ARTICLE

Access to Ontario Midwifery Care by Neighbourhood-Level Material Deprivation Quintile, 2006–2017: A Retrospective Cohort Study

Accès aux soins prodigués par des sages-femmes en Ontario par quintile de défavorisation matérielle des quartiers, de 2006 à 2017 : étude de cohorte rétrospective

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ABSTRACT

Objective: To describe access to Ontario midwifery care based on socio-economic status.
Design: Two retrospective cohort studies.
Setting: Ontario, Canada.
Participants: (1) All Ontario midwifery billable courses of care discharged between April 1, 2006, and March 31, 2017 (N = 187,009), and (2) all Ontario residents who gave birth (≥ 20 weeks) in Ontario between April 1, 2012, and March 31, 2017 (N = 699,843).
Data Sources: The Ontario Midwifery Program Legacy Database and the Better Outcomes Registry & Network's Ontario perinatal registry.
Measurements and Findings: We used residential postal codes to assign socio-economic status quintiles, using the Ontario Marginalization Index's material deprivation measure. Between 2006 and 2017, the proportion of midwifery clients in the two least-marginalized quintiles was consistently greater than the proportion of midwifery clients in the two most-marginalized quintiles. Between 2012 and 2017, physicians cared for a larger proportion of people in the most-marginalized quintile than midwives, while midwives cared for a larger proportion of people in the least-marginalized quintile.
Key Conclusions: People of low socio-economic status in Ontario are less likely to receive midwifery care than people of high socio-economic status. There was little change in this pattern over an 11-year period from 2006 to 2017.
Implications: Efforts to reduce inequities in access to midwifery care should be prioritized and will require a multi-pronged approach that is supported by practicing midwives, government, midwifery stakeholder organizations, and other health care professionals.

KEYWORDS
midwifery; health services accessibility; social class; health care quality, access, and evaluation; maternal health services; cohort studies

This article has been peer reviewed.

RÉSUMÉ

Objectif : Décrire l'accès aux soins prodigués par des sages-femmes en Ontario selon le statut socioéconomique.
Méthodologie : Deux études de cohorte rétrospectives
Milieu : Ontario, Canada.
Participants : (1) Tous les parcours de soins de sages-femmes facturables réalisés en Ontario entre le 1er avril 2006 et le 31 mars 2017 (N = 187 009); (2) toutes les résidentes de l'Ontario qui ont accouché (≥ 20 semaines) dans la province entre le 1er avril 2012 et le 31 mars 2017 (N = 699 843).
Sources de données : La base de données existante du Programme ontarien de coordination des services de sages-femmes et le registre périnatal du Registre et réseau des bons résultats dès la naissance (BORN) de l'Ontario.
Mesures et constatations : Nous avons utilisé les codes postaux résidentiels pour attribuer les quintiles de statut socioéconomique à l'aide de l'indice de défavorisation matérielle de l'Indice de marginalisation ontarien. Entre 2006 et 2017, la proportion des clientes des services de sages-femmes dans les deux quintiles les moins marginalisés a été invariablement plus élevée que la proportion de celles des deux quintiles les plus marginalisés. Entre 2012 et 2017, les médecins ont pris soin d'une plus grande proportion de personnes du quintile le plus marginalisé que les sages-femmes, tandis que celles-ci se sont occupées d'une plus grande proportion de gens du quintile le moins marginalisé.

Principales conclusions : En Ontario, les personnes de statut socioéconomique faible sont moins susceptibles de recevoir les soins d'une sage-femme que celles de statut socioéconomique élevé. Il y a eu peu de changement de cette tendance au cours de la période de 11 ans située entre 2006 et 2017.
Répercussions : Il faut prioriser les efforts visant à réduire les inégalités d'accès aux soins des sages-femmes. Pour ce faire, il faudra adopter une approche à plusieurs volets qui soit soutenue par les sages-femmes en exercice, le gouvernement , les organisations d'intervenants du domaine de la pratique sage-femme et d'autres professionnels de la santé.

MOTS-CLÉS
pratique sage-femme; accessibilité des services de santé; classe sociale; soins de santé : qualité, accès et évaluation; services de santé maternelle; études de cohorte.

Cet article a été évalué par un comité de lecture.

