Neighbourhood socio-economic status and spontaneous premature birth in Alberta

Stephen Wood, MD, MSc,[1] Debbie McNeil, PhD,[2] Wendy Yee, MD, MSc,[3] Jodie Siever, MSc,[2] Sarah Rose, PhD[4]

ABSTRACT

OBJECTIVE: To evaluate a possible association between neighbourhood socio-economic status and spontaneous premature birth in Alberta births.

METHODS: The study design was a retrospective cohort of all births in Alberta for the years 2001 and 2006. The primary outcome was spontaneous preterm birth at <37 weeks gestation. Neighbourhood socio-economic status was measured by the Pampalon Material Deprivation Index for each Statistics Canada census dissemination area. Births were linked to dissemination area using maternal postal codes.

RESULTS: The analysis comprised 73,585 births, in which the rate of spontaneous preterm delivery at <37 weeks was 5.3%. The rates of spontaneous preterm delivery for each neighbourhood socio-economic category ranged from 4.9% (95% CI 4.5%-5.2%) in the highest category to 6.3% (95% CI 6.0%-6.7%) in the lowest (p<0.001). After controlling for smoking, parity, maternal age and year, we found that women living in the highest socio-economic status neighbourhoods had an adjusted spontaneous preterm birth rate of 5.1% (95% CI 4.7%-5.5%) compared to 6.0% (95% CI 5.6%-6.4%) for women living in the lowest (p=0.003).

CONCLUSION: This study documented a modest increase in the risk of spontaneous preterm birth with low socio-economic status. The possibility of confounding bias cannot be ruled out.

KEY WORDS: Social class; obstetric labour; premature

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

Can J Public Health 2014;105(5):e383-e388.

It has been fairly well established that low socio-economic status (SES) is associated with a number of adverse health outcomes and premature death.[1] This has led naturally to an interest in determining whether poor perinatal outcomes are associated with low SES. Prematurity has been a particular interest as it is the most important cause of perinatal morbidity and mortality.[2] Spontaneous premature labour is the cause of the majority of premature births,[3] especially for those born at <32 weeks of gestation,[4] and the risk factors are distinct from those related to induced or iatrogenic prematurity.[5,6]

Generally, studies from the United States have demonstrated a significant association between factors such as maternal education and prematurity.[7-11] Similar findings have been reported in ecological and cohort studies from the United Kingdom and Europe.[12-15] However, investigations from other countries such as New Zealand and Taiwan have reported no such association between socio-economic factors and prematurity.[16,17] Two Canadian studies have been published with conflicting results. A Quebec study documented a mild association between prematurity and neighbourhood income. A subsequent Nova Scotia study found no association between individual SES and prematurity. Only two of these studies differentiated between induced and spontaneous preterm birth.[7,12]

We sought to evaluate the possible association between neighbourhood SES and spontaneous premature birth in Alberta, Canada. Defining a possible relationship between socio-economic factors and prematurity is important for designing community-based programs to alleviate deprivation and also may provide insight into the aetiology of premature labour.

METHODS

Study population

The study population comprised all singleton births in Alberta for the years 2001 and 2006. Birth outcome data were obtained from the Alberta Perinatal Health Program (APHP) Database. This database contains demographic, delivery and pregnancy outcome data for over 600,000 births from 81 hospitals in Alberta, Canada. For the study years, 2001 and 2006, all of the hospital and home births in Alberta were in the database. Perinatal and delivery records of all perinatal deaths are reviewed by the hospital Perinatal Mortality Committees and then forwarded for further review to the provincial Reproductive Care Committee. Spontaneous preterm

Author Affiliations

1. Department of Obstetrics and Gynecology and Community Health Sciences, University of Calgary, Calgary, AB
2. Surveillance and Infrastructure, Population Public and Aboriginal Health, Alberta Health Services, Calgary, AB
3. Department of Pediatrics, University of Calgary, Calgary, AB
4. No affiliation.

Correspondence: Dr. Stephen L. Wood, Rm 403, North Tower, Foothills Medical Centre, 1403 29th St NW, Calgary, AB T2N 4A9, Tel: 403-944-2017, E-mail: stephen.wood@albertahealthservices.ca

Acknowledgements: The author's research group (Partnership for Research and Education in Mothers and Infants) is supported by an unrestricted grant from Abbott Nutrition.

Conflict of Interest: None to declare.

