A Study of the Association Between Characteristics of CLSCs and the Risk of Small for Gestational Age Births Among Term and Preterm Births in Quebec, Canada

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ABSTRACT

Objectives: The objective of this study was to describe whether the social environment of the territory of residence is associated with indicators of foetal growth retardation.

Methods: All newborns (n=667,254) from 143 Centres locaux de services communautaires (CLSC) territories of Quebec, Canada, 2000-2008 were included in this study. Small for gestational age (SGA), very small for gestational age (VSGA) and SGA-preterm births were identified. Social characteristics and access to medical services of the population in the CLSCs were obtained from the Canadian Community Health Survey. Data on material deprivation, racial diversity and social isolation were obtained from the 2001 and 2006 Canadian censuses. A compromise between two methods, stepwise and best subset, was used to select variables for multivariate logistic modelling. The model was fitted on each studied outcome: SGA, VSGA and SGA among preterm births.

Results: When investigating material deprivation, racial diversity, social isolation, proportion of sedentary residents and proportion with fair or poor availability of health care services in the CLSC territories, material deprivation, racial diversity, social isolation and sedentary residents showed increased adjusted risk of SGA. Results of the model fit on VSGA birth and on SGA among preterm births were similar.

Conclusion: CLSC characteristics of material deprivation, racial diversity, social isolation as well as the contextual variable of sedentary lifestyle were associated with indicators of foetal growth retardation. Further work on features of the CLSCs could help understand how the outcome of SGA is associated with contextual factors and identify groups for intervention.

Key words: Small for gestational age; fetal growth retardation; social environment; health behaviour; health surveys; logistic models

La traduction du résumé se trouve à la fin de l'article.

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Interest is growing with regard to how social environment influences health.^{1,2} Results of contextual analyses depend not only on the factors investigated but also on the geographic levels at which they are assessed as well as the type of measurement.³ Generally, the geographic level of the analysis is determined by administrative boundaries,¹ even though further health promotion intervention at this level might be questionable.

Studied factors are mostly drawn from censuses, although some authors have also used complementary surveys.⁴ Census-derived variables proxy social processes, while surveys provide information more directly; both types of information are useful for studying foetal health.⁵

Small for gestational age (SGA) birth is a proxy of foetal growth retardation. Individuals born SGA are at increased risk of neonatal death and chronic illnesses.^{6,7} Risk factors of SGA include maternal age, parity, low weight gain, and smoking.⁶ Contextual factors were reported: socio-economic deprivation, race, immigration and social isolation.⁸⁻¹¹ Almost all of them were census-derived.² Measures from complementary surveys were used less frequently,^{2,4,12,13} even though large surveys are available.

We hypothesized that the social environment of the mother has an influence on the weight of the infant at birth and that a better knowledge of this environment could help to identify groups for efficient prenatal intervention. Our objectives were to study economic, racial, social and other contextual features of the territories of residence in relation to the outcomes of SGA, very

small for gestational age (VSGA) and SGA among premature births in Quebec.

METHODS

Study population and setting

The population of this observational study consisted of live singleton births to mothers living in Quebec, Canada from 2000 to 2008. Because survey data from northern territories (Nord-du-Québec, Terres-Cries-de-la-Baie-James and Nunavik) were not comparable to other territories, they were excluded. Births of less than 22 or more than 43 completed weeks of gestational age or with an implausible weight for age according to a criteria table presented in Alexander et al.'s US fetal growth curve study¹⁴ were also excluded.

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Conflict of Interest: None to declare.

Table 1. Available Variables for CLSC Portraits From Census and Survey Data and Associated Latent Variable

Variable	Latent Variable
Census	
Proportion of people without high school degree	Material deprivation
Mean age	
Mean household size	Social isolation
Proportion of household size of one	Social isolation
Proportion of immigrants	Racial diversity
Mean income	Material deprivation
Proportion of people with low income*	Social isolation & racial diversity
Proportion of people speaking a non-official language at home	Racial diversity
Proportion of people not married	Social isolation
Proportion of workers walking or biking to work	
Type of territory (urban/urban and rural/rural)	
Survey	
Proportion † having five alcohol drinks on one occasion once a week	
Proportion † that had food insecurity in the past 12 months	
Proportion † eating fruit and vegetables less than five times per day	
Proportion † with low emotional support (<29 on MOS‡)	
Proportion † with low tangible social support (<15 on MOS‡)	
Proportion † with sedentary behaviour (without physical activity in the past 3 months)	
Proportion † rating their availability of health care as “fair” or “poor”	
Proportion † smoking cigarettes daily	Material deprivation
Proportion † having someone smoking in home almost every day	Material deprivation

* According to Statistics Canada's low income cut-off.

