

Longitudinal Rates and Risk Factors for Adverse Birth Weight Among First Nations Pregnancies in Alberta

Richard Thomas Oster, PhD, Ellen Louise Toth, MD

Department of Medicine, University of Alberta, Edmonton, Alberta

Abstract

Objective: We wished to identify the prevalence, longitudinal trends, and associated risk factors for various birth weight categories by First Nations ethnicity in the province of Alberta.

Methods: We performed a retrospective analysis of administrative data for the years 2000 to 2009 inclusive. Age-adjusted prevalence trends for high birth weight (HBW; > 4000g), very HBW (> 4500g), low birth weight (LBW; < 2500g), and very LBW (< 1500g) were compared via average annual percent change analyses. Logistic regression analysis was used to determine risk factors.

Results: First Nations ethnicity was a significant independent predictor of HBW (OR 1.82 [95% CI 1.75, 1.89]), very HBW (OR 2.35 [95% CI 2.18, 2.52]), and very LBW (OR 1.35 [95% CI 1.23, 1.48]), but not of LBW (OR 0.98 [95% CI 0.93, 1.03]). However, HBW prevalence decreased and other birth weight categories remained stable over time in First Nations populations. Gestational diabetes and maternal weight \geq 91 kg were potentially manageable risk factors for HBW. Potentially manageable risk factors for LBW included pre-gestational renal disease, hypertension, and maternal weight \leq 45 kg, as well as smoking, illicit drug dependence, and alcohol consumption.

Conclusion: Although HBW, very HBW, and very LBW remain more common in Alberta First Nations populations than in the general population, their prevalence is not increasing.

Résumé

Objectif : Nous souhaitions identifier la prévalence, les tendances longitudinales et les facteurs de risque connexes pour ce qui est de diverses catégories de poids de naissance chez les populations des Premières Nations dans la province de l'Alberta.

Méthodes : Nous avons mené une analyse rétrospective des données administratives pour les années 2000 à 2009, inclusivement. Les tendances, corrigées en fonction de l'âge, de la prévalence pour ce qui est du poids de naissance élevé (PNÉ; > 4000 g), du poids de

naissance très élevé (PNTÉ; > 4500 g), du poids de naissance faible (PNF; < 2500 g) et du poids de naissance très faible (PNTF; < 1500 g) ont été comparées par l'intermédiaire d'analyses de la modification annuelle moyenne en pourcentage. Une analyse de régression logistique a été utilisée pour déterminer les facteurs de risque.

Résultats : L'ethnicité « Premières Nations » a été un facteur prédictif indépendant significatif de PNÉ (RC, 1,82; IC à 95 %, 1,75, 1,89), de PNTÉ (RC, 2,35; IC à 95 %, 2,18, 2,52) et de PNTF (RC, 1,35; IC à 95 %, 1,23, 1,48), mais non de PNF (RC, 0,98; IC à 95 %, 0,93, 1,03). Cependant, la prévalence du PNÉ a connu une baisse et les autres catégories de poids de naissance sont demeurées stables avec le temps au sein des populations des Premières Nations. Le diabète gestationnel et le poids maternel \geq 91 kg ont été des facteurs de risque potentiellement gérables en ce qui concerne le PNÉ. Parmi les facteurs de risque potentiellement gérables en ce qui concerne le PNF, on trouvait la maladie rénale prégestationnelle, l'hypertension, le poids maternel \leq 45 kg, le tabagisme, la dépendance aux drogues illicites et la consommation d'alcool.

Conclusion : Bien que le PNÉ, le PNTÉ et le PNTF demeurent plus courants au sein des populations albertaines des Premières Nations que dans la population générale, leur prévalence n'est pas en hausse.

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INTRODUCTION

We have shown recently in a large longitudinal administrative dataset that high-risk pregnancies and poor outcomes are more common among First Nations women than in the general population in the province of Alberta.¹ First Nations are Canada's most populous Aboriginal group, and similar poor outcomes have been found for Indigenous women in international settings.² In our previous analysis (which was focused on diabetes in pregnancy epidemiology) we noted a disproportionately

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higher risk of both low birth weight (LBW) and high birth weight (HBW) among infants born to First Nations women.¹ Birth weight is a key determinant of morbidity and mortality in both infancy and early childhood, and can also affect health outcomes in adult life.^{3,4} However, there is little information about the epidemiology of birth weight in First Nations populations because longitudinal changes have not been rigorously explored, and data on risk factors are limited.

