Unequal at birth? Unravelling perinatal health inequalities in the Netherlands

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Why perinatal health in the Netherlands?

Source: Eurostat
Why inequalities in perinatal health in the Netherlands?

Perinatal mortality in the Netherlands (2004-2007) by province deprived and non-deprived areas in main cities

Source: de Graaf et al 2013
What do we do?

• Descriptive paper
  • Is perinatal health in the Netherlands associated to parental income?
    • Is this association constant over the income distribution?

  • Does this association vary across regions over time?
    • In which regions does income matter most?
    • Does location matter more for low income babies?

• What are the factors related to the regional variation in this association?
  • Simple correlations between small area characteristics related to maternal behavior, supply of care, environmental factors
Data

• Perinatal Register 2004-2014
  • 1.6M births
  • Outcome variables: perinatal mortality (stillbirths + 7 days), low birthweight (<2,500g) and small for gestational age (<10\textsuperscript{th} percentile)

• Linked with household parental income
  • Equivalent household income at t-1
  • Use rank (at yearly level using all births in a given year)

• Local area characteristics
  • Every newborn assigned to location of the mother at time of conception
Regional differences in perinatal health (2004-2014)
Trends in perinatal health: perinatal mortality
Trends in perinatal health: low birthweight
Is perinatal health in the Netherlands associated to parental income?
Is this association constant over the income distribution?

• Run a piecewise linear regression at national level allowing for a separate intercept and slope for each decile for three time periods (2004-2007, 2008-10, 2011-14)

\[ H_{ird} = \alpha_{id} + \beta_{d} D_i R_{Pi} + \varepsilon_{ird} \]

\( H_{ird} \) is perinatal health of newborn i in region r in decile d
\( R_{Pi} \) is the relative position within the decile (0 to 9)

Test for differences in estimated slopes, starting from final decile
\( H_0: \beta_{10} = \beta_{9} \)
If we do not reject the null hypothesis: \( H_0: \beta_{10} = \beta_{9} = \beta_{8} \)

...
Is this association constant over the income distribution?
Is this association constant over the income distribution?
Does this association vary across regions over time?

Perinatal Mortality: Estimated $\beta_1$ by region over time

Perinatal Mortality: Estimated $\beta_2$ by region over time
Does this association vary across regions over time?

Perinatal mortality: Estimated $\beta_3$ by region over time

Perinatal mortality: Estimated $\beta_4$ - $\beta_{10}$ by region over time
So far

• Large differences in perinatal health across regions in the Netherlands

• Perinatal health is associated with parental income
  • Association is larger among the bottom deciles, and close to zero for top-60%
  • Policies to improve perinatal health should specially focus on vulnerable income groups
    • Although average perinatal mortality among top-20% still higher than in other EU-countries, like Spain

• The magnitude and evolution of this association over time is different across different regions
Next steps

• What are the regional characteristics associated to better perinatal health at different points of the income distribution?
  • Health behaviors
  • Quality of (access to) health care
  • Environmental factors
  • Income inequality and social cohesion
  • Other

• Several sensitivity analysis:
  • Choice of region
  • Functional form income gradient

• Incorporate your suggestions

• Follow-up paper: causal effects of exposure
Thank you for your attention
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