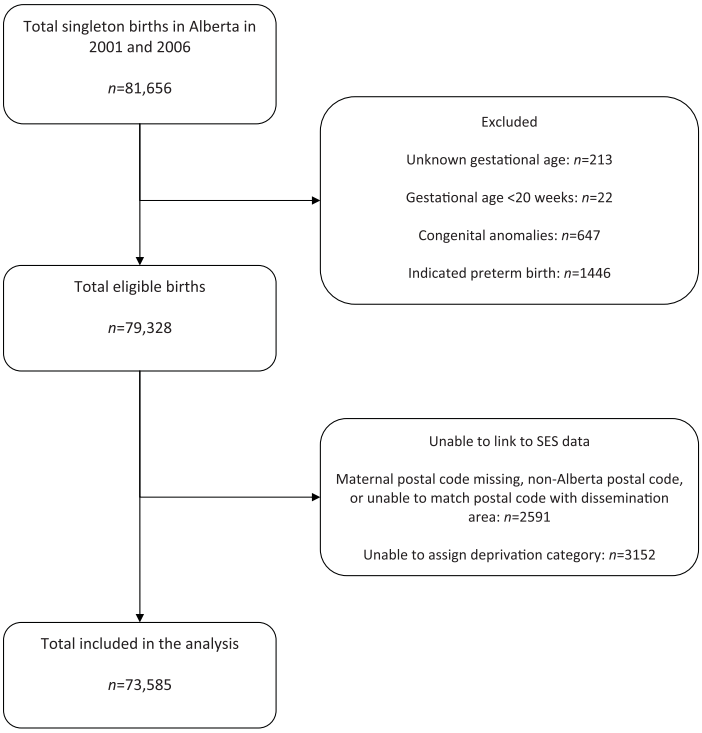

Figure 1. Study population flow diagram

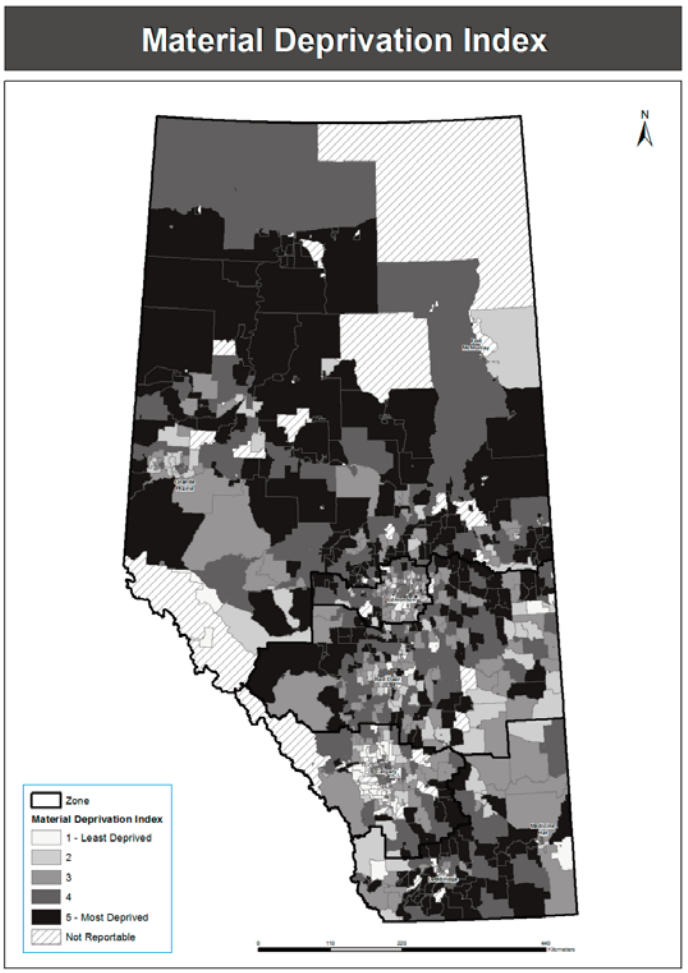

Figure 2. Material Deprivation Index by Alberta Health Services Zones

deliveries were defined as deliveries at less than 37 weeks gestation, either with spontaneous labour or occurring following preterm premature rupture of membranes (PPROM). As we were primarily interested in spontaneous preterm labour deliveries, those with induced labour for other indications and pre-labour Cesarean sections were considered indicated preterm deliveries and were omitted from the analysis. Additional births were excluded from the study if the gestational age at delivery either was missing or was less than 20 weeks gestation or if the infant had either a congenital anomaly or was small for gestational age (SGA).

Proxy measure for socio-economic status

Individual data on SES are not available in the database. The Pampalon material deprivation index[18] was used as a proxy measure to identify SES for each woman based on the geographic location of her residence. We used the Pampalon index as previous research had documented it was associated with premature mortality in Canada.[18] Each woman's postal code was linked to the corresponding dissemination area, a geographic area made up of 400 to 700 individuals which represents the smallest stable census area. Statistics Canada 2001 and 2006 Census data on income, education and employment were used to calculate deprivation factor scores for each dissemination area. These scores were then divided into quintiles. Each woman in this study, based on her residence's dissemination area and the year that she gave birth, was assigned a deprivation category ranging from 1 (least deprived or highest SES) through 5 (most deprived or lowest SES).