INTRODUCTION

Even within a publicly funded health care system, people of low socio-economic status (SES) are less likely to receive adequate prenatal care, due to range of psychosocial, attitudinal, economic, and structural barriers, and are more likely to experience adverse perinatal outcomes such as preterm birth and smallness for gestational age.[1–6] Research has shown that midwifery-led continuity-of-care models offer features—such as time to build trusting relationships, continuity of care provider, and a nonjudgmental approach—that are well suited to the needs of people of low SES who struggle to access care.[7–10] Further Canadian evidence has shown that midwifery-led continuity-of-care models are associated with a reduced risk of outcomes such as preterm birth and low birth weight for infants born to parents of low SES.[11,12] Together, this evidence suggests that midwifery care may have an important role to play in addressing disparities in perinatal outcomes and access to care in Canada.

The relationship between SES and access to midwifery services in Ontario has not previously been well described. Midwifery was regulated in Ontario in 1994; at that time, public funding was implemented for all Ontario residents, with a goal of increasing access to midwifery services.[13] A cross-sectional survey of Ontario midwifery practices conducted in 1999 found that midwives perceived that public funding had increased the diversity of midwifery clients: 94% of practices reported increased use by low-income women.[14] Although increasing access to midwifery care for women from marginalized groups was explicitly identified as a goal of regulation,[13] access to Ontario midwifery care based on clients' SES has not been directly measured and monitored. This article describes research we undertook to address this gap as part of a larger program of research on SES and access to midwifery care. Our primary research question was, "Has the distribution of midwifery clients across neighbourhood SES quintiles in Ontario changed between 2006 to 2016?" Our secondary research questions were, "Is the distribution of pregnant people across neighbourhood SES quintiles in Ontario different amongst those receiving midwifery-led care compared to all pregnant people?" and "Does this vary regionally?"

Ontario offers publicly funded health care through a single-payer system.[15] Publicly funded services include prenatal, intrapartum, and postpartum care from a variety of health care providers, including midwives. Approximately 16% of pregnancies in Ontario are cared for by midwives.[16] People who do not access midwifery care in Ontario receive prenatal and intrapartum care from nurses and either an obstetrician or a family physician.

As primary care providers, midwives in Ontario are reimbursed for each "course of care" they complete. A course of care is a bundle of services that usually includes care during pregnancy, birth, and the first 6 weeks post partum. A course of care is billable if the midwife attended the client's childbirth or the client received at least 12 weeks of midwifery care. People can access midwifery services directly without referral, but demand for midwifery services

> People of low socio-economic status (SES) in Ontario are less likely to receive midwifery care than people of high SES.

exceeds supply. Approximately a quarter of those seeking midwifery services in 2016 were unable to obtain a midwife.[17]

METHODS

Study Design, Population, and Setting

We conducted two retrospective population-based cohort studies. In the first study, the population included all midwifery billable courses of care in Ontario discharged between April 1, 2006, and March 31, 2017. Pregnancies ending in miscarriage or termination that involved at least 12 weeks of midwifery care were included in the first study cohort. The second study included all Ontario residents who gave birth in Ontario between April 1, 2012, and March 31, 2017. The second study cohort excluded pregnancies that ended prior to 20 weeks' gestation.

