

# Perinatal Health Inequalities in the Netherlands

The Role of Income and Neighborhoods

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- A strong association has been found between adverse birth outcomes and poor health from early childhood to adulthood.
- Adverse birth outcomes are higher among low-SES parents and those in low-income countries and neighborhoods.

Aizer and Currie (2014); Black et al. (2007); Blencowe et al. (2012); de Graaf et al. (2013b); Gluckman et al. (2008); Pattenden et al. (2010); Vos et al. (2014)

- Policymakers may target policies to high-risk geographic areas and demographic groups.

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- **But how can areas where low-income parents are more likely to experience adverse birth outcomes be characterized?**
- Previous studies have not been able to isolate geographic variation while adjusting for income-driven parents' selection due to data limitations.

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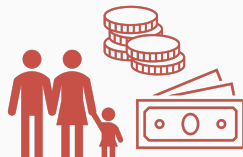
Neighborhood with high rates of  
adverse birth outcomes



Environmental  
characteristics



Low SES of  
parents



To document the association between **adverse birth outcomes** and a wide range of **sociodemographic circumstances** by linking 1.4 million births between 2008 and 2016 to Dutch administrative data on home addresses, household incomes, and migration backgrounds of parents.

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2. **Preterm birth (PTB)** The delivery of a newborn before completing 37 weeks of gestation.
3. **Infant mortality** Newborns who die during pregnancy or within a year of birth.

1. **Family household Income** Average annual pretax family household income in 2014–2018.

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2. **Migration background** Native Dutch, Moroccan, Turkish, Dutch Antillean, Surinamese, and others.
3. **Neighborhoods** 1) The child's earliest recorded address registration, 2) Geographical units: municipalities, and postal codes.

# Results



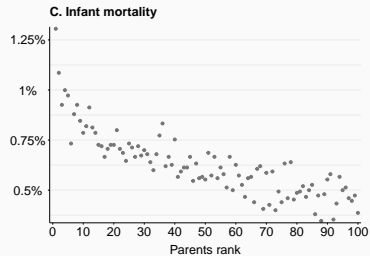
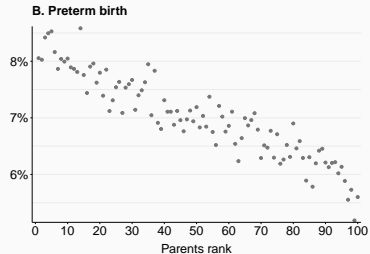
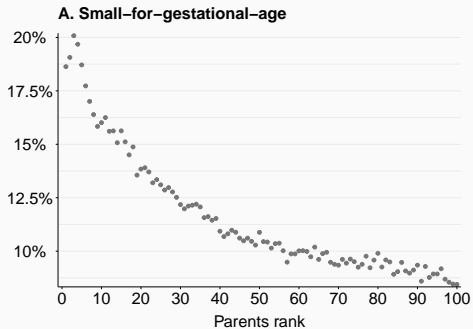
# Three-part analysis

1. Income and Perinatal Health
2. Geographical Inequalities
3. Correlation Analysis

# 1. Income and Perinatal Health



# Income gradients at the national level



# SGA by migration background and income

## A. Small for gestational age

Background	Total	Q20	Q40	Q60	Q80	Q100	N
Total	11.57	15.85	12.31	10.65	9.81	9.24	1,489,883
Native Dutch	10.09	15.17	11.17	9.56	8.82	8.41	945,466
Moroccan	11.5	11.89	11.19	11.32	10.9	11.51	70,106
Turkish	13.21	13.76	12.94	12.91	13.13	11.78	55,961
Dutch Antillean	16.18	18.91	15.82	13.95	13.17	10.73	28,116
<b>Surinamese</b>	<b>22.56</b>	<b>24.97</b>	<b>23.3</b>	<b>21.33</b>	<b>20.21</b>	<b>18.44</b>	<b>50,605</b>
Others	13.43	16.13	13.81	12.77	11.75	10.73	339,629

Notes. This table shows the percentage of small-for-gestational-age by migration background and parents income quintile in the Netherlands between 2008 and 2016.