Analysis

All analyses were conducted in Stata S/E Version 12.[19] Descriptive statistics were conducted with categorical variables expressed as frequencies and percentages. Differences in the distributions of variables between the years 2001 and 2006 were examined using Chi-square tests or t-tests as appropriate. An unadjusted analysis was first conducted to examine the relationship between the primary predictor variable (SES) and the dependent variable (spontaneous preterm birth at less than 37 weeks) using an individual logistic regression model. The unadjusted proportion of preterm births for each SES category was calculated. Subsequently, a multivariable regression analysis was conducted, the goal of which was to examine the effect of SES on preterm birth after controlling for all potential confounding variables. These variables were determined a priori based on the list of variables available in the APHP database and included: smoker during pregnancy (yes, no), maternal age at delivery (<20, 20-34, ≥35 years), previous preterm birth (nulliparous, multiparous and no previous preterm birth, multiparous and previous preterm birth), pre-pregnancy weight (<45 kg, 45-91 kg, >91 kg), and year of birth (2001, 2006). Univariable analysis was performed and variables that were significantly related to SES and to preterm delivery were deemed possible confounding variables. We first ruled out possible interactions between these variables and SES in predicting preterm birth and then examined all possible two- and three-way interactions. Interaction terms were considered significant and were included in the model if $p<0.05$, based on the Likelihood Ratio Statistic (LRS). Any possible confounding variables not included in the interactions were eligible for inclusion in the multivariable model if they were significant at $p<0.05$ in an individual logistic

Table 1. Descriptive statistics of study births, by year

Variables	Babies born 2001 *N*=32,388 Mean (sd)	Babies born 2006 *N*=39,442 Mean (sd)	*p*
Maternal age (years) (Missing *n*=266)	28.4 (5.6)	28.6 (5.5)	<0.001
Infant birth weight (grams) (Missing *n*=173)	3416.3 (574.2)	3373.3 (575.1)	<0.001
	n (%)	**n (%)**	
Maternal age (Missing *n*=266)			
<20	1969 (5.9)	2018 (5.0)	<0.001
20-34	26,340 (79.6)	32,150 (80.0)	
≥35	4803 (14.5)	6039 (15.0)	
Smoker during pregnancy (Missing *n*=1127)	7192 (22.0)	7369 (18.6)	<0.001
Parity (Missing *n*=472)			
Nulliparous	13,885 (41.9)	17,406 (43.5)	<0.001
Multiparous no previous preterm birth	18,342 (55.4)	21,473 (53.7)	
Multiparous and previous preterm birth	891 (2.7)	1116 (2.8)	
Pre-pregnancy weight (Missing *n*=1150)			
<45 kg	146 (0.5)	202 (0.5)	0.007
45-91 kg	29,958 (91.5)	36,087 (90.9)	
>91 kg	2623 (8.0)	3419 (8.6)	
Pregnancy outcome			
Live birth	33,181 (99.5)	40,088 (99.6)	0.802
Stillbirth	89 (0.3)	99 (0.2)	
Neonatal death	56 (0.2)	72 (0.2)	
Gestational age at birth			
≤33 weeks	447 (1.3)	606 (1.5)	0.019
34-36 weeks	1319 (4.0)	1606 (4.0)	
≥37 weeks	31,560 (94.7)	38,047 (94.5)	
Spontaneous preterm birth at <37 weeks	1766 (5.3)	2212 (5.5)	0.244
Neighbourhood SES category			
1 (High)	5350 (16.1)	7084 (17.6)	<0.001
2	6340 (19.0)	7847 (19.5)	
3	6638 (19.6)	7989 (19.8)	
4	7559 (22.7)	7883 (19.5)	
5 (Low)	7539 (22.6)	9506 (23.6)	

Table 2. Distribution of spontaneous preterm delivery, smoking during pregnancy, maternal age, parity, and pre-pregnancy weight by neighbourhood SES (Highest=1 to lowest=5)

