

# Risk of Preterm Birth According to Maternal and Paternal Country of Birth: A Population-Based Study

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## Abstract

**Objective:** To examine the co-contribution of maternal and paternal country of origin to preterm birth, and the differences in PTB rates between immigrants giving birth in Canada and those giving birth in their country of origin.

**Methods:** Using a population-based study for all of Ontario, we included 1 200 864 singleton and twin livebirths from 2002 to 2011. The risk of PTB in infants of immigrant parents from the same country was compared to those whose parents were both Canadian-born. Logistic regression analysis adjusted for maternal and paternal age, parity, marital status, income, infant sex, and twins. We also measured differences in the calculated rate of PTB among immigrants by parental country of birth minus the published PTB rate within their native country. The main outcome measures were PTB < 37 weeks, late PTB at 34 to 36 weeks, and very PTB < 32 weeks.

**Results:** Compared with infants of two Canadian-born parents, those of immigrant parents from the same country had a lower risk of PTB (aOR 0.94, 95% CI 0.92 to 0.96) and late PTB (aOR 0.92, 95% CI 0.89 to 0.94) but a higher risk of very PTB (aOR 1.09, 95% CI 1.04 to 1.16). Infants of couples from Guyana, Trinidad and Tobago, the Philippines, and Jamaica were at increased risk of PTB, late PTB, and very PTB. The rate of PTB was, on average, 3% lower for newborns of immigrant parents than the published rate of PTB in their native country.

**Conclusion:** The rate of PTB is influenced by maternal and paternal country of birth. That rate is generally lower among immigrants than the rate in their native country of origin.

**Key Words:** Premature birth, preterm birth, parental, maternal, paternal, immigration, ethnicity

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## Résumé

**Objectif :** Examiner l'apport concomitant du pays d'origine de la mère et de celui du père en ce qui concerne la question de l'accouchement préterme, et déterminer les différences en matière de taux d'accouchement préterme (APT) entre les immigrantes accouchant au Canada et celles qui accouchent dans leur pays d'origine.

**Méthodes :** En utilisant une étude en population générale pour l'ensemble de l'Ontario, nous avons inclus 1 200 864 naissances vivantes (issues de grossesses monofœtales ou gémellaires) ayant eu lieu entre 2002 et 2011. Le risque d'APT auquel étaient exposés les nouveau-nés issus de parents immigrants provenant du même pays a été comparé à celui auquel étaient exposés les nouveau-nés dont les deux parents étaient nés au Canada. Une analyse de régression logistique a permis la neutralisation des effets de l'âge de la mère et du père, de la parité, de l'état matrimonial, du revenu, du sexe du nouveau-né et de l'obtention de jumeaux. Nous avons également comparé le taux calculé d'APT chez les immigrants en fonction du pays d'origine des parents au taux publié d'APT au sein de ce pays d'origine. Les principaux critères d'évaluation ont été l'APT < 37 semaines, l'APT tardif à 34-36 semaines et l'accouchement très préterme (ATPT) < 32 semaines.

**Résultats :** Par comparaison avec les nouveau-nés dont les deux parents sont nés au Canada, ceux dont les parents immigrants provenaient du même pays étaient exposés à un risque moindre d'APT (RCc, 0,94; IC à 95 %, 0,92 - 0,96) et d'APT tardif (RCc, 0,92; IC à 95 %, 0,89 - 0,94), mais étaient exposés à un risque accru d'ATPT (RCc, 1,09; IC à 95 %, 1,04 - 1,16). Les nouveau-nés issus de couples provenant de la Guyane, de Trinidad et Tobago, des Philippines et de la Jamaïque étaient exposés à des risques accrus d'APT, d'APT tardif et d'ATPT. Chez les nouveau-nés issus de parents immigrants, le taux d'APT était, en moyenne, de 3 % inférieur au taux d'APT publié au sein du pays d'origine des parents.

**Conclusion :** Le taux d'APT est influencé par le pays d'origine de la mère et du père. Chez les immigrants, ce taux est généralement inférieur à celui qui est constaté au sein de leur pays d'origine.