# Preterm birth by migration background and income

## B. Preterm birth

Background	Total	Q20	Q40	Q60	Q80	Q100	N
Total	7.08	7.9	7.38	7.05	6.8	6.26	1,489,883
Native Dutch	7.07	8.67	7.52	7.04	6.69	6.27	945,466
Moroccan	6.08	6.33	5.76	5.78	6.13	6.22	70,106
Turkish	7.08	7.13	7.31	6.87	6.88	6.58	55,961
Dutch Antillean	8.64	9.31	8.85	7.77	8.26	6.86	28,116
<b>Surinamese</b>	<b>9.53</b>	<b>10.43</b>	<b>9.29</b>	<b>9.46</b>	<b>9.3</b>	<b>7.58</b>	<b>50,605</b>
Others	6.82	7.07	7.01	6.98	6.89	6.07	339,629

Notes. This table shows the percentage of preterm birth by migration background and parents' income quintile in the Netherlands between 2008 and 2016.

# Infant mortality by migration background and income

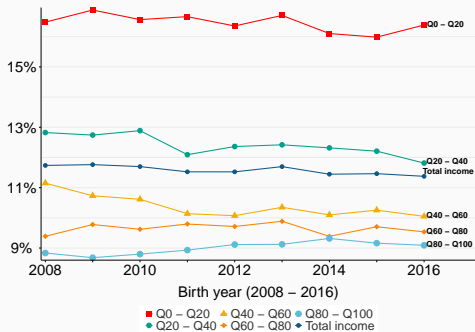
## C. Infant mortality

Background	Total	Q20	Q40	Q60	Q80	Q100	N
Total	0.63	0.86	0.66	0.6	0.54	0.50	1,491,397
Native Dutch	0.60	0.80	0.65	0.59	0.54	0.52	946,403
Moroccan	<b>0.85</b>	0.88	<b>0.86</b>	0.82	<b>0.92</b>	0.62	70,183
Turkish	0.79	0.85	0.73	<b>0.85</b>	0.77	0.55	56,032
Dutch Antillean	0.71	0.82	0.71	0.48	0.53	<b>0.63</b>	28,150
Surinamese	<b>0.85</b>	<b>1.11</b>	0.76	0.66	0.71	0.55	50,658
Others	0.63	0.89	0.60	0.53	0.46	0.40	339,971

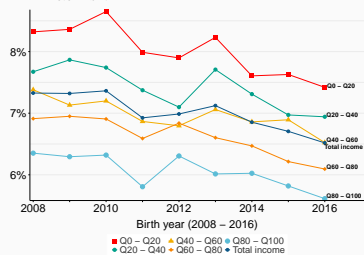
*Notes.* This table shows the percentage of infant mortality by migration background and parents' income quintile in the Netherlands between 2008 and 2016.

# Variation over time by income

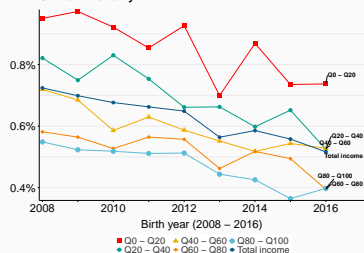
## A. Small-for-gestational-age



## B. Preterm birth



## C. Infant mortality



## 2. Geographical Inequalities



To characterize the spatial variation of adverse birth outcomes in the Netherlands, we use the following OLS model:

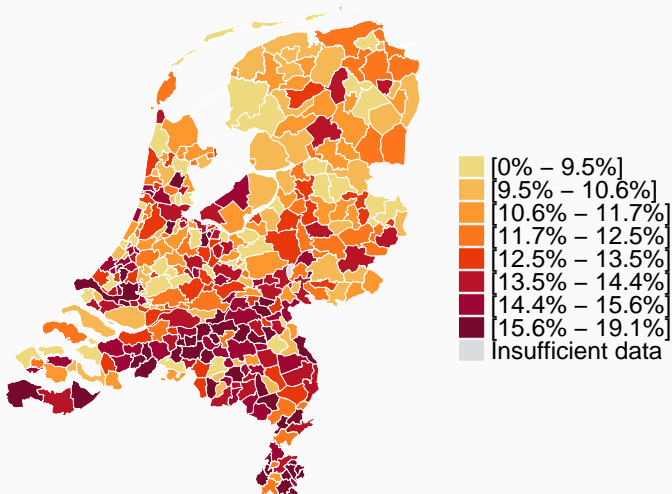
$$R_{P,ic} = \alpha_c + P\beta_c \quad (1)$$

with percentile rank of parents  $P$  on the expected adverse birth outcome  $R_{P,ic}$  for child  $i$  who grew up in area  $c$ .