	Neighbourhood SES category *N*=71,830					
	1 *n*=12,308 *n* (%)	**2 *n*=13,899 *n* (%)**	**3 *n*=14,153 *n* (%)**	**4 *n*=14,911 *n* (%)**	**5 *n*=16,559 *n* (%)**	***p***
Spontaneous preterm delivery at <37 weeks	598 (4.9)	710 (5.1)	741 (5.2)	812 (5.5)	1047 (6.3)	<0.001
Smoking during pregnancy	1239 (10.1)	2131 (15.3)	2862 (20.2)	3438 (23.1)	4744 (28.7)	<0.001
Maternal age (years)						
<20	230 (1.9)	489 (3.5)	726 (5.1)	957 (6.4)	1485 (9.0)	<0.001
21-34	9309 (75.6)	11,131 (80.1)	11,452 (80.9)	12,124 (81.3)	13,225 (79.9)	
≥35	2769 (22.5)	2279 (16.4)	1975 (14.0)	1830 (12.3)	1849 (11.1)	
Parity						
Primiparous	5973 (48.5)	6118 (44.0)	6177 (43.6)	6238 (41.8)	6330 (38.2)	<0.001
Multiparous	6177 (50.2)	7478 (53.8)	7578 (53.6)	8190 (54.9)	9596 (58.0)	
Previous preterm birth	158 (1.3)	303 (2.2)	398 (2.8)	483 (3.3)	633 (3.8)	
Pre-pregnancy weight						
<45 kg	42 (0.3)	64 (0.5)	72 (0.5)	77 (0.5)	93 (0.6)	<0.001
45-91 kg	11,540 (93.8)	12,750 (91.7)	12,839 (90.7)	13,427 (90.1)	14,944 (90.2)	
>91 kg	726 (5.9)	1085 (7.8)	1242 (8.8)	1407 (9.4)	1522 (9.2)	
Year						
2001	5281 (42.9)	6205 (44.6)	6369 (45.0)	7258 (48.7)	7275 (43.9)	<0.001
2006	7027 (57.1)	7694 (55.4)	7784 (55.0)	7653 (51.3)	9284 (56.1)	

regression model or if there was evidence of confounding of the primary relationship of SES and preterm birth. For estimation of coefficients and their standard errors, we used a GEE model with an unstructured covariance matrix to adjust for clustering within dissemination areas. To aid interpretation of the model, we used predictive margins to calculate the estimated proportions (and 95% confidence interval) of spontaneous preterm birth for each deprivation category, adjusted for the other covariates in the model.

The study was approved by the University of Calgary Conjoint Health Research Ethics Board #23063.

RESULTS

There were 81,656 singleton births in Alberta for the years 2001 and 2006. After exclusions there were 79,328 eligible births (Figure 1). Of these, 2,591 could not be assigned a deprivation category because the postal code was missing or could not be assigned to an Alberta dissemination area. A further 3,152 births were excluded as a deprivation score could not be assigned to the subjects' corresponding dissemination area. This was due to too sparse a population, inadequate income data or too high a proportion of institutionalized individuals. Ultimately, these exclusions resulted in 73,585 births for the analysis. There were statistically significant though small differences between years for several variables, including maternal age, infant birth weight, smoking, parity, pre-pregnancy weight, gestational age, and neighbourhood SES category (Table 1). The Alberta dissemination areas and their corresponding deprivation index quintiles are displayed in Figure 2. Overall, the rate of spontaneous preterm delivery at <37 weeks was

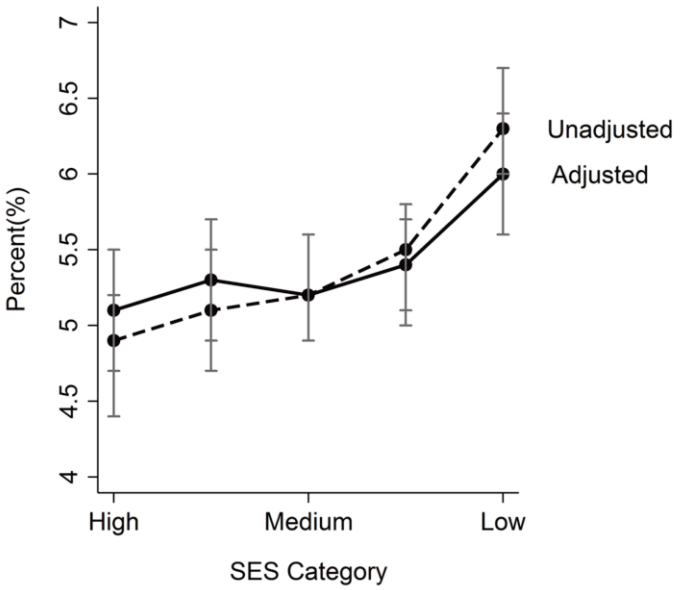

Figure 3. Proportion of spontaneous preterm birth (95% confidence interval) for each category of neighbourhood socio-economic status. Unadjusted estimates: dashed line. Estimates adjusted for potential confounding factors: solid line.

