

Title: Neighbourhood deprivation and perinatal health in the Netherlands

List of authors: Milagros Ruiz¹

Author affiliations: ¹Research Department of Epidemiology and Public Health, University College London, London, United Kingdom

Corresponding author: Milagros Ruiz, Research Department of Epidemiology and Public Health, University College London, 1-19 Torrington Place, London WC1E 7HB, UK, m.a.ruiz@ucl.ac.uk, +44 (0)20 7679 8252

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Neighbourhood deprivation has been theorised to capture the material conditions of the residential environment,¹ and has been extensively linked with health across the life course in empirical research over the last two decades.² Neighbourhood deprivation is not only an influential driver of lifelong health inequalities,² but is also accountable for the intergenerational transmission of inequalities from parents to offspring. A robust literature has found that babies who are born to mothers living in areas of higher deprivation have an increased risk of adverse birth outcomes, such as prematurity and restricted fetal growth.³ Given that these suboptimal outcomes lead to poorer developmental trajectories in childhood⁴ and chronic diseases in later adulthood,⁵ health at birth is a profoundly important priority for public health and social care. Despite substantial improvements in perinatal morbidity and mortality over time in Europe as a whole, advances have been slower in the Netherlands.⁴

Bertens et al report that neighbourhood deprivation-related inequalities in perinatal mortality, premature birth and small for gestational age (SGA) in the Netherlands have decreased in absolute terms, but persisted in relative terms, from 2003 to 2017.⁴ This begs the question, have perinatal inequalities in the Netherlands improved or not? The magnitude of absolute and relative health inequalities may be differentially influenced by the overall level of health in the population⁶ and helps to explain the observed inconsistency between absolute versus relative trends in perinatal inequalities. The authors estimate that absolute rates for each of the three perinatal outcomes decreased over the 14 year period;⁴ and illustrates the scenario where drops in the overall frequency of the outcome can result in a reduction of absolute inequality, but no change in relative inequality.⁷ Given that some experts favour monitoring absolute inequality for public health planning, management and evaluation,^{7,8} and that declines in relative inequality seem conceivable under far fewer conditions in Western European countries;⁹ it is tempting to conclude from the overall findings that deprivation-related perinatal inequalities have generally improved in the Netherlands. While absolute rates of birth outcomes decreased across all areas ranging from least (top quintile) to most (bottom quintile) deprived, the largest improvements were observed in the most deprived quintile.⁴

The study by Bertens and colleagues used data on all registered singleton births between 24 to 41 weeks of gestation from 2003 to 2017 from Perined, the national perinatal registry holding information on >97% of all births in the Netherlands.⁴ Indices of deprivation for small areas with an average of 4,000 residents were calculated in 2003, 2008 and 2012 by the Netherlands Institute for Health Services Research (NIVEL). Deprivation indices (measured by the proportion of unemployed and non-working adults, mean individual income, mean address density and the proportion of non-Western immigrants) were linked to individual data on pregnancies of women using their residential address (as recorded at time of delivery) according to year of delivery for the 2003 (2003-2007), 2008 (2008-2011) and 2012 (2012-2017) indices. Time-trend analyses of absolute rates revealed that the larger declines observed in the most deprived quintile were considerably greater than in the least deprived for premature birth and SGA, but not for perinatal mortality, after adjusting for mother's age, parity and non-Western/Western ethnic group.

Studies on the relationship between aspects of the residential environment and health operate, subject to certain assumptions, on the premise that the social and environmental context at the mezzo level bears an influential role on the health of residents, either in addition to or in interaction with micro-level and individual-level factors.² The literature has made clear that

maternal health behavioural and psychosocial determinants do not fully explain socio-economic and ethnic inequalities in perinatal health; prompting Culhane and Elo's conceptual framework on the neighbourhood context and birth outcomes. The framework connects three residential domains (social environment, service environment and physical characteristics) to birth outcomes via psychosocial, social support, health behavioural and maternal stress physiological pathways.³ Although Bertens and colleagues regard the inability to adjust their analyses for maternal risk factors such as smoking as a study limitation due to lack of data access;⁴ controlling for these intermediate variables would have likely introduced overadjustment bias given empirical support for some of the abovementioned pathways.³

A important review on neighbourhood and health research has pointed out that social epidemiologists have sought to establish an independent neighbourhood effect on health, which is somehow separate to the composition of neighbourhoods (i.e., individual characteristics of residents). This general tendency arises as a way to address the compositional explanation for neighbourhood differentials in health, which has predominated the literature.² A purely compositional explanation for the findings by Bertens and colleagues would be that neighbourhoods across the deprivation spectrum are comprised of individuals across a similar social gradient.¹⁰ For example, pregnant women of lower socio-economic position (SEP) are more likely to have worse birth outcomes, so it follows that neighbourhoods with larger numbers of women of lower SEP will have higher rates of adverse outcomes. In other words, if low and high SEP women experience lower and higher rates of these outcomes, respectively, wherever each group resides; the neighbourhood patterning of adverse birth outcomes would be entirely due to spatial clustering of low and high SEP women in different areas. Consequently, some may argue that a multilevel framework could be applied to the analyses by Bertens et al to parse out the distal effect of neighbourhood deprivation on perinatal health from the proximal effects due to individual factors. While this is methodologically feasible, Oakes and colleagues have argued that too much attention has been made on disentangling places from persons because contextual and compositional effects of neighbourhoods are not mutually exclusive, but inseparably intertwined.

For this reason, it would be beneficial for researchers to move their focus away from quantifying independent effects of neighbourhoods on health;² and toward examining the interplay between people and places that shape health through biological embedding, the process by which socially patterned early experiences 'get under the skin.'¹¹ Biosocial processes such as exposure to poor housing conditions, residential instability, segregationist policies, and exposure to environmental toxins, are becoming increasingly recognised as critical for reducing the impact of neighbourhood deprivation on perinatal health. Hence, investigations on the role of these biosocial processes may be informative for future policies and interventions.^{2 11} Bertens et al's large-scale study of >2.3 million births reports that absolute declines in deprivation-related inequalities for perinatal mortality lag behind those for perinatal morbidity.⁴ This is very concerning for population health in the Netherlands on the grounds that the World Health Organization considers the guarantee of 'a good start to life for every child' as the highest priority to address health inequalities and their social determinants.¹² Time trends of perinatal inequalities are therefore important to clarify the extent to which scientific knowledge is being generated and implemented to advance population health in the Netherlands.

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