

ECONOMIC CONDITIONS AT BIRTH AND HEALTH LATER IN LIFE: EVIDENCE FROM BIOMARKERS

Rob Alessie, Viola Angelini, Gerard van den Berg, Jochen O. Mierau, Laura Viluma

Introduction

Numerous studies^{1,2,3,4,5,6,7} have shown that the economic conditions at the time of birth influence health later in life. For example, deprivation during gestation is an important early origin of adult cardiac and metabolic disorders due to fetal programming that permanently shapes the body's structure, function, and metabolism.

Issues in the Literature

Even though the relationship between early life circumstances and late life outcomes is well established, several issues have not been sufficiently addressed:

- Mortality as outcome.** Most of the economic literature use mortality as outcome measure. Although it is an objective and easy-to measure outcome and mortality data is widely available, it does not reveal the social and biological mechanisms that lead from birth during an economic downturn to increased risk of dying.
- "Old" cohorts.** The use of mortality data results in analysis of cohorts that have been born long time ago and the results of these analyses might not be directly applicable to current cohorts.
- Gender differences.** Although evidence suggests that this relationship might be different between men and women, very little attention in the literature has been paid to gender differences:
 - Male fetuses and infants are more sensitive to harsh environment than female fetuses
 - Women's health more affected by childhood SES⁸

Our contribution

Our goal is to analyze the relationship between the economic circumstances at the time of birth and adult health outcomes.

In particular:

- We use unemployment levels as a proxy for economic conditions at birth
- Use biomarkers as an intermediate health outcome which also allows to analyze "younger" cohorts than mortality data
- We use data from the Netherlands, that allows us to identify *ambient economic stress* as the main mechanism behind the effect.
- We allow for gender differences.

Possible mechanisms and the Netherlands (NL)

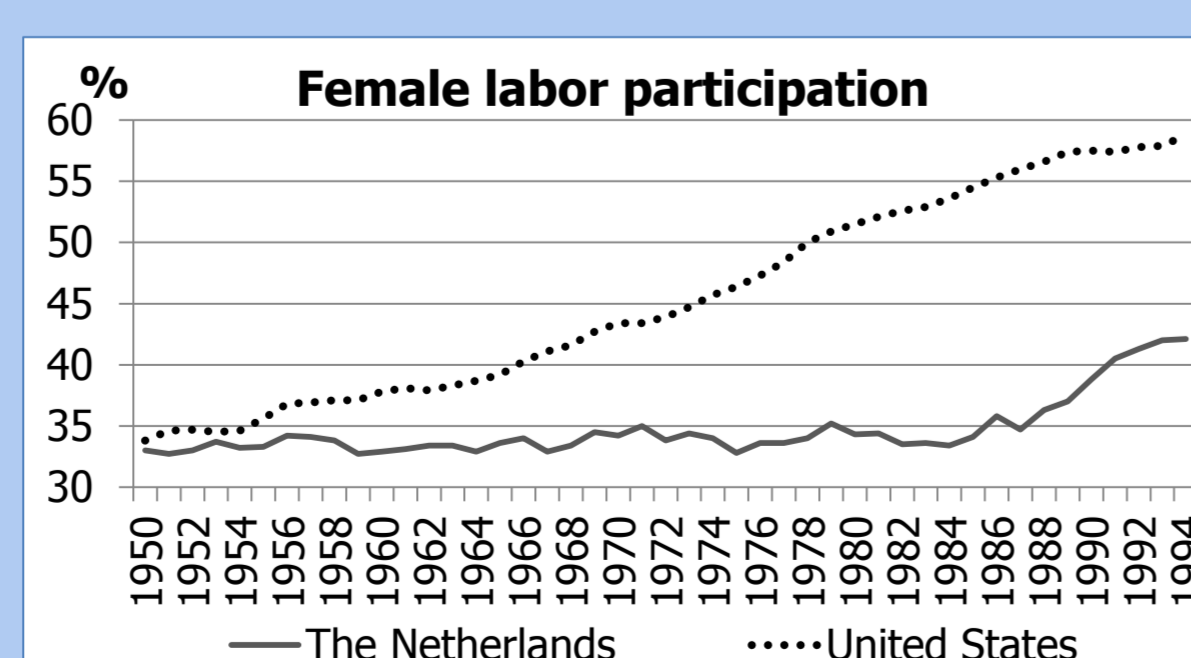
Several mechanisms could explain the relationship between high unemployment at birth and health later in life:

- Deprivation and malnutrition in utero due to a decrease in income

In NL: Strong welfare state with generous unemployment insurance (75% of last salary first 2 months, 70% thereafter) which limits the effects of job loss on income and consumption.