† Proportion-like values built with the results of a regression on CCHS data (exclude year-cycle and data collection effects).

‡ Medical Outcome Study subscale.

Territory definition

Territories were the 143 Centres locaux de services communautaires (CLSC, local community health and social services centres). CLSCs vary in size (average of 46,727 individuals), each being a mix of similar-sized subterritories (urban, rural). The CLSC is the first level at which Quebec health services and prenatal interventions are organized.

Outcomes

Neonates with a weight for gestational age below the 10th and 5th percentile were identified as SGA and VSGA using the Canadian standard reference.¹⁵ SGA births occurring before 37 weeks were qualified as SGA-preterm.

Independent variables

CLSC portraits were drawn from responses to Statistics Canada's Canadian Community Health Survey (CCHS)¹⁶ and from census profiles. Variables were selected if a link with birth outcomes was suspected and the variables were of public health interest (Table 1). Individual variables were used in a sensitivity analysis (mother's age, marital status, parity, academic degree, Canadian-born).

Source of data

Birth certificates from Quebec's registry of demographic events of 2000 to 2008 were used.*

The CCHS is a cross-sectional survey that has been conducted in four cycles (2000-2001, 2003, 2005 and 2007-2008). Data from the cycles were pooled¹⁷ and CLSC proportion-like values were built using the 100,832 CCHS responses in a logistic regression model that accounted for the sampling design (respondent sampling weights) and controlled for data collection method and cycle effects.¹⁶⁻¹⁸

Profile values of the CLSC subterritories (2001 and 2006 census tracts in urban setting, and census subdivisions otherwise) were aggregated by CLSC by weighting by number of residents.¹⁹

Missing CLSC values from either the CCHS or the census were imputed as implemented in the SAS MI procedure^{20,21} (expectation-maximization option, logit transform for proportions).

* Some births occurring outside of the province might have been missing from the 2008 registry.

Table 2. Description of Birth Data From the 143 CLSC Territories

	N	CLSC Mean (s.d.)	[Min; Max]
Total births (no.)	143	4666 (3369)	[113; 15,819]
SGA (%)	143	8.22 (1.34)	[2.93; 13.54]
VSGA (%)	143	3.77 (0.74)	[1.21; 6.56]
Premature (%)	143	6.32 (0.92)	[4.48; 9.32]
SGA among preterm (%)	143	9.28 (3.65)	[0.00; 33.33]

N: number of CLSC territories.

Statistical analysis

An exploratory factor analysis was performed to highlight the concepts (latent variables) measured by contextual data. The independent and inappropriately-represented variables (no communality exceeding |0.5|) were removed, and the Heywood method was used when anomalies about communality estimates were encountered.²²

CLSC portraits were linked to births based on the mother's place of residence. Then, the association between the outcome of SGA and different categories of the exposure gradient was evaluated with logistic regression. The type of CLSC territory was categorized as “rural”, “urban and rural” and “urban” (reference). Other explanatory variables were treated as tertiles (1, 2 and 3, for the lower, middle and upper part of the distribution, respectively), with the first tertile being the reference category (except for mean income and mean household size, for which the third tertile was the reference). Tertile values yielded results that were easier to interpret than those obtained by using either CLSC proportions or the latent variables resulting from the factor analysis as explanatory variables. Odds ratios (OR) were used to estimate relative risks.

Univariate model fit yielded crude ORs. Subsequently, a multivariate model was built. For variable selection, a compromise between a stepwise and best-subset selection method was used since objections relating to the bias-variance trade-off had been brought forth for both methods.^{23,24} The Schwarz information criterion for the comparison of non-nested models^{23,24} indicated the optimal number of variables k from the complete stepwise sequence. We fitted three best-subset models of k , $k+1$ and $k-1$.