5.3% (95% CI 5.3%-5.6%) and similar in 2001 (5.2%) and 2006 (5.4%). The rates of spontaneous preterm birth for each neighbourhood SES category ranged from 4.9% (95% CI 4.5%-5.2%) in the highest to 6.3% (95% CI 6.0%-6.7%) in the lowest category (p<0.001) (Table 2).

Univariable analysis-documented smoking, maternal age, pre-pregnancy weight and previous preterm birth were associated with spontaneous preterm birth at <37 weeks. The multivariable logistic regression model included the five categories of maternal neighbourhood SES, smoking, previous preterm birth, pre-pregnancy weight, maternal age, and year of birth (Table 3). There was no evidence of an interaction present between neighbourhood SES and any of these variables, but there was evidence of a three-way interaction between smoking, maternal age, and previous preterm birth (LRS p<0.001) and a two-way interaction between smoking and year of birth (LRS p<0.001). Pre-pregnancy weight remained significant in the final model and was retained (LRS p<0.001). The estimated marginal probabilities from the estimated coefficients for the full model are presented in Appendix A. In the adjusted (i.e., multivariable) analysis, only the highest neighbourhood SES category was significantly different from the lowest category (Wald statistic p-values 0.561, 0.707, 0.413 and 0.003 for each of categories 2, 3, 4 and 5 compared to category 1 respectively). After controlling for smoking, parity, maternal age and year, we found that women living in the highest SES category neighbourhoods had a spontaneous preterm birth rate of 5.1% (95% CI 4.7%-5.5%) compared to 6.0% (95% CI 5.6%-6.4%) for women living in the lowest (Figure 3). Women residing in neighbourhoods categorized in one of the middle groups (two, three or four) had similar preterm birth rates, ranging from 5.2%-5.4% (95% CI ranging from 4.9%-5.7%). As expected, low pre-pregnancy weight <45 kg and previous preterm birth were also significantly associated with spontaneous preterm birth (Appendix A).

Table 3. Distribution of maternal age, smoking during pregnancy, parity, pre-pregnancy weight, and year by spontaneous preterm birth

Variables	Spontaneous preterm birth at <37 weeks *N*=3978 *n* (%)	Full-term birth at ≥37 weeks *N*=69,607 *n* (%)	*p*
Maternal age (Missing *n*=266)			
<20	281 (7.1)	3706 (5.3)	<0.001
20-34	3089 (77.8)	55,401 (79.9)	
≥35	602 (15.1)	10,240 (14.8)	
Smoker during pregnancy (Missing *n*=1127)	1130 (28.6)	13,431 (19.6)	<0.001
Parity (Missing *n*=472)			
Nulliparous	1855 (47.1)	29,436 (42.6)	<0.001
Multiparous no previous preterm birth	1682 (42.7)	38,133 (55.1)	
Multiparous and previous preterm birth	404 (10.2)	1603 (2.3)	
Pre-pregnancy weight (Missing *n*=1150)			
<45 kg	29 (0.7)	319 (0.5)	<0.001
45-91 kg	3633 (92.4)	62,412 (91.1)	
>91 kg	272 (6.9)	5770 (8.4)	
Year			
2001	1766 (44.4)	31,560 (45.3)	0.244
2006	2212 (55.6)	38,047 (43.7)	

DISCUSSION

In this retrospective cohort study, women residing in the lowest level of neighbourhood SES had a significantly increased risk of spontaneous premature birth at <37 weeks. The observed increased risk of prematurity was modest but, given the imprecision in measuring neighbourhood SES, it likely is an underestimate of the true effect. In addition, our findings are strengthened by our use of a previously validated measure of neighbourhood SES with a large detailed perinatal database. Our data allowed us, unlike most previous studies, to focus on spontaneous prematurity which, etiologically, is much less heterogeneous than indicated preterm birth. This heterogeneity can make interpreting results quite challenging. For instance, smoking appears to be associated with spontaneous premature birth[20] and small for gestational age births.[21] However, smoking appears to significantly reduce the risk of pre-eclampsia, which is a common cause of induced prematurity.[21] Therefore, combining induced and spontaneous premature births may obscure potentially important relationships. Burguet et al. in the Epipage cohort study unexpectedly found that smoking was associated with prematurity in multiparous but not in primiparous subjects.[22] The only explanation they could suggest for this paradoxical result was that smoking reduced the risk of prematurity from pre-eclampsia, which is far more common in primiparous women.

Only two of the previous studies have differentiated spontaneous from induced premature labour. Ahern et al. excluded all induced births in their California study.[7] They demonstrated that smoking increased the risk of prematurity as did high neighbourhood unemployment and low income. However, the association was significantly modified by whether subjects had public health insurance. Ancel et al. preformed a case control analysis of the EUROPOP survey.[12] They reported an increased risk of both induced and spontaneous preterm birth at <32 weeks gestation associated with low social class and education.

