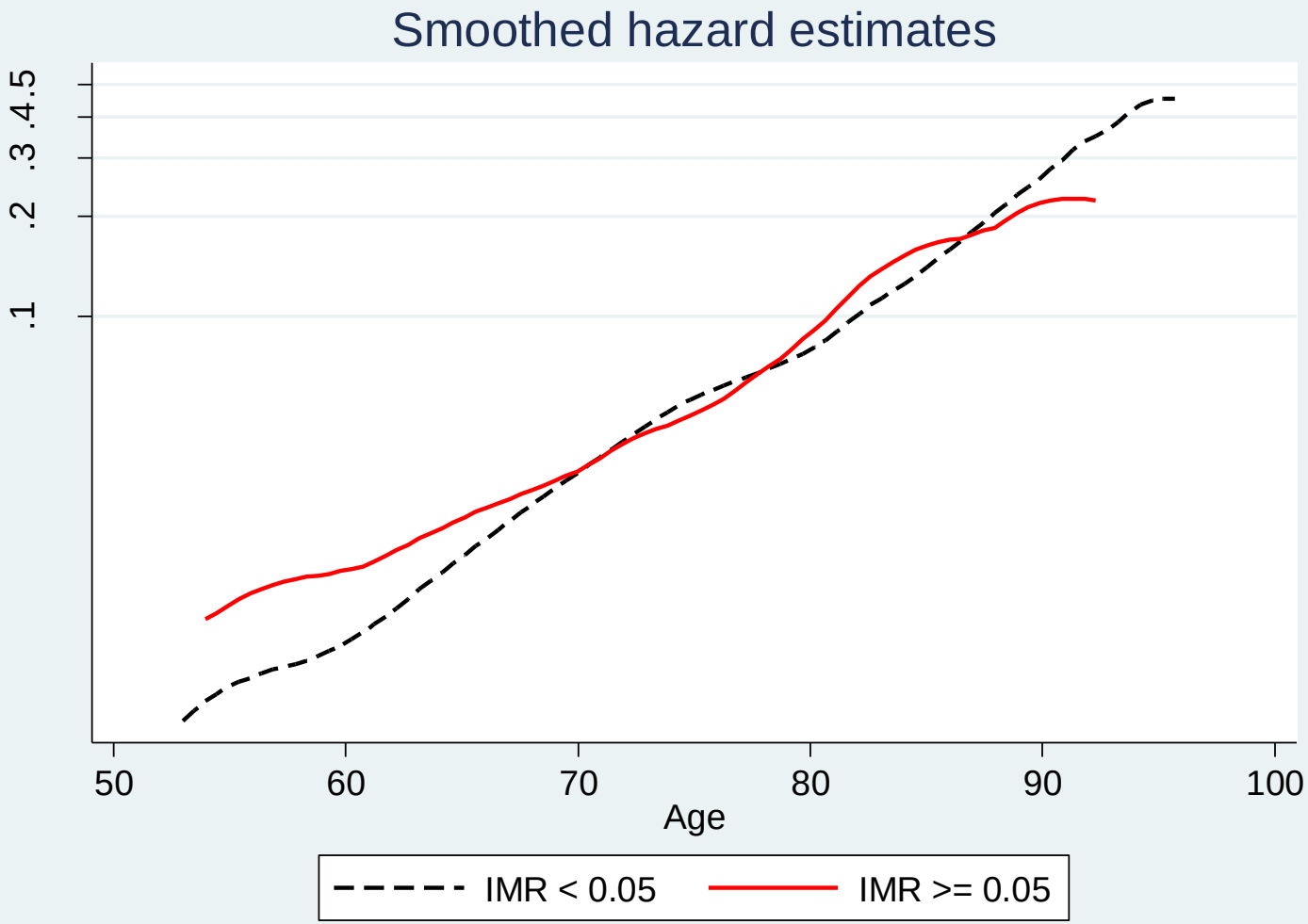
Effect of other early life indicators on childhood mortality



