International Journal of Gynecology and Obstetrics xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

www.figo.org

CLINICAL ARTICLE

Comparison of stillbirth rates by cause among Haitians and non-Haitians in Canada

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ARTICLE INFO

Article history:
Received 16 October 2015
Received in revised form 26 January 2016
Accepted 6 May 2016

Keywords:
Emergencies
Placental abruption
Pregnancy complications
Stillbirth
Vulnerable populations

ABSTRACT

Objective: To compare rates of stillbirth among Haitians and non-Haitians in Canada. *Methods:* A retrospective cohort study was performed using data on all stillborn and live-born singletons weighing at least 500 g in the province of Quebec, Canada, from 1981 to 2010. Stillbirth rates were computed, and hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated for Haitians relative to non-Haitians. The main outcome measure was stillbirth by cause of death. *Results:* Data for 9657 stillbirths (124 Haitian) and 2 414 751 live births (17 165 Haitian) were included. Stillbirth rates were higher for Haitians than non-Haitians (7.17 [95% CI 5.91–8.43] vs 3.96 [95% CI 3.88–4.04] per 1000 births), particularly for cord prolapse (adjusted HR 1.87, 95% CI 1.10–3.18) and placental abruption (adjusted HR 2.84, 95% CI 1.95–4.15). Haitians had higher risks of stillbirth due to cord prolapse and abruption at every week of pregnancy. Risks were not elevated for stillbirth due to congenital anomaly, a cause less responsive to urgent intervention. *Conclusion:* Stillbirth rates among Haitians are disproportionately high in Canada, particularly fetal death due to cord prolapse and placental abruption. The potential to reduce stillbirth rates through optimal emergency care in vulnerable minorities requires further investigation.

1. Introduction

The occurrence of stillbirths is receiving increased attention worldwide [1]. In high-income countries, nearly five of every 1000 pregnancies result in stillbirth [1]. Numerous studies have attempted to identify strategies for the reduction of stillbirths [2–4]; however, prevention is difficult [5] because risk factors, such as smoking and obesity, are hard to modify [6]. Some stillbirths can be prevented through obstetric care, particularly those due to late pregnancy conditions that are fairly easy to recognize [2–4,6]. Causes such as cord prolapse and placental abruption are emergencies that are potentially responsive to intervention [7,8]; however, evidence linking emergency care with stillbirth is lacking [9].

Some studies recommend that high-income countries focus on decreasing inequality in stillbirth rates in vulnerable groups [3]; stillbirth rates are high for black individuals in the USA and ethnic minorities in Europe [1,6,10–14]. Nevertheless, evidence that this inequality is even greater following obstetric complications potentially responsive to emergency intervention remains absent. Optimizing emergency care is potentially easier than modifying behavior in women, but to develop such policies, data suggesting that ethnic minorities experience higher rates of stillbirth due to obstetric emergencies are needed.

The present study compares rates of stillbirth due to causes potentially responsive to emergency intervention with those for stillbirth due to causes that are less responsive, using data on Haitians and non-Haitians in Canada. Very high stillbirth rates have been reported for Haitians in Canada [15], with Haitians being socioeconomically disadvantaged given their origin from the poorest country in the Americas.

2. Materials and methods

A retrospective cohort study was undertaken of all births from 1981 to 2010 in the province of Quebec, Canada. Data were drawn from birth registration certificates covering the entire province. All stillborn and live-born singletons weighing 500 g or more at delivery were included in the analysis. The study complied with the ethical requirements for research involving human beings in Canada, and the institutional review board of the University of Montreal Hospital Centre waived ethics review. The data were de-identified and patient consent was not needed.

Most Haitians in Canada reside in Quebec [15]. Haitians and non-Haitians were identified using maternal mother tongue or language

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http://dx.doi.org/10.1016/j.ijgo.2016.01.022
0020-7292/

spoken at home as reported on birth certificates. Haitians predominantly use Creole [15], whereas French and English are commonly used by non-Haitians in Quebec.

The main outcome was stillbirth by cause of death, according to responsiveness to emergency intervention. The primary cause of death was reported by physicians and coded by the Quebec provincial statistics agency using the International Classification of Diseases (ICD, 9th and 10th revisions). There is no strict definition of responsiveness, but three general categories of causes were considered, including (1) those potentially preventable with emergency intervention, (2) those poorly responsive to intervention, and (3) those with intermediate or undetermined responsiveness to intervention. Cord prolapse (ICD 762.4, 762.5, P02.4, P02.5) and placental abruption (ICD 762.1, P02.1) were included as causes potentially responsive to emergency intervention [7,8], and congenital anomalies (ICD 740-759, Q00-Q99) as causes poorly responsive to intervention. Remaining or unexplained causes were included in the category of intermediate or undetermined responsiveness. This latter category is more likely to contain stillbirth caused by risk factors such as smoking or obesity [6]. It is acknowledged that there are limitations to this classification, but emergencies such as cord accidents and abruption could be considered on the opposite end of responsiveness to emergency intervention compared with congenital anomalies.

The covariates maternal age (<20, 20–34, ≥35 years), education (secondary diploma or less, post-secondary, university), legal marital status (yes, no), parity (0, 1, ≥2 previous deliveries), decade (1981–1990, 1991–2000, 2001–2010), and the number of completed weeks of pregnancy at the time of delivery on the basis of ultrasonography estimates were included in the analysis. Multiple imputation was used to impute missing data on gestational age (0.7%), maternal age (0.01%), education (4.4%), and marital status (0.02%) using the distribution of observed covariates [16].