The modest differences we observed in spontaneous premature birth between SES classes may be due to a less steep social gradient

Appendix A. Marginal probabilities for the variables included in the significant three-way interaction, two-way interaction and main effects only in the final regression model of predictors of spontaneous preterm birth at <37 weeks (*N*=71,830)

Neighbourhood SES				***N***	**Marginal probability (%)**	**95% CI**
1 (High)				12,308	5.1	(4.7-5.5)
2				13,899	5.3	(4.9-5.7)
3				14,153	5.2	(4.9-5.6)
4				14,911	5.4	(5.0-5.7)
5 (Low)				16,559	6.0	(5.6-6.4)
Smoking, age, parity and previous preterm birth interaction						
Smoking	**Parity**	**Preterm**	**Age**			
Non-smoker	primip		<20	1692	6.3	(5.1-7.4)
Non-smoker	primip		20-34	20,893	5.7	(5.3-6.0)
Non-smoker	primip		≥35	2491	7.0	(5.9-8.0)
Non-smoker	multip	No	<20	229	4.2	(1.6-6.7)
Non-smoker	multip	No	20-34	24,853	3.4	(3.2-3.6)
Non-smoker	multip	No	≥35	6903	4.4	(3.9-4.9)
Non-smoker	multip	Yes	<20	10	38.5	(7.8-69.3)
Non-smoker	multip	Yes	20-34	1090	17.8	(15.4-20.2)
Non-smoker	multip	Yes	≥35	291	12.8	(9.0-16.6)
Smoker	primip		<20	1663	6.8	(5.6-8.0)
Smoker	primip		20-34	4443	6.5	(5.8-7.3)
Smoker	primip		≥35	278	6.9	(3.9-10.0)
Smoker	multip	No	<20	324	9.4	(6.2-12.6)
Smoker	multip	No	20-34	6406	7.0	(6.3-7.6)
Smoker	multip	No	≥35	918	6.3	(4.7-7.9)
Smoker	multip	Yes	<20	30	21.1	(6.2-36.0)
Smoker	multip	Yes	20-34	531	26.2	(22.5-30.0)
Smoker	multip	Yes	≥35	112	30.1	(21.3-39.0)
Smoking and year interaction						
Non-smoker		2001		25,956	5.0	(4.7-5.3)
Smoker		2001		7333	6.6	(6.0-7.1)
Non-smoker		2006		32,974	4.9	(4.6-5.1)
Smoker		2006		7519	7.9	(7.3-8.5)
Pre-pregnancy weight						
45-91 kg				67,203	5.5	(5.3-5.7)
<45 kg				356	7.8	(5.2-10.5)
>91 kg				6199	4.4	(3.9-4.9)

in our population than is seen in other countries, such as the United States.[23] It is also possible that universal health care, which is available in Alberta, buffers some of the effects of low SES in our subjects.[24] In their Nova Scotia cohort study, Joseph et al. observed an increase in obstetric intervention in the lower social class subjects, which they concluded may have improved their perinatal outcomes.[25] However, in their discussion it was apparent that interpretation of their results was complicated by the inclusion of both induced and spontaneous premature births. In the only other Canadian study, Luo reported a slight association between neighbourhood SES (lowest vs. highest) and premature birth [OR 1.14 (1.10-1.17)].[26] Our study differs primarily from the two previous Canadian studies in that we included only spontaneous premature births.

The mechanism underlying the effect of low neighbourhood SES on prematurity cannot be determined from our data. It has been previously hypothesized that increased stress or genital tract infections could be causal mechanisms.[27] However, subsequent investigations have questioned this.[28-31]

The main limitation of our study is that there is no exact method for measuring SES. This is a problem shared by all research in this area. Individual measures such as income and education, although seemingly more accurate, are as potentially imprecise as neighbourhood factors. In any event, this misclassification bias would be expected to make it harder for investigators to detect an association, thereby strengthening our findings. Still, the inability to measure deprivation accurately makes it difficult to hypothesize a biologically plausible mechanism of action. Additionally, as for any observational study, confounding bias cannot be entirely ruled out. We were able to control for many known potential confounding factors, such as pre-pregnancy weight, smoking, age, parity and previous preterm birth, but there are likely unknown confounding factors for which we could not control.