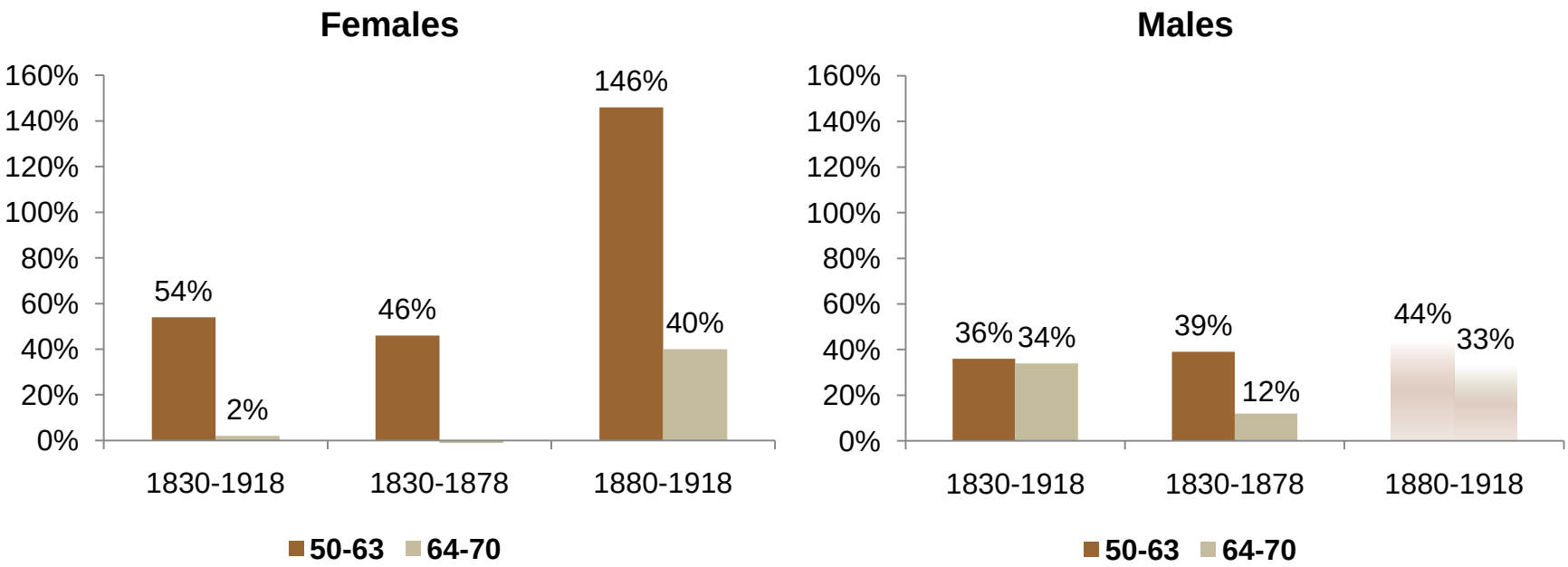


Note: lighter colour indicates no statistical significance

Effects of IMR on female old age mortality