The purpose of this study was to gain a better understanding of the epidemiology (prevalence, longitudinal changes, and associated risk factors) of various birth weight categories in the province of Alberta, particularly among First Nations. Our overall aim was to provide knowledge that could lead to better pregnancy care/interventions and lowered risk of adverse birth weight outcomes.

METHODS

We conducted a secondary analysis of anonymized administrative records, and therefore informed consent was not required. Data for the years 2000-2009 had been previously acquired from the Alberta Perinatal Health Program (APHP). In Alberta, the APHP collects and stores perinatal data from the provincial delivery record for all hospital births and registered midwife-attended home births. Delivery record information obtained from prenatal records and/or from the patient is recorded by a health care provider (usually a nurse) on the delivery record when a pregnant woman presents for delivery. For each variable included in the analysis, data were complete or nearly complete (available for 97% to 100% of pregnancies). In addition to birth weight, maternal risk factors explored included age, parity, ethnicity, pre-existing hypertension, gestational diabetes (GDM), pre-existing diabetes, diabetes retinopathy, proteinuria, chronic renal disease, pre-gestational weight (defined as either $\leq 45\text{kg}$ or $\geq 91\text{kg}$), anemia, multiple gestation, illicit drug dependence, smoking use (at any time during pregnancy), alcohol use (at any time during pregnancy), history of abortion, history of preterm infant, history of neonatal death, history of stillbirth, history of Caesarean section, history of fetal anomaly, history of small for gestational age (SGA) neonate, and history of large for gestational age (LGA) neonate. A detailed description of all of the included variables is provided in our previous publication, as are statistical comparisons of these variables between First Nations and non-First Nations populations.¹ In the years 2000-2009 there were 433 445 pregnancies in Alberta. Only records with gestational age ≥ 20 weeks were included in the analysis. Records with missing birth weight data were not

included. A total of 426,945 pregnancy records were analyzed.

Three distinctive populations of Canadian Indigenous people are recognized in Canada: First Nations, Métis (mixed blood), and Inuit. In Alberta, there are approximately 116,670 First Nations people and 96,865 Métis people, representing approximately 3.3% and 2.7% of the provincial population, respectively.⁵ Only approximately 1600 Inuit people live in Alberta. First Nations and Inuit individuals whose Nations have engaged in Treaties are granted “registered Indian” or Treaty status, under the federal Indian Act of Canada. The Alberta Health Care Insurance Plan Central Stakeholder Registry file includes an identifier for such individuals. Thus, to determine First Nations ethnicity, the data were sent to Alberta Health and matched via the Personal Health Number. Women delivering in Alberta with a First Nations identifier (First Nations or Inuit) were considered “First Nations”, whereas all other women (including First Nations individuals without Treaty status and Métis individuals) were considered “non-First Nations”.

All statistical analyses were performed using STATA version 11 (StataCorp LP, College Station, TX) and Joinpoint version 3.5.1 (Informer Technologies Inc., Rockville, MD) statistical software. We categorized infants based on their birth weight as either normal birth weight (2500g-4000g), HBW ($> 4000\text{g}$), very HBW ($> 4500\text{g}$), LBW ($< 2500\text{g}$), and very LBW ($< 1500\text{g}$). Annual age-adjusted prevalence values and 95% confidence intervals (CIs) of the four birth weight categories were compared (using χ -square analysis) by ethnicity. For the prevalence calculations, the denominator was the total number of pregnancies for which data on that variable were available for the specific group of interest. The numerator was the total number of pregnancies for which the criteria for the variable of interest were met, for the specific group of interest. Average annual percent change (AAPC) values and 95% CIs in birth weight prevalence over time were calculated. The AAPC provides a summary measure of the trend over a pre-specified fixed interval. An AAPC with a *P* value of < 0.05 was considered to be a statistically significant change over time.

Statistical modelling using multivariable purposeful logistic regression was used to evaluate the relationships between the various birth weight categories and possible explanatory variables.⁶ Briefly, independent variables with a *P*-value < 0.20 in the univariate linear regression analysis were fitted in a multivariable model. Variables with a *P*-value > 0.05 were removed, and the potential confounding effect of each variable was assessed. Odds

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