CONCLUSION

Ultimately, the main purpose of investigating a possible relationship between socio-economic factors and prematurity is both to inform community-based programs and to provide insight into the aetiology of premature labour. Although we report a modest association between spontaneous preterm delivery and low neighbourhood SES, it is not certain that this is a causal relationship or that it can be mitigated. The reported failures of programs to reduce prematurity by enhancing social support should be considered.[28] Novel programs such as group prenatal care may reduce prematurity in socially disadvantaged women, but more high-quality trials will be needed to confirm this.[32] Further research into the potential impact of social disadvantage on pregnancy outcomes are required to develop effective interventions.

REFERENCES

1. Adler N, Bush NR, Pantell MS. Rigor, vigor, and the study of health disparities. *Proc Natl Acad Sci U S A* 2012;109:Suppl 9.
2. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. Global, regional, and national causes of child mortality in 2008: A systematic analysis. *Lancet* 2010;375(9730):1969-87.
3. Slattery MM, Morrison JJ. Preterm delivery. *Lancet* 2002;360:1489-97.
4. Langhoff-Roos J, Kesmodel U, Jacobsson B, Rasmussen S, Vogel I. Spontaneous preterm delivery in primiparous women at low risk in Denmark: Population based study. *BMJ* 2006;332(7547):937-39.
5. Berkowitz GS, Blackmore-Prince C, Lapinski RH, Savitz D. Risk factors for preterm birth subtypes. *Epidemiology* 1998;9:279-85.

6. Hendler I, Goldenberg RL, Mercer BM, Iams JD, Meis PJ, Moawad AH, et al. The Preterm Prediction Study: Association between maternal body mass index and spontaneous and indicated preterm birth. *Am J Obstet Gynecol* 2005;192(3):882-86.
7. Ahern J, Pickett KE, Selvin S, Abrams B. Preterm birth among African American and white women: A multilevel analysis of socioeconomic characteristics and cigarette smoking. *J Epidemiol Community Health* 2003;57(8):606-11.
8. Messer LC, Vinikoor LC, Laraia BA, Kaufman JS, Eyster J, Holzman C, et al. Socioeconomic domains and associations with preterm birth. *Soc Sci Med* 2008;67(8):1247-57.
9. O'Campo P, Xue X, Wang MC, Caughy M. Neighborhood risk factors for low birthweight in Baltimore: A multilevel analysis. *Am J Public Health* 1997;87(7):1113-18.
10. O'Campo P, Burke JG, Culhane J, Elo IT, Eyster J, Holzman C, et al. Neighborhood deprivation and preterm birth among non-Hispanic Black and White women in eight geographic areas in the United States. *Am J Epidemiology* 2008;167(2):155-63.
11. Peacock JL, Bland JM, Anderson HR. Preterm delivery: Effects of socioeconomic factors, psychological stress, smoking, alcohol, and caffeine. *BMJ* 1995;311(7004):531-35.
12. Ancel PY, Saurel-Cubizolles MJ, Di Renzo GC, Papiernik E, Breart G. Social differences of very preterm birth in Europe: Interaction with obstetric history. Europop Group. *Am J Epidemiol* 1999;149(10):908-15.
13. Fairley L, Leyland AH. Social class inequalities in perinatal outcomes: Scotland 1980-2000. *J Epidemiol Community Health* 2006;60(1):31-36.
14. Janghorbani M, Stenhouse E, Millward A, Jones RB. Neighborhood deprivation and preterm birth in Plymouth, UK. *J Matern Fetal Neonatal Med* 2006;19(2):85-91.
15. Bonet M, Smith LK, Pilkington H, Draper ES, Zeitlin J. Neighbourhood deprivation and very preterm birth in an English and French cohort. *BMC Pregnancy Childbirth* 2013;13:97.
16. Tuntiseranee P, Olsen J, Chongsuvivatwong V, Limbutara S. Socioeconomic and work related determinants of pregnancy outcome in southern Thailand. *J Epidemiol Community Health* 1999;53(10):624-29.
17. Craig ED, Thompson JM, Mitchell EA. Socioeconomic status and preterm birth: New Zealand trends, 1980 to 1999. *Arch Dis Child Fetal Neonatal Ed* 2002;86(3):F142-F146.
18. Pampalon R, Hamel D, Gamache P, Raymond G. A deprivation index for health planning in Canada. *Chronic Dis Can* 2009;29(4):178-91.
19. Stata statistical software. College Station TX: StataCorp, 2011.
20. Smith GC, Shah I, White IR, Pell JP, Crossley JA, Dobbie R. Maternal and biochemical predictors of spontaneous preterm birth among nulliparous women: A systematic analysis in relation to the degree of prematurity. *Int J Epidemiol* 2006;35(5):1169-77.
21. Cnattingius S, Mills JL, Yuen J, Eriksson O, Salonen H. The paradoxical effect of smoking in preeclamptic pregnancies: Smoking reduces the incidence but increases the rates of perinatal mortality, abruptio placentae, and intrauterine growth restriction. *Am J Obstet Gynecol* 1997;177(1):156-61.
22. Burguet A, Kaminski M, Abraham-Lerat L, Schaal JP, Cambonie G, Fresson J, et al. The complex relationship between smoking in pregnancy and very preterm delivery. Results of the Epipage study. *BJOG: an International Journal of Obstetrics & Gynaecology* 2004;111(3):258-65.
23. Marmot M. Social determinants of health inequalities. *Lancet* 2005;365(9464):1099-104.
24. Veugelers PJ, Yip AM. Socioeconomic disparities in health care use: Does universal coverage reduce inequalities in health? *J Epidemiol Community Health* 2003;57(6):424-28.
25. Joseph KS, Liston RM, Dodds L, Dahlgren L, Allen AC. Socioeconomic status and perinatal outcomes in a setting with universal access to essential health care services. *CMAJ* 2007;177(6):583-90.
26. Luo ZC, Wilkins R, Kramer MS, Fetal and Infant Health Study Group of the Canadian Perinatal Surveillance System. Effect of neighbourhood income and maternal education on birth outcomes: A population-based study. *CMAJ* 2006;174(10):1415-20.
27. Kramer MS, Goulet L, Lydon J, Seguin L, McNamara H, Dassa C, et al. Socio-economic disparities in preterm birth: Causal pathways and mechanisms. *Paediat Perinat Epidemiol* 2001;15 Suppl 2:104-23.
28. Hodnett ED, Fredericks S. Support during pregnancy for women at increased risk of low birthweight babies. *Cochrane Database of Systematic Reviews* 2003;(3):CD000198.
29. Kramer MS, Lydon J, Seguin L, Goulet L, Kahn SR, McNamara H, et al. Stress pathways to spontaneous preterm birth: The role of stressors, psychological distress, and stress hormones. *Am J Epidemiol* 2009;169(11):1319-26.
30. Carey JC, Klebanoff MA, Hauth JC, Hillier SL, Thom EA, Ernest JM, et al. Metronidazole to prevent preterm delivery in pregnant women with asymptomatic bacterial vaginosis. National Institute of Child Health and Human Development Network of Maternal-Fetal Medicine Units. *NEJM* 2000;342(8):534-40.
31. Klebanoff MA, Carey JC, Hauth JC, Hillier SL, Nugent RP, Thom EA, et al. Failure of metronidazole to prevent preterm delivery among pregnant women with asymptomatic Trichomonas vaginalis infection. *NEJM* 2001;345(7):487-93.
32. Ruiz-Mirazo E, Lopez-Yarto M, McDonald SD. Group prenatal care versus individual prenatal care: A systematic review and meta-analyses. *JSOGC* 2014;34(3):223-29.