**Low-income parents:** To estimate the average rate of adverse birth outcome for area  $c$  at 25th parents' percentile rank:

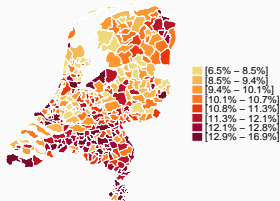
$$R_{P,c} = \alpha_c + 25\beta_c \quad (2)$$

## Low-income parents

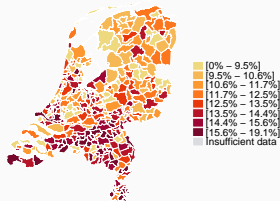


# Geographical inequalities of small for gestational age

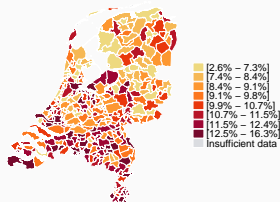
A. All parents



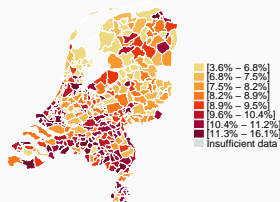
B. Low-income parents



C. Middle-income parents

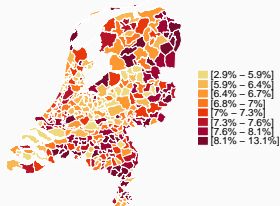


D. High-income parents

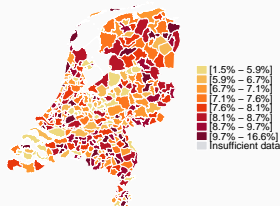


# Geographical inequalities of preterm birth

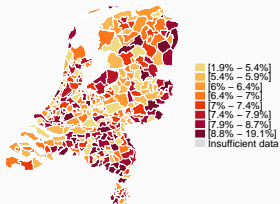
A. All parents



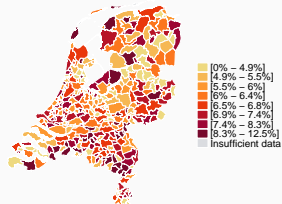
B. Low-income parents



C. Middle-income parents

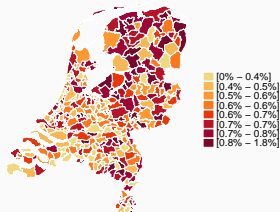


D. High-income parents

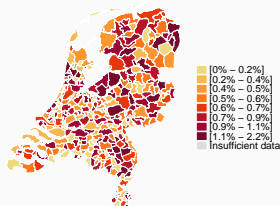


# Geographical inequalities of infant mortality

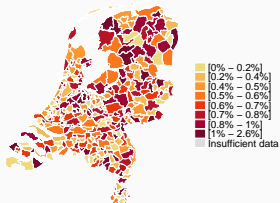
A. All parents



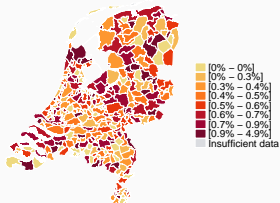
B. Low-income parents



C. Middle-income parents



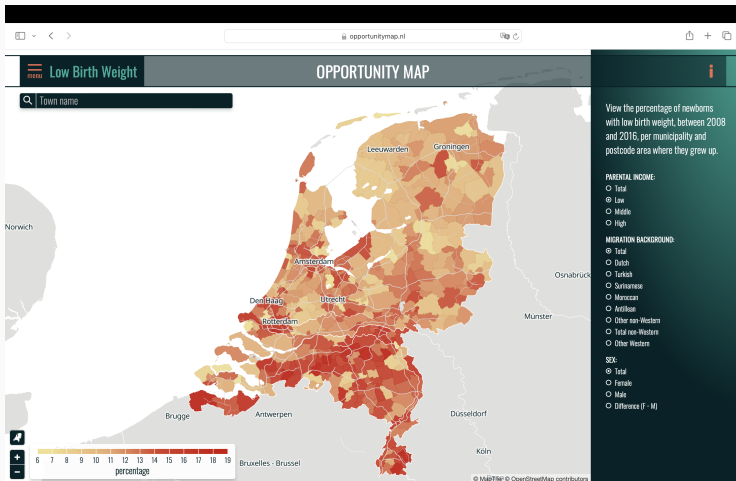
D. High-income parents



# Interactive website

English version: [www.opportunitymap.nl](http://www.opportunitymap.nl)

Dutch version: [www.kansenkaart.nl](http://www.kansenkaart.nl)



... but why do certain areas have higher rates of adverse birth outcomes than others?

