Severe Maternal Morbidity Associated With Maternal Birthplace: A Population-Based Register Study

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Abstract

Objective: This study sought to quantify the risk of severe maternal morbidity (SMM) according to maternal country of birth in Canada.

Methods: The study analyzed 1 252 543 in-hospital deliveries of Ontario residents discharged between April 1, 2002, and March 31, 2012. The main outcome measure was a composite indicator of SMM used for surveillance. The top 10 most common component conditions were also evaluated. Maternal country of birth and other immigration characteristics were obtained through linkage with official immigration records. We used modified Poisson regression with generalized estimating equations to assess associations according to maternal country of birth.

Results: Overall, immigrant women (N = 335 544) did not differ from Canadian-born women (n = 916 999) in SMM rates (12.1 vs. 12.0 cases per 1000 deliveries, respectively). However, SMM varied substantially according to maternal region of birth, from 9.2 cases per 1000 deliveries among immigrants from Western countries to 23.0 cases per 1000 deliveries among immigrants from Sub-Saharan Africa. Even larger variations were found when immigrants were categorized by their specific countries of birth. The top 10 contributing conditions to SMM among Canadian-born women were also the main contributors among immigrant subgroups. The notable exception was HIV infection, the top contributor among immigrants from Sub-Saharan Africa, whose rate of HIV infection was 43 times that of Canadian-born women (95% CI 34.39 to 55.23). After excluding HIV cases, disparities in SMM were largely reduced among Sub-Saharan African women but did not disappear.

Conclusion: There is large heterogeneity in SMM and its component conditions among Canadian immigrants depending on country of origin.

Key Words: severe maternal morbidity, near miss, immigration, Canada, pregnancy, birth, maternal complications

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Résumé

Objectif : Cette étude avait pour but de quantifier le risque de morbidité maternelle sévère (MMS) au Canada, selon le pays d'origine de la mère.

Méthodologie : Nous avons analysé 1 252 543 accouchements en milieu hospitalier, dont les mères étaient des résidentes ontariennes ayant obtenu leur congé entre le 1er avril 2002 et le 31 mars 2010. L'indicateur de résultat principal était un indicateur composite de MMS utilisé à des fins de surveillance. Les 10 facteurs contributifs les plus fréquents ont également été évalués. Des données relatives aux pays d'origine des femmes et à l'immigration ont été obtenues à partir des documents d'immigration officiels. Nous nous sommes servis d'un modèle de régression de Poisson et d'équations d'estimation généralisées pour évaluer les résultats obtenus en fonction du pays d'origine des femmes.

Résultats : Dans l'ensemble, les immigrantes (n = 335 544) et les Canadiennes de naissance (n = 916 999) présentaient un taux de MMS semblable (12,1 cas c. 12,0 pour 1 000 accouchements, respectivement). Or, la MMS variait considérablement selon la région de naissance de la mère, allant de 9,2 cas pour 1 000 accouchements chez les immigrantes venant de pays occidentaux à 23,0 cas pour 1 000 accouchements chez celles venant d'Afrique subsaharienne. Des variations encore plus grandes ont été observées lorsque les immigrantes ont été classées selon leur pays de naissance. Les 10 principaux facteurs contributifs de la MMS chez les Canadiennes de naissance étaient les mêmes que chez les sous-groupes d'immigrantes. L'infection au VIH, principal facteur contributif chez les immigrantes d'Afrique subsaharienne, était cependant l'exception importante : le taux d'infection au VIH était 43 fois plus élevé chez ces femmes que chez les Canadiennes de naissance (IC à 95 % : 34,39 à 55,23). Une fois les cas de VIH exclus, l'écart de MMS observé était beaucoup moins grand dans le groupe des femmes d'Afrique subsaharienne, mais toujours présent.

Conclusion : La MMS et ses facteurs contributifs sont très hétérogènes chez les immigrantes canadiennes et varient selon le pays d'origine des femmes.

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Maternal mortality varies more between countries than within countries. Non-industrialized countries account for approximately 99% of the global burden of maternal deaths. Increasingly, immigrants originate from non-industrialized countries where maternal mortality is roughly 20 times higher than in immigrant-receiving industrialized countries.[1,2] However, a recent meta-analysis reported that migrant women in Western European countries have twice the risk of maternal mortality than native-born women.[3] The shrinkage in the disparity among immigrants from the destination to the receiving country may reflect several factors, including self-selection of healthier women for migration, selective immigration admission policies,[4,5] greater material resources for everyday life, and access to better primary and obstetric care in receiving societies,[6] despite cultural barriers that may potentially preclude immigrants from fully benefiting from available health care services.[7]

As maternal mortality has become a rare event in industrialized countries in recent decades, research and surveillance have increasingly focused on various indices of severe maternal morbidity (SMM) or "near miss" to capture more accurately the serious and life-threatening conditions affecting pregnancy, labour, and the postpartum period that could potentially result in maternal death.[8–11] Some of these SMM indices have been created using multiple diagnoses and procedures recorded in population-based administrative databases.[8–10,12] Such comprehensive definitions of composite SMM are relatively frequent (relative to maternal death), thereby making it possible to study variations in SMM within population subgroups. Despite this advantage, previous studies did not have large enough study sizes to examine SMM in immigrant women from specific countries of origin (women could be aggregated only by world regions) or to study specific components of the composite indicator, thus compromising specificity.[6,12–14]

The objectives of this study were to describe variations in SMM according to regions and specific countries of origin and to note the top component conditions contributing to SMM among immigrants to Ontario. Two features make the Province of Ontario an excellent setting for studying variations in immigrant health according to country of birth. Ontario has the largest concentration of immigrants in Canada and receives approximately 50% of the 250 000 immigrants arriving in Canada each year from most parts of the world. In addition, antenatal, hospital, and obstetric care services are provided free of charge to all legal permanent residents eligible under the provincial health insurance plan.

METHODS

Study Design

We used a retrospective cohort study design that linked population-based administrative databases at the Institute for Clinical and Evaluative Sciences in Toronto by using unique encoded identifiers.

Study Population

We included all in-hospital delivery episodes of women discharged between April 1, 2002, and March 31, 2012, who were Ontario residents with a valid health card number at the time of delivery.

Data Sources

We obtained records for women admitted to an Ontario hospital for childbirth from the Discharge Abstract Database of the Canadian Institute of Health Information. We used diagnosis and procedure codes (from the ICD-10-Canada[15] and the Canadian Classification of Health Interventions[16]) to identify women who had any SMM.[8,17] The labour and delivery information contained in this database has been shown to be accurate.[18] The database also contains information on maternal age at delivery, number of previous live births, and birth plurality. Close to 99% of births in Ontario take place in hospitals.[19]

Immigration characteristics, such as country of birth and other sociodemographic characteristics at the time of immigration, were obtained from the Ontario portion of the federal Immigration, Refugees and Citizenship Canada Permanent Resident Database, which is considered virtually complete and of high accuracy in most fields because of its administrative and legal use. Less than 1% of records in the database contained missing values. Approximately 90% of individuals in the database were matched to an Ontario resident with a valid provincial health care card. Unmatched individuals may have either moved out of the province (i.e., to other Canadian provinces or other countries or returned to their countries of origin) or may