Table 3. Crude Odds Ratios of SGA Birth According to Tertile Values of CLSC Variables

CLSC Territory Variable	N (% Imputed)	Category		OR	[99% CI]
Census*					
Without academic degree	143 (0.00)	Low prop.	[0.04; 0.15]	1.00	
		Middle prop.	[0.15; 0.20]	1.02	[0.94; 1.10]
		High prop.	[0.20; 0.37]	1.13	[1.02; 1.26]
Age (years)	143 (0.00)	Low mean	[25.92; 38.30]	1.00	
		Middle mean	[38.30; 40.52]	0.98	[0.89; 1.08]
		High mean	[40.52; 51.75]	1.08	[0.99; 1.18]
Household size (people)	143 (0.00)	High mean	[4.45; 2.46]	1.00	
		Middle mean	[2.46; 2.31]	1.02	[0.94; 1.11]
		Low mean	[2.31; 1.70]	1.14	[1.05; 1.25]
Household size of one	143 (0.00)	Low prop.	[0.12; 0.26]	1.00	
		Middle prop.	[0.26; 0.30]	1.07	[1.00†; 1.15]
		High prop.	[0.30; 0.54]	1.20	[1.11; 1.29]
Immigrants	143 (0.70)	Low prop.	[0.00; 0.01]	1.00	
		Middle prop.	[0.01; 0.05]	0.98	[0.91; 1.06]
		High prop.	[0.05; 0.62]	1.09	[1.00†; 1.19]
Income (\$)	143 (0.00)	High mean	[28 798; 56 036]	1.00	
		Middle mean	[25 269; 28 797]	1.07	[0.99; 1.15]
		Low mean	[16 144; 25 268]	1.17	[1.06; 1.29]
Low income	143 (0.00)	Low prop.	[0.00; 0.07]	1.00	
		Middle prop.	[0.07; 0.09]	1.06	[0.99; 1.14]
		High prop.	[0.09; 0.26]	1.21	[1.12; 1.31]
Non-official language	143 (0.00)	Low prop.	[0.00; 0.00]	1.00	
		Middle prop.	[0.00; 0.02]	1.01	[0.92; 1.10]
		High prop.	[0.02; 0.71]	1.13	[1.03; 1.23]
Not married	143 (0.00)	Low prop.	[0.44; 0.58]	1.00	
		Middle prop.	[0.58; 0.62]	0.94	[0.84; 1.05]
		High prop.	[0.62; 0.86]	1.03	[0.94; 1.14]
On foot/biking to work	143 (0.00)	Low prop.	[0.02; 0.07]	1.00	
		Middle prop.	[0.07; 0.10]	1.07	[1.00†; 1.15]
		High prop.	[0.10; 0.64]	1.15	[1.04; 1.27]
Type of territory	143 (0.00)	Only urban subterritories		1.00	
		Rural and urban subterritories		0.97	[0.90; 1.05]
		Only rural subterritories		0.93	[0.86; 1.02]
Survey*					
Five or more alcohol drinks/one occasion	143 (2.10)	Low prop.	[0.00; 0.07]	1.00	
		Middle prop.	[0.07; 0.10]	0.92	[0.85; 1.00†]
		High prop.	[0.10; 0.21]	1.04	[0.94; 1.14]
Presence of food insecurity	143 (5.59)	Low prop.	[0.02; 0.11]	1.00	
		Middle prop.	[0.11; 0.15]	1.12	[1.02; 1.22]
		High prop.	[0.15; 0.36]	1.20	[1.12; 1.29]
Less than five fruit/vegetables	143 (2.10)	Low prop.	[0.04; 0.51]	1.00	
		Middle prop.	[0.51; 0.58]	1.09	[0.99; 1.20]
		High prop.	[0.58; 0.78]	1.08	[0.99; 1.17]
Low emotional support	143 (7.69)	Low prop.	[0.13; 0.41]	1.00	
		Middle prop.	[0.41; 0.50]	1.06	[0.97; 1.16]
		High prop.	[0.50; 1.00]	1.02	[0.92; 1.12]
Low tangible social support	143 (7.69)	Low prop.	[0.12; 0.38]	1.00	
		Middle prop.	[0.38; 0.47]	1.05	[0.96; 1.15]
		High prop.	[0.47; 0.96]	0.99	[0.91; 1.07]
Sedentary behaviour	143 (1.40)	Low prop.	[0.02; 0.10]	1.00	
		Middle prop.	[0.10; 0.14]	1.07	[0.99; 1.16]
		High prop.	[0.14; 0.75]	1.17	[1.07; 1.27]
Fair or poor availability of health care services	143 (5.59)	Low prop.	[0.00; 0.32]	1.00	
		Middle prop.	[0.32; 0.45]	1.03	[0.93; 1.14]
		High prop.	[0.45; 0.93]	0.98	[0.90; 1.07]
Daily cigarette smoking	143 (1.40)	Low prop.	[0.01; 0.21]	1.00	
		Middle prop.	[0.21; 0.26]	1.04	[0.95; 1.13]
		High prop.	[0.26; 0.47]	1.11	[1.00†; 1.22]
Someone smoking inside home	143 (1.40)	Low prop.	[0.05; 0.22]	1.00	
		Middle prop.	[0.22; 0.29]	0.96	[0.87; 1.05]
		High prop.	[0.29; 0.50]	1.02	[0.92; 1.13]