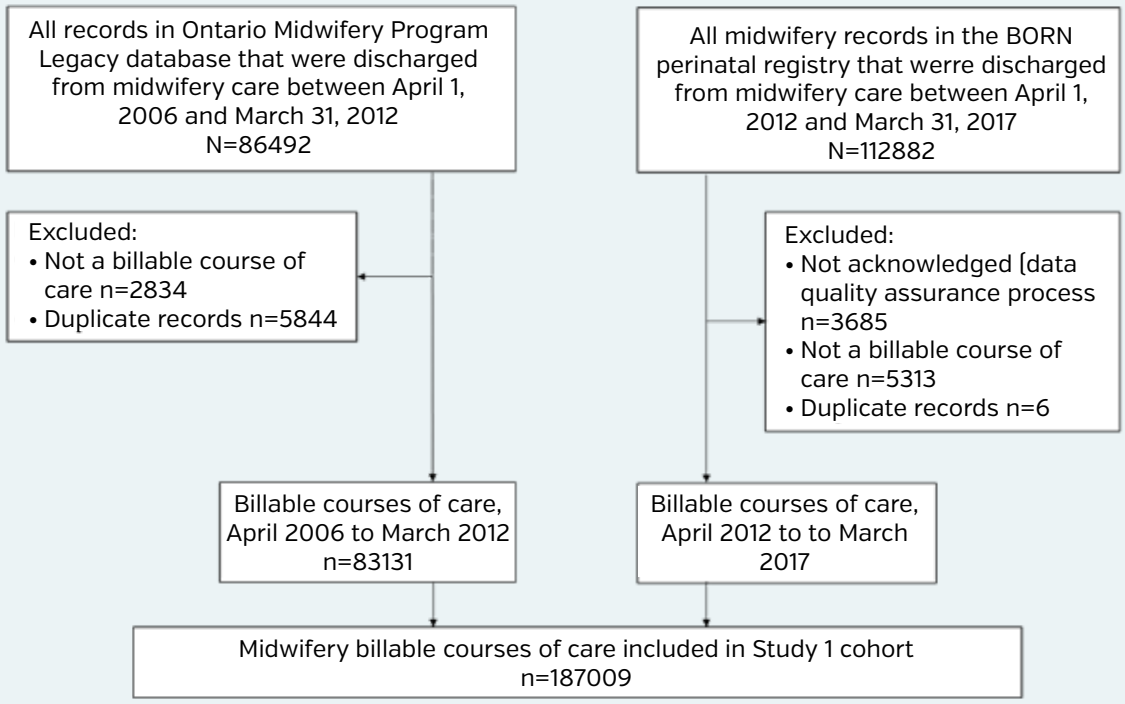
Data Sources

The study was conducted at the Better Outcomes Registry & Network (BORN), a provincial organization with authority under privacy legislation to be a custodian of health data on pregnancy, birth, and early childhood. We used data from the Ontario Midwifery Program legacy database and from BORN's perinatal registry. The Ontario Midwifery Program legacy database was created by the Ontario Ministry of Health and Long-Term Care and captured data on midwifery services in the province from April 2003 to March 2012. In April 2012, the BORN perinatal registry began to capture data on all births in the province, including those attended by midwives. Midwifery data in both these sources were collected prospectively by registered midwives and include anonymized data on all recipients of midwifery care in Ontario, including demographic information and clinical information pertaining to pregnancy, birth, and the first 6 weeks post partum. Data collection in both sources was mandatory and tied to midwives' invoicing (which ensured complete capture of all births and high completion of most variables). In the BORN perinatal registry, data on hospital births are either uploaded directly from hospital electronic health records or are entered into the online system manually by health care providers. High data quality is ensured through BORN's providing formal training to the individuals who collect and enter data. The registry also uses built-in data validation rules, quality checks, and data verification processes.[18] In both studies, we excluded records from BORN that had not undergone an acknowledgement process to resolve data quality issues.

Variables

We used a neighbourhood-level socio-economic variable—the Ontario Marginalization Index[19] (OMI) material deprivation quintile—to assign SES, using maternal residential postal codes. The OMI material deprivation quintile is derived by using neighbourhood-level national census data and is based on the entire population of the province. (Pregnant people may not be evenly distributed across the quintiles). It is a composite measure that incorporates income level, income support, quality of housing, educational attainment, and family structure. We were only able to use Ontario Midwifery Program data from April 2006 onward. (Prior to then, postal codes were not collected in

Figure 1. Cohort Creation Flow Diagram for Study 1



the database.) We used maternal residential postal codes and the Postal Code Conversion File Plus (PCCF+) to assign rural or urban residence.[20] We also used PCCF+ to group people living in census metropolitan areas–i.e., geographical areas that consist of one or more neighbouring municipalities situated around a core and that have a total population of at least 100,000, of which 50,000 or more live in the core.[21] We also grouped the study population in fiscal years that align with the Ontario Ministry of Health fiscal cycle from April 1 to March 31.

Both data sources included a variable about whether the individual had received midwifery services that constituted a billable course of care (either 12 weeks of care or attendance during labour and birth). In our second cohort, we used this variable to identify recipients of midwifery care; all other records were assigned to the physician group.