### **3. Correlation Analysis**

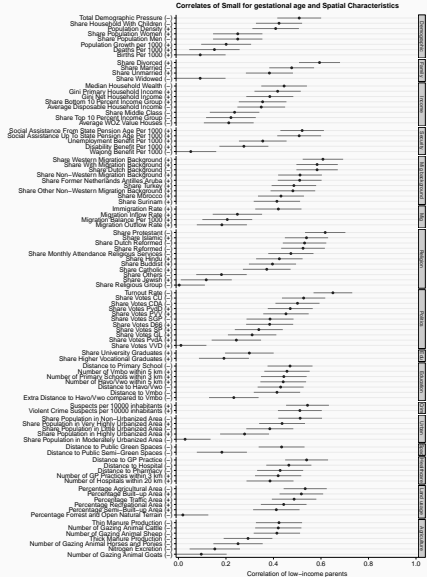


# Correlation analysis of small for gestational age

Analysis of weighted correlations between adverse birth outcomes and municipal-level characteristics (96 municipal-level characteristics in total)

▶ SGA map for low-income parents

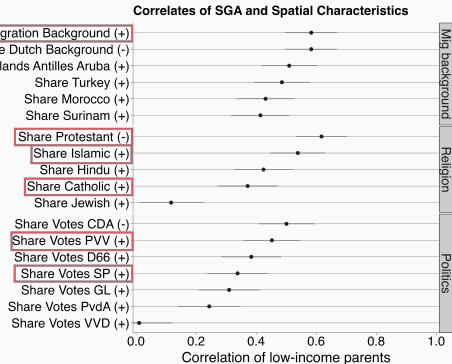
▶ Other correlates



# Correlation analysis of small for gestational age

Areas, where low-income parents are more likely to experience adverse birth outcomes, are characterized by a large share of:

1. Roman Catholic and Muslim, but not Protestant Christian;
2. Residents with an immigrant background;
3. Voters for two populist parties on the left and the right of the political spectrum.



# Conclusion



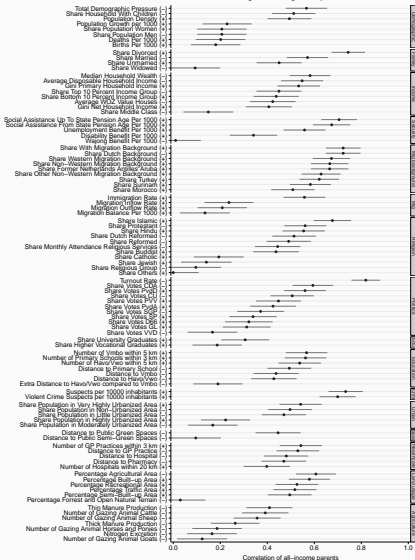
- Controlling for parental income, strong geographic variation in birth outcomes persists in the Netherlands.
- Our insights can help guide policy plans and preventive strategies throughout the first 1,000 days of life.

# Appendix

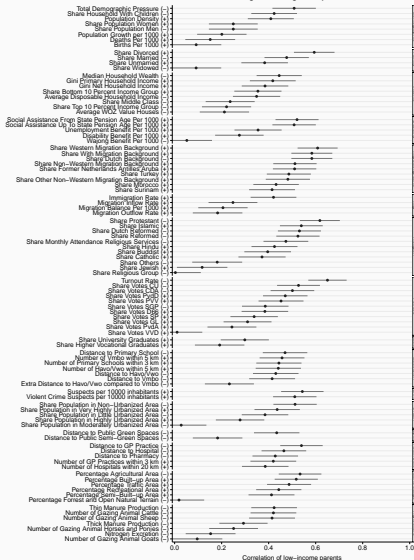
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# Correlation analysis of small-for-gestational-age