* Variable presented is a proportion unless otherwise mentioned.

† The exact value is above 1.

N: number of CLSCs; prop.: proportion; OR: Odds ratio; CI: Confidence interval.

terms. The end model was chosen from the best-subset models that presented an acceptable goodness-of-fit Hosmer and Lemeshow statistic. The latter was adjusted to SGA as well as to VSGA and SGA-preterm birth. Each explanatory variable was reported with its underlying latent variable as determined in the factor analysis to facilitate comparisons with other work using either variables or latent variables.

The following were assessed: sensitivity to imputation of the CLSC data, robustness of the results to the addition of individual explanatory variables, sensitivity to the territory definition, and sensitivity

to the final model selection. For the sensitivity analysis to the territory definition, we incorporated the census variables which were at first aggregated at the subterritory level (2,368 tract or subdivision areas) to the CCHS variables that were only aggregated at the CLSC level in the model. Robust variances that capture the inter-CLSC variability were used for both the analysis with individual variables and the analysis with the data aggregated at the subterritory level.

The Commission d'Accès à l'Information du Québec and Université Laval's Ethics Committee approved this research project. Analysis was carried out using SAS 9.2 MI, FACTOR, LOGISTIC

Table 4. Adjusted Odds Ratios of SGA, VSGA and SGA-preterm Birth From the Final Model According to Tertile Values of CLSC Variables

Latent Variable	Variable			SGA		VSGA		SGA-preterm	
				OR	[99% CI]	OR	[99% CI]	OR	[99% CI]
Material deprivation	Without academic degree	Low prop.	[0.04; 0.15]	1.00		1.00		1.00	
		Middle prop.	[0.15; 0.20]	1.08	[1.03; 1.14]	1.10	[1.03; 1.17]	0.99	[0.89; 1.11]
		High prop.	[0.20; 0.37]	1.19	[1.09; 1.30]	1.25	[1.13; 1.38]	1.19	[1.02; 1.38]
Racial diversity	Immigrants	Low prop.	[0.00; 0.01]	1.00		1.00		1.00	
		Middle prop.	[0.01; 0.05]	1.05	[0.99; 1.12]	1.04	[0.95; 1.13]	1.08	[0.94; 1.24]
		High prop.	[0.05; 0.62]	1.09	[1.01; 1.17]	1.10	[1.00†; 1.20]	1.08	[0.93; 1.26]
Social isolation	Not married	Low prop.	[0.44; 0.58]	1.00		1.00		1.00	
		Middle prop.	[0.58; 0.62]	0.95	[0.89; 1.01]	0.95	[0.88; 1.02]	0.92	[0.79; 1.06]
		High prop.	[0.62; 0.86]	0.93	[0.85; 1.01]	0.94	[0.86; 1.04]	0.97	[0.84; 1.12]
Social isolation	Household size of one	Low prop.	[0.12; 0.26]	1.00		1.00		1.00	
		Middle prop.	[0.26; 0.30]	1.05	[0.99; 1.12]	1.05	[0.97; 1.14]	0.97	[0.84; 1.12]
		High prop.	[0.30; 0.54]	1.15	[1.04; 1.26]	1.13	[1.01; 1.27]	1.03	[0.85; 1.24]
Social isolation & racial diversity	Low income	Low prop.	[0.00; 0.07]	1.00		1.00		1.00	
		Middle prop.	[0.07; 0.09]	1.03	[0.96; 1.10]	1.05	[0.96; 1.15]	0.98	[0.85; 1.14]
		High prop.	[0.09; 0.26]	1.09	[0.99; 1.20]	1.11	[0.99; 1.25]	1.11	[0.92; 1.33]
Social environment	Sedentary behaviour	Low prop.	[0.02; 0.10]	1.00		1.00		1.00	
		Middle prop.	[0.10; 0.14]	1.05	[0.99; 1.11]	1.07	[1.00‡; 1.14]	1.04	[0.93; 1.17]
		High prop.	[0.14; 0.75]	1.07	[1.01; 1.13]	1.08	[1.00‡; 1.16]	1.15	[1.01; 1.31]
Social environment	Fair or poor availability of health care services	Low prop.	[0.00; 0.32]	1.00		1.00		1.00	
		Middle prop.	[0.32; 0.45]	1.04	[0.98; 1.11]	1.04	[0.97; 1.12]	1.12	[1.01; 1.26]
		High prop.	[0.45; 0.93]	1.05	[1.00‡; 1.11]	1.04	[0.97; 1.11]	1.04	[0.92; 1.19]