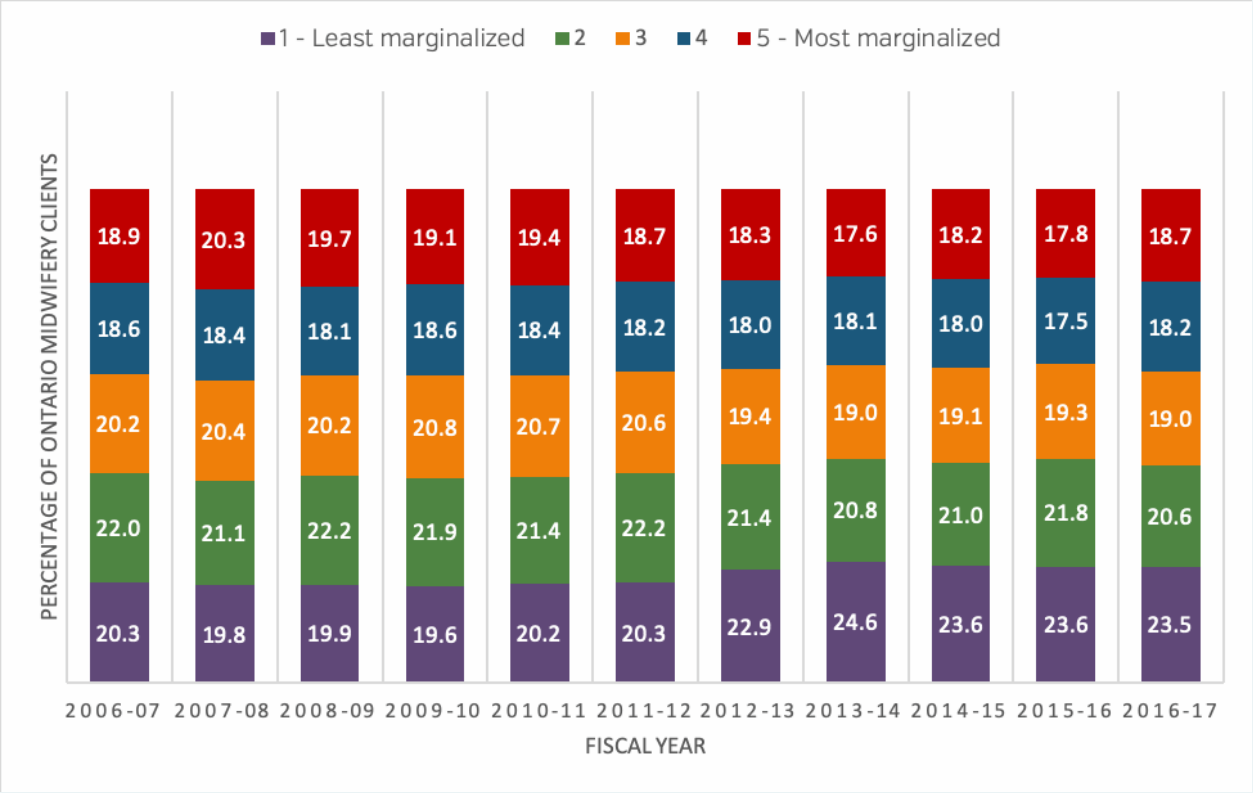
Statistical Analysis

We used descriptive statistics to describe the demographic characteristics and basic clinical outcomes of both study populations. We also used descriptive statistics to determine the distribution of midwifery clients across SES quintiles to compare this distribution between midwife and physician groups and to examine this comparison within each of Ontario's 16 census metropolitan areas. All analyses were conducted with SAS version 9.4 (SAS Institute, Cary, NC).

RESULTS

The cohort for our first study included 187,009 midwifery courses of care in Ontario that were billed between April 2006 and March 2017; Figure 1 details cohort creation. Table 1 shows the demographic characteristics of these midwifery clients by fiscal year. The demographic characteristics remained fairly stable over time; there was a small decrease in the proportion of clients under the age of 30 years and a corresponding increase in the proportion of clients between the ages of 30 and 34 years. (Basic clinical outcomes of midwifery clients are reported by fiscal year in Table 2.) Over the 11-year period there was a slight decrease in the rate of spontaneous

Figure 2. Distribution of Ontario Marginalization Index Material Deprivation Quintiles in Ontario Midwifery Clients by Fiscal Year, 2006–2017



Sources: Ontario Midwifery Program Database (2006–2012), the Better Outcomes Registry & Network perinatal registry (2012–2017), and the Ontario Marginalization Index

labour and a slight increase in the rate of cesarean sections.

Figure 2 shows the distribution of OMI material deprivation quintiles within Ontario midwifery clients by fiscal year from 2006 to 2017. Throughout this period, the proportion of midwifery clients in the two least-marginalized quintiles was consistently greater than the proportion of midwifery clients in the two most-marginalized quintiles. The proportion of midwifery clients in the most-marginalized quintile remained relatively stable over the study period, while the proportion in the least-marginalized quintile rose slightly.