Received: November 27, 2013
Accepted: August 31, 2014

RÉSUMÉ

OBJECTIF : Évaluer une association possible entre le statut socioéconomique du quartier et les accouchements prématurés spontanés parmi les naissances en Alberta.

MÉTHODE : Le protocole d'étude comportait une cohorte rétrospective de toutes les naissances survenues en Alberta en 2001 et en 2006. Le principal résultat était la prématurité spontanée à <37 semaines de gestation. Le statut socioéconomique du quartier a été mesuré selon l'indice de défavorisation matérielle de Pampalon pour chaque aire de diffusion du recensement de Statistique Canada. Les naissances ont été liées aux aires de diffusion à l'aide des codes postaux maternels.

RÉSULTATS : L'analyse a compris 73 585 naissances, parmi lesquelles le taux d'accouchements prématurés spontanés à <37 semaines était de 5,3 %. Les taux d'accouchements prématurés spontanés pour chaque catégorie de statut socioéconomique du quartier variaient de 4,9 % (IC de 95 % : 4,5 %-5,2 %) dans la catégorie la plus élevée à 6,3 % (IC de 95 % : 6,0 %-6,7 %) dans la catégorie la moins élevée (p<0,001). Compte tenu du tabagisme, de la parité, de l'âge maternel et de l'année, nous avons constaté que les femmes vivant dans les quartiers au statut socioéconomique le plus élevé avaient un taux ajusté de prématurité spontanée de 5,1 % (IC de 95 % : 4,7 %-5,5 %), contre 6,0 % (IC de 95 % : 5,6 %-6,4 %) pour les femmes vivant dans les quartiers au statut économique le plus faible (p=0,003).

CONCLUSION : Cette étude fait état d'une légère augmentation du risque de prématurité spontanée liée au faible statut socioéconomique. La possibilité d'un biais dû aux facteurs de confusion ne peut être écartée.

MOTS CLÉS : classe sociale; travail obstétrical; prématuré