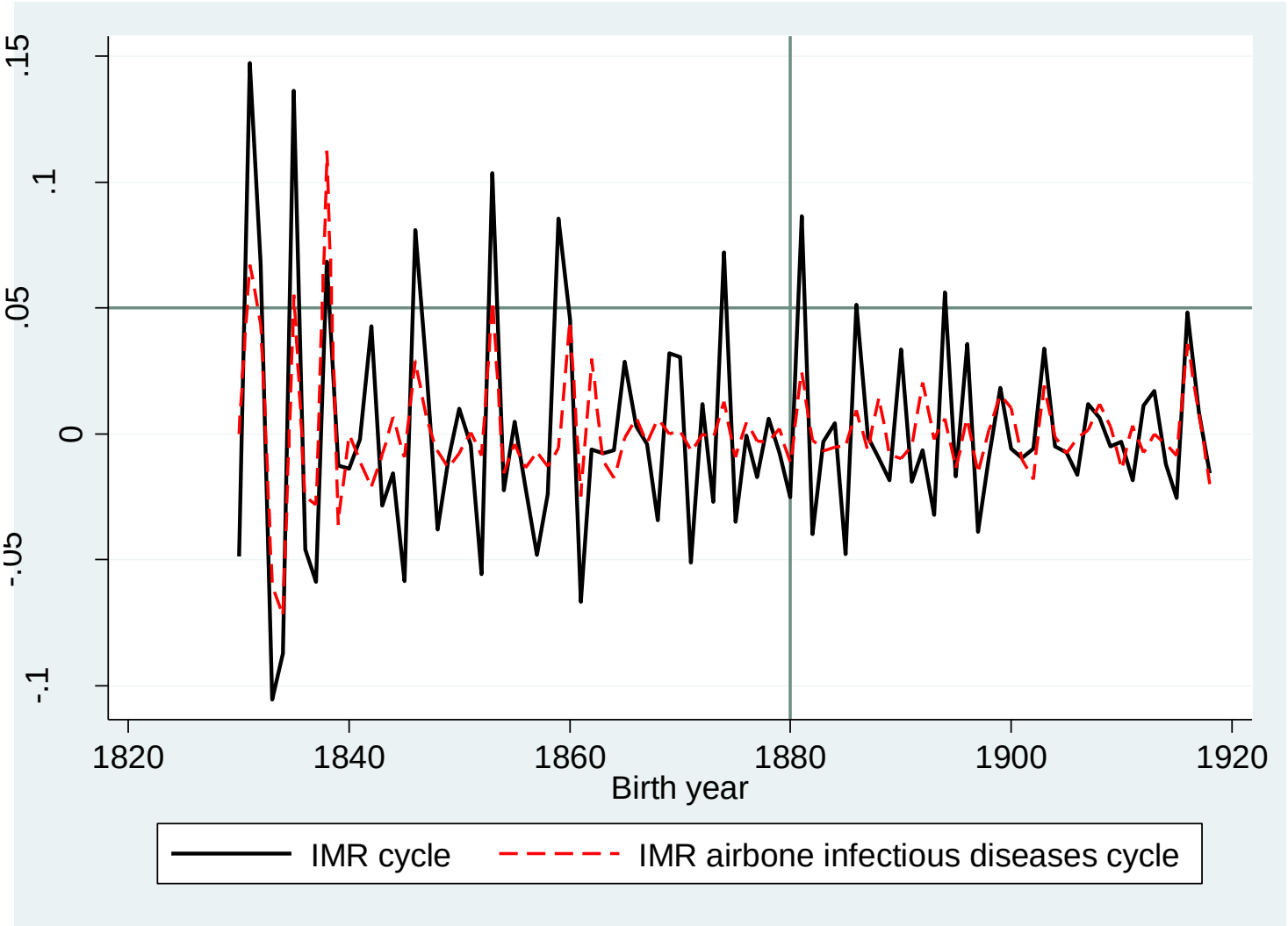


Differences in the risk of dying in ages 50-70 for individuals born in a year with high IMR