The cohort for our second study included 699,843 births that occurred in Ontario during the study window from 2012 to 2017 (Figure 3). Of these, 101,571 were assigned to the midwife group and 598,272 were assigned to the physician group. Table 3 describes the characteristics of this cohort by provider group. Compared to the physician group, recipients of midwifery care were less likely to be at either extreme of maternal age, more likely to give birth at a greater gestational age, and more likely to live in a rural area. Table 4 compares unadjusted labour type and birth type between the two provider groups. Compared to the physician group, recipients of midwifery care were more likely to labour spontaneously and more likely to have a spontaneous vaginal birth.

Figure 4 displays the OMI material deprivation quintiles from 2012 to 2017 of all Ontario births and by provider group. Overall, physicians cared for a larger proportion of people in the most-marginalized quintile than did midwives, while midwives cared for a larger proportion of people in the least-marginalized quintile.

Figure 5 compares the proportion of midwifery clients and physician clients in the highest material

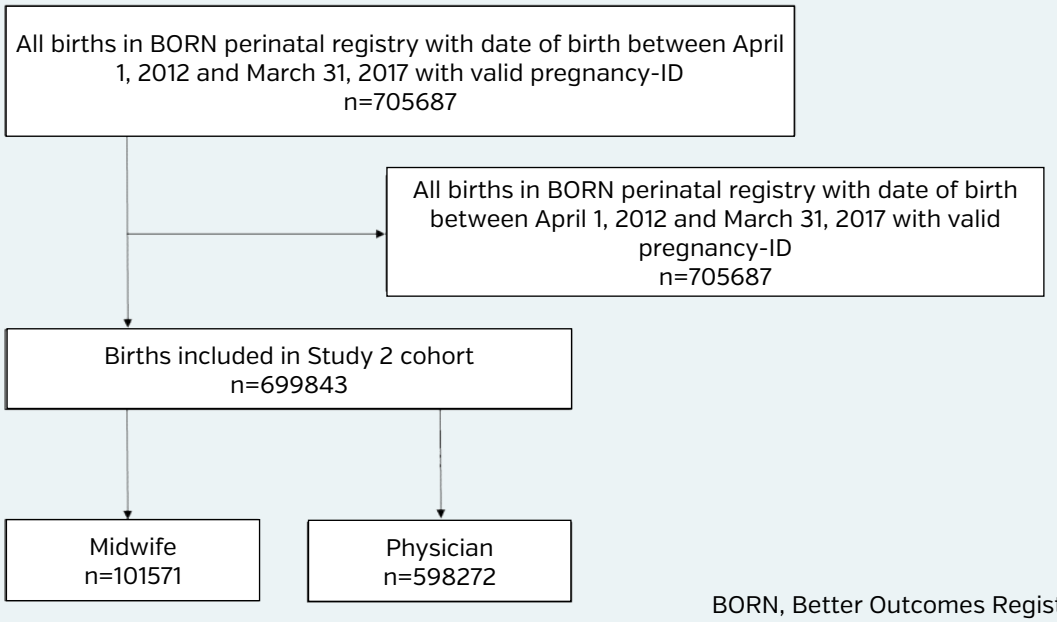
Table 1. Characteristics of Ontario Midwifery Clients, by Fiscal Year, 2006–2017