## INTRODUCTION

Preterm birth (PTB) is a major predictor of infant mortality and morbidity worldwide, with worse outcomes at lower gestational ages.<sup>1</sup> Globally, the rate of PTB averages 11%, ranging from 5% to 9% in most high income countries and up to 25% in some low income countries.<sup>2,3</sup> The etiology of PTB is multifactorial, including maternal and fetal medical conditions, as well as environmental and socioeconomic factors.<sup>4</sup> PTB risk may also vary by race/ethnicity and nativity.<sup>5,6</sup> Women who migrate to western countries from Asia and Africa are at higher risk of PTB than their counterparts who are born in those western nations.<sup>7</sup> However, the use of broad racial/ethnic categorizations like “Asian” and “Black” potentially obscures more obvious differences in the influence of ethnic ancestry<sup>6,8</sup> and country of origin<sup>7,9</sup> on the risk of PTB.

Like many industrialized countries, Canada receives large numbers of immigrant women and men from a wide range of countries, some of whom have high native rates of PTB. Although a growing proportion of Canadian births are to immigrant mothers and fathers, little is known about their birth outcomes, including PTB. The few studies that have assessed the influence of ethnicity and PTB relied solely on the mother’s status.<sup>8,10</sup> The contribution of paternal ethnicity to PTB has been limited to studies on Black and White parents in the United States.<sup>11,12</sup>

Prior studies have compared PTB rates between countries,<sup>2</sup> but none have contrasted the likelihood of an immigrant couple having a PTB in the host country where they settle with the likelihood in their country of birth.

In this study, we sought to determine the associations of maternal and paternal country of birth with the risk of PTB < 37 (24 to 36) weeks, late PTB at 34 to 36 weeks, and very PTB < 32 (24 to 31) weeks, and also sought to determine whether that risk varies by the source country. We also compared the rate of PTB in Ontario among the infants of immigrant mothers and fathers from different countries with the published rate of PTB in each respective native country.

## METHODS

We conducted a population-based study of live singleton and twin births in Ontario between 2002 and 2011. Foreign-born individuals make up 20% of Canada’s population, the highest proportion of the G8 countries.<sup>13</sup> The province of Ontario receives the largest share of Canada’s immigrants,<sup>13</sup> who together contribute to approximately one third of all births in the province.

Data were retrieved from live birth records provided by Vital Statistics. A birth record requires that two documents be submitted to the Office of the Registrar General, which is part of the Ministry of Government Services of Ontario. The first document is from the birth attendant/certifier (physician or midwife), and the second is completed by the parent. All current records were stripped of parental and child identifiers, so a given woman may have contributed more than one birth during the study period. Approximately 95% of Ontarian women undergo prenatal ultrasonography before 20 weeks’ gestation, enhancing the accuracy of gestational age as determined at delivery.<sup>14</sup>

The main study outcomes were PTB < 37 weeks, late PTB at 34 to 36 weeks, and very PTB < 32 weeks’ gestation. The main exposures were maternal and paternal country of birth, each self-reported on the infant’s birth record. Each newborn was assigned to one of five exposure categories:

1. parents were both Canadian-born,
2. Canadian-born mother and foreign-born father,
3. Canadian-born father and foreign-born mother,
4. parents were both foreign-born but were not from the same country, or
5. parents were both from the same foreign country.

First, we assessed whether having missing data on paternal country of birth systematically affected the rate of PTB across all countries. Using all eligible births before exclusions, we calculated the proportion of births with father’s country of birth missing, and compared that proportion to the rate of PTB < 37 weeks in Ontario according to the mother’s country of birth. We used linear regression to derive a weighted  $R^2$  (95% CI) as a measure of that association, weighted by the number of births contributed by mothers from each respective country.

For the main analysis, adjusted odds ratios (aORs) and 95% CIs were derived using multivariable logistic regression analysis to estimate the risk of an infant being PTB < 37 weeks, late PTB at 34 to 36 weeks, and very PTB < 32 weeks’ gestation, each in association with one of the five described combinations of immigrant and Canadian-born parents, with Canadian-born couples as the reference group. ORs were adjusted for maternal age (< 20, 20 to 34,  $\geq$  35 years, unknown), paternal age (< 20, 20 to 34,  $\geq$  35 years, unknown), parity (0, 1, 2, 3,  $\geq$  4, unknown), marital status (married/common-law, unmarried, unknown), residential income quintile (Q1 to Q5, unknown), infant sex, and twin birth. Income quintile was derived for maternal dissemination area of residence using Statistics Canada’s Postal Code Conversion File Plus.<sup>15</sup>

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