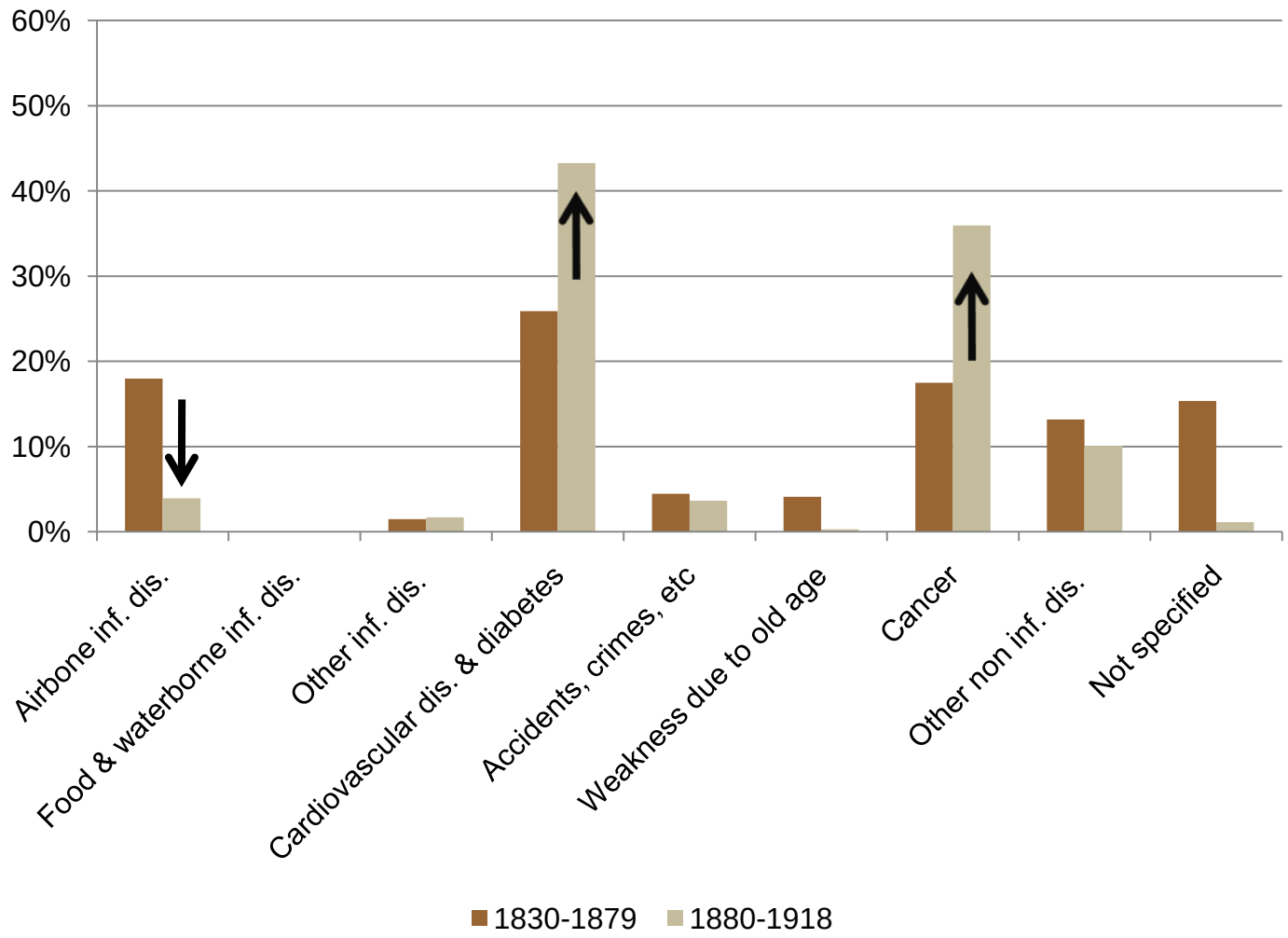


Note: The models also control for SES, year and parish of birth, and $CDR_{20\text{-}50}$ and CPI during year of conception.