Correlates of Small for gestational age and Spatial Characteristics

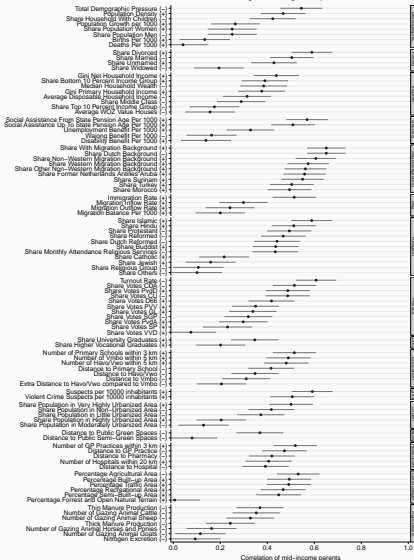


Correlates of Small for gestational age and Spatial Characteristics

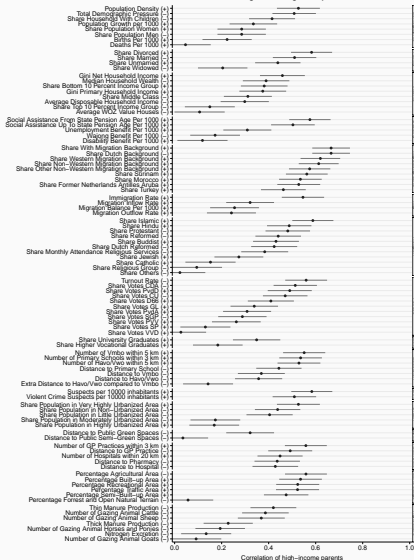


# Correlation analysis of small-for-gestational-age

Correlates of Small for gestational age and Spatial Characteristics

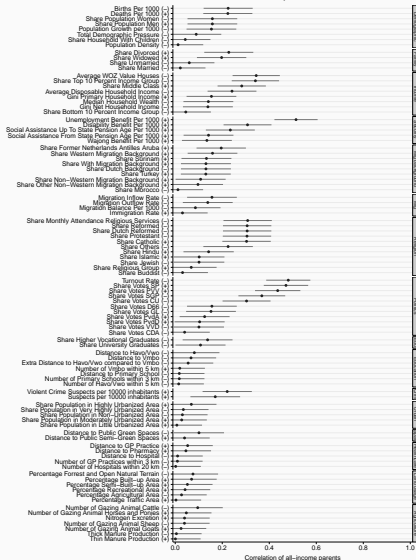


Correlates of Small for gestational age and Spatial Characteristics



# Correlation analysis of preterm birth

Correlates of Preterm birth and Spatial Characteristics

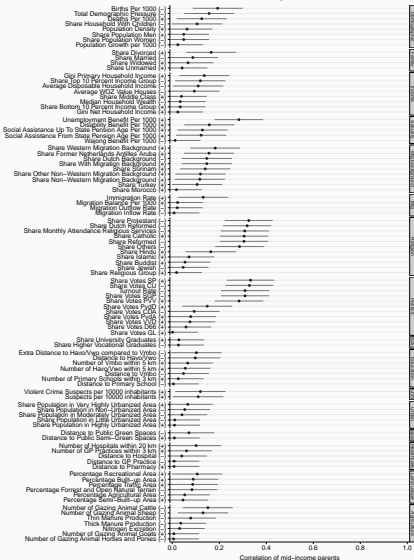


Correlates of Preterm birth and Spatial Characteristics

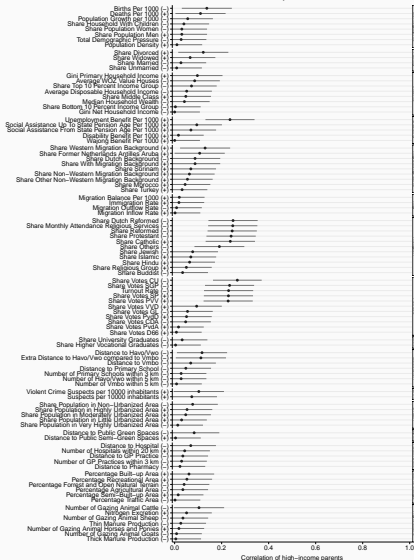


# Correlation analysis of preterm birth

Correlates of Preterm birth and Spatial Characteristics



Correlates of Preterm birth and Spatial Characteristics

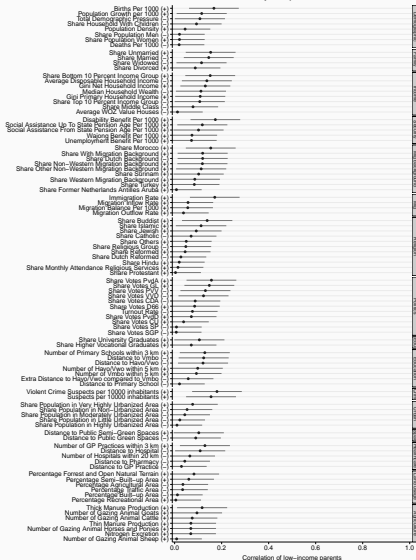


# Correlation analysis of infant mortality

Correlates of Infant mortality and Spatial Characteristics



Correlates of Infant mortality and Spatial Characteristics





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