† The exact value is above 1.

‡ The exact value is below 1.

prop.: proportion; OR: Odds ratio; CI: Confidence Interval.

Results are adjusted for the presence of all variables presented in the table.

(model selection) and GENMOD procedures (final model fitting). Regression results were considered significant at $p < 0.01$.

RESULTS

Participants

Of the 676,165 singleton births, 7,379 were from excluded CLSCs, 850 could not be assigned a CLSC and 682 had no SGA status (163 of the latter had an implausible birth weight or gestational age), leaving 667,254 births (Table 2). There were on average 8.22% and 3.77% SGA and VSGA births, respectively, within each CLSC territory, illustrating that the proportion of SGA births has slightly lowered in Canada since the reference scale was built.^{7,15}

Factor analysis

Three latent variables account for 97.2% of the total variance in the factor analysis: material deprivation, racial diversity and social isolation (Table 1). Interestingly, mean income and low income belong to different latent variables. Explanatory variables that do not belong to a specific latent variable are referred to as “social environment variables” in the remainder of this text.

Regression

The crude ORs of SGA for the third tertile of each census variable differ from the null value of 1, except for age, marital status and type of territory (Table 3). CLSCs with third tertiles of the following variables from the CCHS: food insecurity, sedentary behaviour, and cigarette smoking, have 20%, 17% and 11% higher risks of SGA, respectively.

Our variable selection method led to the multivariate model with 7 explanatory variables presented in Table 4. Results with regard to SGA birth show that, with all other variables being adjusted for, CLSCs with middle and high levels of material deprivation have 8% and 19% higher risks of SGA, respectively. Similar conclusions can be drawn with respect to high levels of racial diversity, social

isolation (variable=household size of one) and being sedentary. Those CLSCs also have higher adjusted risk of VSGA, while CLSCs with high levels of material deprivation and sedentary behaviour and those with middle-level access of health care services have higher adjusted risks of SGA-preterm birth.

Similar ORs were obtained when the model was fitted on SGA with non-imputed data (135 CLSCs). ORs did not change after the inclusion of individual variables* in the model, and would have been similar had we used other territorial limits. Another plausible final model included tangible social support instead of access to services and physical activity (not shown). ORs resulting from this model were similar to those presented.

DISCUSSION

For the 9-year period from 2000-2008, we confirmed contextual associations between SGA birth and material deprivation, racial diversity and social isolation over the territory of residence in Quebec. We also report a novel association between sedentary lifestyle of the residents and SGA.

Our results are subject to the following limitations. There are three possibilities of misclassification of the exposure. The first one arises with our implicit postulate that the tertiles of the CLSC territories remained the same throughout the years. The second one occurs because we did not have information about relocated mothers' context; according to the 2006 census,²⁵ approximately 3.5% of the women were not exposed to the exact tertile we had given them. Third, heterogeneity within CLSC areas may be affecting results. Those three misclassifications of the exposure contributed to a small bias toward the null value. Nonetheless, even after our separate adjustment of models on SGA-preterm and on VSGA birth, our results might still have been subject to other confounding of unmeasured factors.

