



# Contribution of local area deprivation to cultural-linguistic inequalities in foetal growth restriction: Trends over time in a Canadian metropolitan centre

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## ABSTRACT

This study investigated temporal trends in heterogeneity of foetal growth restriction across neighbourhood deprivation levels for two culturally distinct communities (Anglophones and Francophones) in a North American metropolitan centre. Inequalities in foetal growth restriction related to deprivation fell from 1989 to 2008 for Francophones, but initial improvements for Anglophones later reversed with a rise in poor foetal growth in the most materially disadvantaged and, unexpectedly, advantaged areas as well. Inequalities in foetal growth restriction related to neighbourhood material deprivation may be emerging in this minority Anglophone population. Potential mechanisms underlying these trends are discussed, as well as implications for perinatal health policy.

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## 1. Introduction

Cultural and/or ethnic differences in foetal growth restriction are present in many populations, and rapid reversals in group-based inequality can occur even over decades. Inequalities such as these have been found in Canada where Anglophones today are at higher risk of foetal growth restriction than Francophones in the metropolitan centre of Montréal, compared with trends that not long ago favoured Anglophones (Auger et al., 2012a). Characteristics of neighbourhoods in which pregnant women live are associated with foetal growth restriction (Elo et al., 2009), but the relationship with trends over time is poorly understood, especially among minority ethnic and cultural population subgroups (Metcalf et al., 2011). Although rates of foetal growth restriction have improved over time in several countries (Ananth et al., 2004; Auger et al., 2012a; Craig et al., 2004; Langridge et al., 2010; Mortensen et al., 2008), it is unclear if improvements have occurred equally across areas, or if deprived neighbourhoods may have benefitted less than advantaged neighbourhoods. Moreover, little research has investigated how foetal growth restriction is associated with neighbourhood characteristics compared with

other birth outcomes. In a recent systematic review of perinatal outcomes, only 20% of neighbourhood research addressed foetal growth, whereas 85% investigated preterm birth or birth weight (Metcalf et al., 2011). As foetal growth restriction is a risk factor for mortality and adverse health throughout life (Barker, 2006), a better understanding of how neighbourhoods may shape cultural inequalities in foetal growth restriction temporally is warranted. The general aim of this study was to determine how place-related characteristics were associated with trends in foetal growth over time for two culturally distinct populations. We focused on the Canadian metropolitan centre of Montréal, a North American urban region containing cultural groups defined by linguistic status (Anglophone and Francophone) where linguistic inequalities in foetal growth restriction have been documented (Auger et al., 2012a). Foetal growth restriction in this analysis was operationalized as small-for-gestational-age (SGA) birth. An overview of the current state of knowledge is first provided.

### 1.1. Neighbourhood deprivation and SGA birth

Substantial literature suggests that neighbourhood indicators of material deprivation such as low income and employment are associated with SGA birth (Beard et al., 2009; Garcia-Subirats et al., 2012; Liu et al., 2010; Luo et al., 2006; Sundquist et al., 2011; Zeka et al., 2008) and intrauterine growth restriction (Farley et al., 2006). Related characteristics associated with SGA birth include

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neighbourhood crime (Masi et al., 2007), residential stability (Garcia-Subirats et al., 2012), and the built environment (Farley et al., 2006; Lane et al., 2008; Miranda et al., 2009; Zeka et al., 2008). Neighbourhood deprivation is thought to influence perinatal health by impacting availability of goods and services in neighbourhoods, or increasing chronic stress (Culhane and Elo, 2005).

Associations between SGA birth and neighbourhoods are not limited to material characteristics. Though less developed, an emerging literature also suggests an association with social aspects of neighbourhoods. Place-based traits such as social isolation have been associated with SGA birth, particularly for US Blacks (Bell et al., 2006). Similarly, neighbourhood ethnic composition is associated with SGA birth, preterm birth, and birth weight (Masi et al., 2007; Mason et al., 2009). Neighbourhood markers of reciprocal exchange and social support are predictive of birth weight (Buka et al., 2003; Morenoff, 2003). It has been hypothesized that social aspects of neighbourhood deprivation influence perinatal health through psychosocial pathways involving social interactions and support structures that impact stress or health-related behaviours (Auger et al., 2012b).