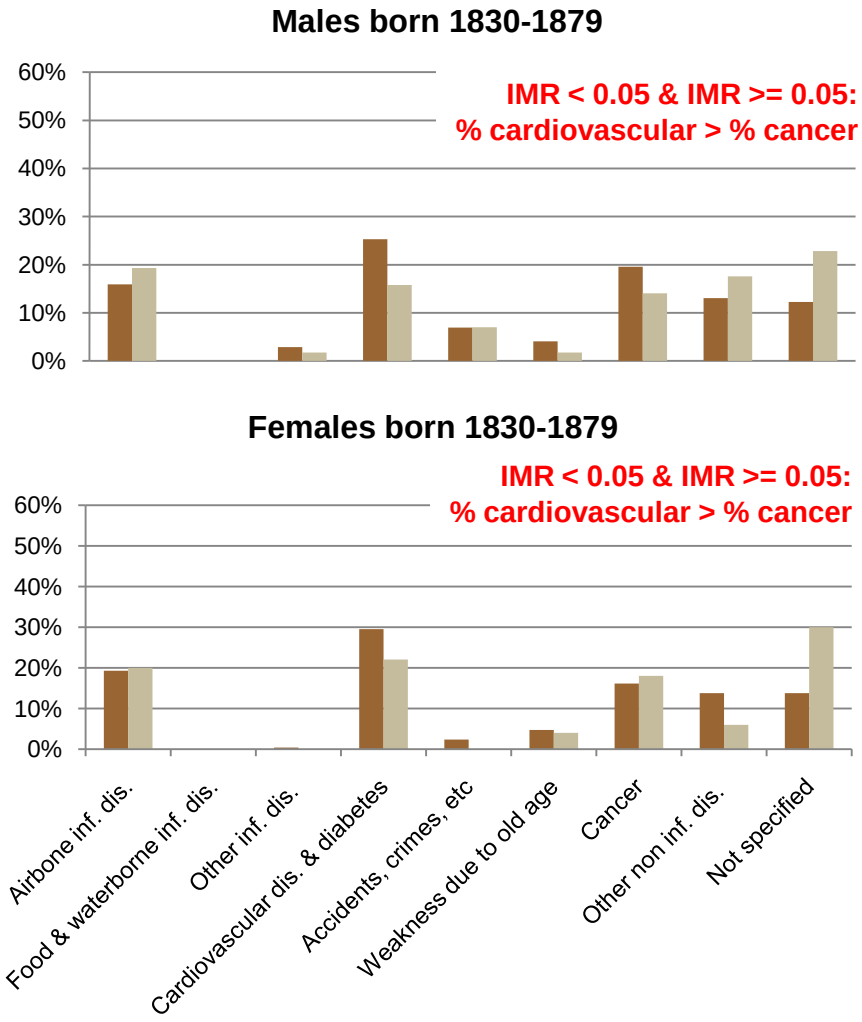
Infant mortality rate

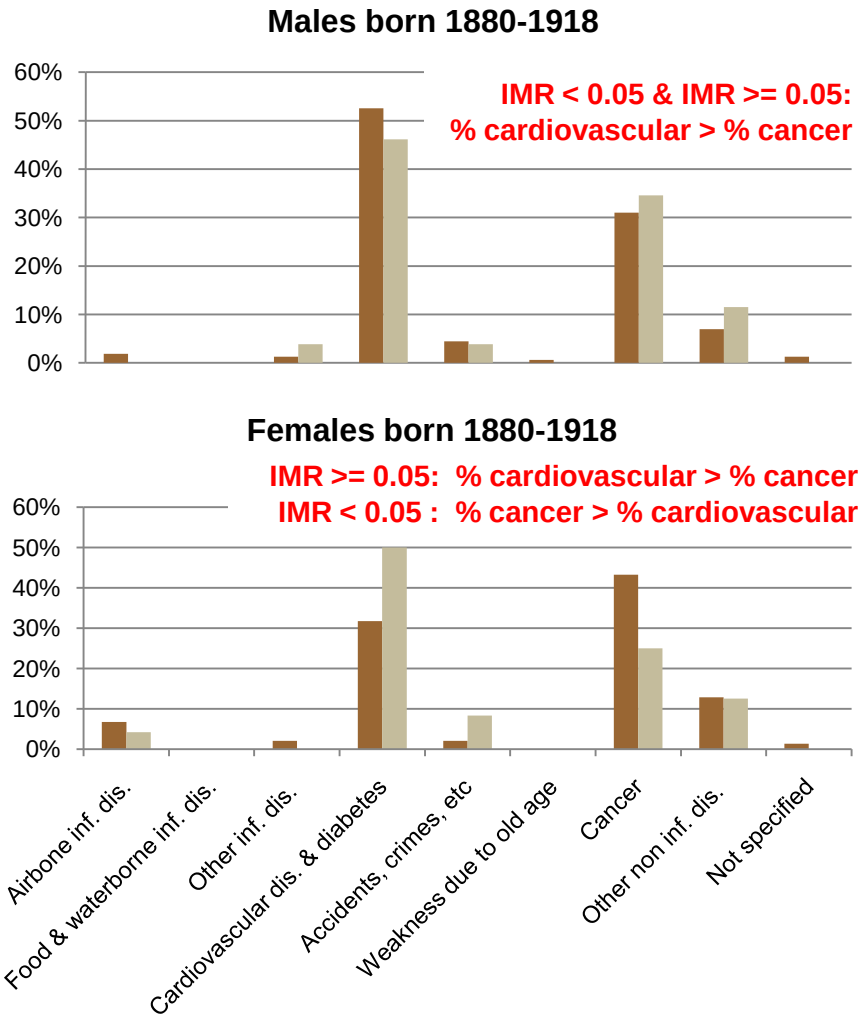


Causes of death in ages 50-70 by birth cohort



Causes of death in ages 50-70 by birth cohort, gender and IMR threshold levels





IMR < 0.05 IMR >= 0.05

Conclusions

Early life conditions have an effect on:

- **Childhood mortality**: Dominance of a selection effect from ages 1 to 2.3 due to exposure to disease during the first year of life (total IMR and IMR due to airborne infectious diseases) and slight dominance of a scarring effect from ages 2.3 to 10. Dominance of a selection effect from ages 1 to 10 due to exposure to disease during the foetal stage ($CDR_{20\text{-}50}$).

- **Mortality during old age:** Dominance of a scarring effect due to exposure to disease during the first year of life. For women this effect is concentrated between ages 50 and 64 and is most extreme for those born after 1880.

Next steps

- Childhood mortality by birth cohorts – evidence of a stronger dominance of a selection effect for children born after 1880.
- Mortality for other age groups – evidence of a dominance of a selection effect until age 20 and a dominance of a scarring effect after age 30.
- Mortality by cause of death.
- Interactions with other variables such as SES at birth.
- Influence of mid-life factors (reproductive, SES) on mortality in later life.