* Mother's age, mother's marital status, mother's parity, mother's academic degree, mother Canadian-born and interaction terms (“academic degree × marital status”, “Canadian-born × age”, “Canadian-born × marital status”, “academic degree × Canadian-born”, “age × parity” and “academic degree × parity”).

Some constitutionally small infants may have been classified as SGA even though they were not growth retarded. Since our ORs of SGA birth were similar to ORs of a narrower definition of the indicator (VSGA birth), it appears improbable that the inclusion of constitutionally small infants would have a significant impact.

Fewer significant associations were found on SGA-preterm birth. That could denote a lack of power for analysis among preterm births.

Two of the latent variables, material deprivation and social isolation, are part of a known population-specific deprivation index.²⁶ Information about race was added into another index that correlates better to infant health than to general health.²⁷ Our mean income and low income features belonged to different latent variables; such controversies were also observed by Braveman and colleagues.²⁸

This work has identified a novel association of sedentary lifestyle in Quebec's territories with the outcome of SGA when material deprivation, racial diversity and social isolation were adjusted for. It has also confirmed previously reported contextual risk factors in Quebec: income deprivation was associated with SGA in an urban setting among births from 1991 to 2000 (with adjustment for individual variables),¹¹ and area income and immigrant density tertiles were associated with SGA birth from 1999 to 2003 (there is an overlap with our data; results were adjusted for area income, income inequality, immigrants and individual variables).⁸ The association between SGA and social isolation (variable=household size of one) found in this population was in the same direction as one seen in the United States between a category of low household crowding and occurrence of low birth weight, when compared to the highest crowding category (with adjustment for mother's smoking behaviour and contextual poverty, ethnicity and education).¹⁰ Access to medical services was not associated with the outcome of SGA; this was also seen in the United States.²⁹ Still, it was associated with SGA among preterm births. Overall, SGA modelling with census variables was improved with the addition of social environment features.

Finally, observed associations might represent: real contextual effects; effects of the mothers' unmeasured individual characteristics such as tobacco use, pre-pregnancy weight or low weight gain; or both contextual effects and mothers' individual characteristics. Further research should be carried out on this topic in order to help dissociate effects of individual characteristics from the contextual ones, and thus permit identification of groups at risk of SGA birth for prenatal intervention.

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RÉSUMÉ

Objectifs : L'objectif de cette étude était d'investiguer si l'environnement social délimité par le territoire de résidence est associé avec des indicateurs de retard de croissance fœtale.

Méthodes : Les nouveau-nés de 143 Centres locaux de services communautaires (CLSC) du Québec, Canada en 2000-2008 (n=667 254) ont été inclus. Les naissances de faible et de très faible poids pour leur âge gestationnel (SGA et VSGA) et les naissances prématurées ont été identifiées. Des caractéristiques de l'environnement social et d'accès aux services de santé sur les territoires de CLSC ont été obtenues à partir de l'Enquête sur la santé dans les collectivités canadiennes. Celles de défavorisation matérielle, d'isolement social et de diversité raciale ont été obtenues à partir des recensements canadiens de 2001 et 2006. Un

compromis entre deux méthodes de sélection de variables, les méthodes pas-à-pas et du meilleur sous-ensemble, a été utilisé pour bâtir un modèle de régression logistique multivarié. Ce dernier a été ajusté sur le SGA, le VSGA et le SGA parmi les naissances prématurées.

Résultats : Lors de l'examen des variables du contexte matériel, social et racial ainsi que celles de sédentarité et d'accès aux services, les CLSC ayant une importante défavorisation matérielle, un important isolement social, une importante diversité raciale et ceux ayant une importante part de résidents sédentaires présentaient un risque ajusté de SGA accru. Les résultats sur le VSGA et sur le SGA parmi les naissances prématurées étaient similaires.

Conclusion : Les caractéristiques contextuelles de défavorisation matérielle, d'isolement social, de diversité raciale et de sédentarité ont été associées à des indicateurs de retard de croissance fœtale. Des travaux complémentaires sur les caractéristiques des CLSC pourraient aider à clarifier la façon dont le SGA est associé au contexte et à cibler des groupes prioritaires pour l'intervention.

Mots clés : faible poids pour l'âge gestationnel; retard de croissance fœtale; environnement social; comportements favorisant la santé; enquête sur la santé; modèle de régression logistique

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