Stillbirth rates were computed by cause of death per 1000 births. To examine trends over the duration of pregnancy, the cumulative risk of stillbirth was computed at each week of pregnancy using the cumulative incidence function [17]. Cox regression was used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for stillbirth by cause for Haitians versus non-Haitians, and adjusted models were used for maternal age, education, marital status, parity, and decade. Length of pregnancy in weeks was used as the timescale, with censoring of live births and competing causes. The proportionality of hazards was verified with an interaction term between Haitian status and length of pregnancy. To assess absolute risks of stillbirth, binomial regression models were used with an identity link to calculate adjusted risk differences for Haitians versus non-Haitians.

In sensitivity analyses, births with missing data were excluded, and analyses were repeated after including pregnancy terminations in the category of congenital anomalies in the event that terminations were performed for anomalies.

Statistical analyses were performed using SAS 9.3 (SAS Institute, Cary, NC, USA).

3. Results

There were 9657 stillborn and 2 414 751 live-born singletons during the study period, not including 515 stillbirths due to pregnancy termination. There were 17 289 births among Haitians (124 stillbirths and 17 165 live births) and 2 407 119 among non-Haitians (9533 stillbirths and 2 397 586 live births). The proportion of stillbirths autopsied was similar for Haitians and non-Haitians (79/124 [63.7%] vs 6510/9533 [68.3%]; $P = 0.3$). Haitians had higher stillbirth rates (7.17 per 1000 births [95% CI 5.91–8.43]) than did non-Haitians (3.96 per 1000 births [95% CI 3.88–4.04]). Rates seemed to be higher among Haitians irrespective of maternal age, education, marital status, parity, and decade under study (Table 1).

When specific causes were examined, cord prolapse accounted for 1041 (10.8%) stillbirths, abruption for 1338 (13.9%), and congenital anomaly for 1311 (13.6%). Stillbirth was unexplained for 2272 (23.5%), and 3695 (38.3%) stillbirths were due to other causes. The proportion of stillbirths due to causes potentially responsive to emergency intervention was higher among Haitians than among non-Haitians (Fig. 1). Stillbirth rates for Haitians were higher for causes potentially responsive to emergency intervention and for causes with intermediate responsiveness (Table 2). By contrast, the stillbirth rate due to congenital anomaly was similar in both groups (Table 2).

Cumulative risks of stillbirth were higher for Haitians than non-Haitians at every week of pregnancy for all causes except congenital anomalies (Fig. 2). For cord prolapse, the risk for Haitians increased steadily after 27 weeks of pregnancy, whereas for non-Haitians it increased more sharply later in pregnancy, closer to term (after 37 weeks). For placental abruption, Haitians again had a higher risk

Table 1
Stillbirth rates among Haitians and non-Haitians by maternal characteristics.

Maternal characteristic	Haitian [a]			Non-Haitian [b]		
	No. of live births	No. of stillbirths	Stillbirth rate per 1000 births (95% CI)	No. of live births	No. of stillbirths	Stillbirth rate per 1000 births (95% CI)
Age, y						
<20	[c]	[c]	[c]	98 009	544	5.52 (5.06–5.99)
20–34	12 454	88	7.02 (5.56–8.48)	2 053 762	7692	3.73 (3.65–3.82)
≥35	4143	33	7.90 (5.22–10.59)	245 815	1297	5.25 (4.96–5.53)
Education						
Secondary	8843	65	7.30 (5.47–9.12)	693 967	3419	4.90 (4.72–5.09)
Post-secondary	3425	25	7.19 (4.36–10.02)	628 079	2569	4.07 (3.89–4.26)
University	4897	34	6.94 (4.52–9.35)	1 075 540	3545	3.29 (3.17–3.40)
Marital status						
Legally married	10 512	77	7.23 (5.62–8.85)	1 306 435	5024	3.83 (3.73–3.94)
Not legally married	6653	47	7.07 (5.06–9.09)	1 091 151	4509	4.12 (4.00–4.24)
Parity						
0	6046	55	9.01 (6.64–11.39)	1 094 574	5270	4.79 (4.66–4.92)
1	5367	34	6.30 (4.19–8.40)	848 665	2467	2.90 (2.78–3.01)
≥2	5752	35	6.05 (4.05–8.05)	454 347	1796	3.94 (3.76–4.12)
Period						
1981–1990	3872	37	9.47 (6.43–12.50)	853 805	4135	4.82 (4.67–4.97)
1991–2000	6962	45	6.42 (4.55–8.29)	807 966	2945	3.63 (3.50–3.76)
2001–2010	6331	42	6.59 (4.60–8.58)	735 815	2453	3.32 (3.19–3.45)

Abbreviation: CI, confidence interval.
[a] 17 289 births.
[b] 2 407 119 births.
[c] Suppressed because fewer than 10 events.

Please cite this article as: Auger N, et al, Comparison of stillbirth rates by cause among Haitians and non-Haitians in Canada, Int J Gynecol Obstet (2016), http://dx.doi.org/10.1016/j.ijgo.2016.01.022