- Changes in female time use when becoming unemployed

In NL: Extremely low female labor participation: limited effects of unemployment on female time use



- Ambient economic stress: a likely mechanism in The Netherlands

Data:

A large-scale cohort study from north-eastern NL, contains a bio-bank and a questionnaire

Sample for this study:

Size: 76,566

Born between 1950 and 1992 in NL

Currently live in Drenthe, Groningen or Friesland

Dependent variables:

- Biomarkers that predict cardiovascular disease (CVD) risk (cholesterol, blood pressure, triglycerides, glucose, glicated haemoglobin, C-reactive protein, leukocytes, lymphocytes)
- Combined measure: 10 year absolute risk of fatal CVD event (estimated by SCORE)

Main independent variable:

- Provincial unemployment level at the year of birth (Statistics Netherlands)

Methods

Specification:

$$Y_{ipc} = \alpha + \beta_1 u_{pc} * m_i + \beta_2 u_{pc} * f_i + \beta_3 m_i + \sum_{k=1}^K \beta_4 s_{ipc} + \theta_c + \rho_p + \varepsilon_{ipc}$$

Y_{ipc} : health outcome for individual i born in province p and year c

u_{pc} : the unemployment rate in province p and birth year c

m_i : dummy variable taking value 1 if male and 0 if female, while f_i takes the opposite value

s_{ipc} : linear spline with K knots in age of the individual i born in province p and year c

ρ_p : province fixed effect

θ_c : birth year fixed effect

Estimation:

- By OLS
- Standard errors clustered at province level and adjusted for small number of clusters and unbalanced cluster sizes

Selected Results

| | (1) SCORE CVD death risk % | (2) High density lipoprotein (HDL) | (3) Low density lipoprotein (LDL) | (4) Total cholesterol (CHO) | (6) Diastolic blood pressure (DBP) | (7) Triglyce- rides (TGL) | (8) Glucose (GLU) | (10) C-reactive protein (CRP) | (11) Leukocytes (LEU) | (12) Lympho- cytes (LYP) |
|-------------------|-------------------------------------|--|--|--------------------------------------|--|---------------------------------|-------------------------|--|-----------------------------|--------------------------------|
| female x unemp | 0.021*** | -0.006** | 0.0001 | -0.001 | 0.162*** | 0.007* | 0.010*** | 0.025 | 0.010 | 0.064 |
| | <i>0.002</i> | <i>0.002</i> | <i>0.006</i> | <i>0.007</i> | <i>0.019</i> | <i>0.003</i> | <i>0.002</i> | <i>0.046</i> | <i>0.009</i> | <i>0.049</i> |
| male x unemp | -0.006 | 0.005** | -0.033*** | -0.037*** | -0.183** | -0.022*** | 0.002 | -0.064** | -0.016** | -0.127** |
| | <i>0.013</i> | <i>0.002</i> | <i>0.006</i> | <i>0.006</i> | <i>0.065</i> | <i>0.005</i> | <i>0.002</i> | <i>0.025</i> | <i>0.006</i> | <i>0.046</i> |

OLS regression results. The significant coefficients showing a positive effect on health are noted in **green** and those showing a negative effect on health are noted **red**. The specification includes a spline in age, birth year and province fixed effects.

CR2VE standard errors clustered at the province level are reported in italics under the coefficients (***) $p < 0.01$, (**) $p < 0.05$, (*) $p < 0.1$.

Conclusions

Women born during periods of high unemployment are at an *increased* risk for CVD in adult life.

Men born during periods of high unemployment level are at a *decreased* risk for CVD in adult life. The positive effect on health is remarkably bigger for high risk men.

This suggests that girls might be more sensitive to maternal stress early in life than boys. Since large effects have been found in men exposed to hunger and deprivation, our study shows an alternative mechanism that becomes important when deprivation is limited.

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Contact information:

Laura Viluma
University of Groningen
E-mail: l.viluma@rug.nl