### 1.2. Ethnic and cultural disparities in SGA birth

Ethnic or cultural minorities may be susceptible to neighbourhood-level risks, given they may have fewer resources by which to mitigate adverse exposures. Although ethnicity is an important predictor of SGA birth (Bryant et al., 2010; Stein et al., 2009), little research has examined how SGA birth in ethnic subgroups is influenced by neighbourhood characteristics. In New Zealand, material area deprivation is associated with SGA birth among European and Maori, but not Pacific women (Craig et al., 2004). In the US, material deprivation contributes less to Black–White disparities in SGA birth than is the case for preterm birth (Elo et al., 2009; Schempf et al., 2011). This may explain why preterm birth has been the focus of the majority of neighbourhood research, which in large part suggests stronger associations with material deprivation for Blacks than Whites (Buka et al., 2003; Janevic et al., 2010; Kaufman et al., 2003; Messer et al., 2006; Rauh et al., 2001; Reagan and Salsberry, 2005). Nonetheless, SGA birth is common among Blacks in poor areas (Love et al., 2010). In contrast to material deprivation, group density (a potential marker for social deprivation) is more strongly associated with SGA birth in Whites than in Blacks or Hispanics (Masi et al., 2007). Social deprivation is also disproportionately associated with short gestation in Whites and Hispanics than in Blacks in the US (Masi et al., 2007; Mason et al., 2009). It is possible that, for ethnic subgroups, relationships between SGA birth and neighbourhood factors vary in nature and magnitude, depending on the balance of material to social influences.

Compared with ethnicity, research on neighbourhood deprivation and SGA birth across cultural populations is much less prevalent. The underlying reasons are unclear, but may relate to the challenge of identifying suitable cultural markers. Language or minority status have been proposed as tools to distinguish cultural groups (Ford and Harawa, 2010), and recent research suggests that language differentiates perinatal health inequalities in Montréal, a large North American multilingual metropolitan centre (Auger et al., 2012a). This study found that SGA birth prevalence in Montréal was lower for Anglophones than Francophones in the 1980s, but that these disparities narrowed and reversed over the next three decades. Population trends such as these demonstrate how rapidly cultural inequalities in perinatal health can change over time, and raise questions on the underlying reasons for the reversal in SGA birth inequality between Anglophones and Francophones. Montréal has a unique linguistic context wherein Anglophones are a minority and tend to cluster residentially, thus implicating upstream structural factors that shape the context of neighbourhood exposures (Daniel et al., 2008). Processes including emigration of advantaged Anglophones from Québec

in recent decades (Floch and Pocock, 2008) could plausibly affect advantaged more than deprived neighbourhoods, strengthening the possibility that neighbourhood deprivation could mark a reversal of cultural disparities in SGA birth over time. Gradual selection of Anglophones into more deprived neighbourhoods secondary to reduced socioeconomic status could underpin further mechanisms by which area factors shape SGA birth.

### 1.3. Time trends in SGA birth disparities

The lack of data on temporal associations between neighbourhood characteristics and SGA birth is not limited to Canada, but is a widespread problem. The existing literature primarily illustrates overall trends, and suggests that SGA birth prevalence recently declined in Canada (Auger et al., 2012c), the US (Ananth et al., 2004), Scandinavia (Mortensen et al., 2008), Australia (Langridge et al., 2010) and New Zealand (Craig et al., 2004), with no change in Finland (Gissler et al., 2009). Educational and occupational disparities in SGA birth persist in many of these countries (Auger et al., 2012c; Gissler et al., 2009; Mortensen et al., 2008, 2009), as do disparities associated with neighbourhood material deprivation (Beard et al., 2009; Langridge et al., 2010; Luo et al., 2004). Disparities related to neighbourhood social deprivation have not, to our knowledge, been investigated.

Evidence on how area deprivation might modulate cultural group differences in SGA birth over time is, however, scant, despite multiple studies suggesting that time trends in foetal growth disparities vary according to ethnicity. In Denmark, foetal growth restriction among non-Western women rose over the past two decades, widening the disparity relative to Western women (Mortensen et al., 2009). In the US, SGA birth rates improved, but the Black–White gap remains (Ananth et al., 2004). In New Zealand, improvements in SGA birth were more rapid for Maori and Pacific residents than those of European ethnicity (Craig et al., 2004). The extent to which neighbourhood deprivation relates to these temporal trends is, however, not known for any of these countries. Australia is an exception, as disparities in SGA birth related to material deprivation increased more for the non-Aboriginal than the Aboriginal population (Langridge et al., 2010). These studies suggest cultural differences in SGA birth could be masked if vulnerable subgroups are not accounted for. Temporal trends are important to evaluate, as they can provide convincing evidence of emerging neighbourhood risk factors for SGA birth in vulnerable groups, and help improve public health interventions. Documentation of disproportionate improvements in SGA birth in advantaged areas, for example, supports attention to appropriate health policy and potentially tailored prevention (rather than mainstream) strategies for populations at risk in disadvantaged neighbourhoods.

### 1.4. Research objectives and conceptual framework

This study sought to achieve a better understanding of whether linguistic subgroups in deprived neighbourhoods experience less (or similar) improvement in SGA birth over time relative to advantaged areas of Montréal. Such data would advance knowledge of relationships between neighbourhoods and perinatal health, and assist health policy through the planning and evaluation of interventions tailored to areas. The following research questions were addressed:

1. Do associations between neighbourhood deprivation and SGA birth vary according to linguistic status (Anglophone vs Francophone) in Montréal?
2. How does neighbourhood deprivation relate *over time* to linguistic inequalities in SGA birth?

In our conceptual framework, two dimensions of neighbourhood deprivation (material and social) were considered. We

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