Characteristic	Fiscal Year				
	2006/07	2007/08	2008/09	2009/10	2010/11
	N=10,742	*N*=12,063	*N*=13,252	*N*=14,361	*N*=15,911
	n [%]	*n* [%]	*n* [%]	*n* [%]	*n* [%]
Maternal age (yrs)					
< 20	230 [2.1]	279 [2.3]	326 [2.5]	302 [2.1]	337 [2.1]
20–24	1,206 [11.2]	1,420 [11.8]	1,586 [12.0]	1,642 [11.4]	1,734 [10.9]
25–29	3,220 [30.0]	3,593 [29.8]	4,007 [30.2]	4,277 [29.8]	4,769 [30.0]
30–34	4,031 [37.5]	4,499 [37.3]	4,917 [37.1]	5,418 [37.7]	6,003 [37.7]
35–39	1,784 [16.6]	1,967 [16.3]	2,124 [16.0]	2,379 [16.6]	2,658 [16.7]
40+	271 [2.5]	305 [2.5]	292 [2.2]	343 [2.4]	410 [2.6]
Missing					
Gestational age (wks)					
< 20	6 [0.1]	11 [0.1]	8 [0.1]	21 [0.2]	33 [0.2]
20–34	97 [0.9]	145 [1.2]	164 [1.3]	183 [1.3]	181 [1.2]
34–36	376 [3.6]	416 [3.5]	470 [3.6]	480 [3.4]	590 [3.8]
37–38	1,889 [18.1]	2,267 [19.3]	2,547 [19.7]	2,444 [17.5]	2,865 [18.4]
39–40	6,007 [57.5]	6,586 [56.1]	7,271 [56.3]	8,040 [57.4]	8,861 [57.0]
41+	2,073 [19.8]	2,320 [19.8]	2,451 [19.0]	2,840 [20.3]	3,018 [19.4]
Missing					
Maternal parity					
Multiparous	6,042 [56.3]	6,826 [56.6]	7,250 [54.7]	7,892 [55.0]	8,750 [55.0]
Primiparous	4,700 [43.8]	5,237 [43.4]	6,002 [45.3]	6,469 [45.1]	7,161 [45.0]
Missing					
Rurality					
Rural area	1,719 [16.0]	1,895 [15.7]	2,031 [15.3]	2,273 [15.8]	2,524 [15.9]
Small population centre [1,000–29,999]	1,067 [9.9]	1,299 [10.8]	1,399 [10.6]	1,511 [10.5]	1,689 [10.6]
Medium population centre [30,000–99,999]	1,276 [11.9]	1,436 [11.9]	1,634 [12.3]	1,735 [12.1]	1,906 [12.0]
Large urban population centre [≥ 100,000]	6,558 [61.1]	7,306 [60.6]	8,048 [60.7]	8,711 [60.7]	9,644 [60.6]
Not classified	122 [1.1]	127 [1.1]	140 [1.1]	131 [0.9]	148 [0.9]
Missing					
Maternal deprivation quintile					
1 [least deprived]	2,146 [20.3]	2,343 [19.8]	2,590 [19.9]	2,773 [19.6]	3,165 [20.2]
2	2,324 [22.0]	2,507 [21.1]	2,893 [22.2]	3,090 [21.9]	3,355 [21.4]
3	2,127 [20.2]	2,423 [20.4]	2,637 [20.2]	2,941 [20.8]	3,236 [20.7]
4	1,964 [18.6]	2,179 [18.4]	2,353 [18.1]	2,634 [18.6]	2,879 [18.4]
5 [most deprived]	1,989 [18.9]	2,414 [20.3]	2,561 [19.7]	2,707 [19.1]	3,038 [19.4]
Missing					

* wks, weeks

Fiscal Year						Total
2011/12	**2012/13**	**2013/14**	**2014/15**	**2015/16**	**2016/17**	
N=16,802	*N*=15,739	*N*=19,697	*N*=21,243	*N*=23,144	*N*=24,055	***N*=18,7009**
n [%]	*n* [%]	*n* [%]	*n* [%]	*n* [%]	*n* [%]	***n* [%]**
297 [1.8]	239 [1.6]	271 [1.4]	328 [1.6]	288 [1.3]	324 [1.4]	**3,221 [1.7]**
1,776 [10.6]	1,584 [10.4]	1,872 [9.8]	1,983 [9.6]	2,100 [9.3]	2,156 [9.2]	**19,059 [10.2]**
4,969 [29.6]	4,567 [29.9]	5,608 [29.3]	6,040 [29.3]	6,523 [29.0]	6,778 [28.9]	**54,351 [29.1]**
6,499 [38.7]	5,998 [39.3]	7,613 [39.8]	8,110 [39.3]	9,040 [40.2]	9,408 [40.1]	**71,536 [38.3]**
2,787 [16.6]	2,477 [16.2]	3,294 [17.2]	3,624 [17.6]	3,964 [17.6]	4,176 [17.8]	**31,234 [16.7]**
474 [2.8]	387 [2.5]	473 [2.5]	554 [2.7]	596 [2.7]	594 [2.5]	**4,699 [2.5]**
						2,909 [1.6]
30 [0.2]	490 [3.1]	578 [2.9]	612 [2.9]	652 [2.8]	627 [2.6]	**3,068 [1.6]**
182 [1.1]	150 [1.0]	205 [1.0]	238 [1.1]	238 [1.0]	280 [1.2]	**2,063 [1.1]**
576 [3.5]	541 [3.4]	656 [3.3]	682 [3.2]	795 [3.4]	815 [3.4]	**6,397 [3.4]**
3,049 [18.6]	2,955 [18.8]	3,316 [16.8]	3,603 [17.0]	4,031 [17.4]	4,416 [18.4]	**33,382 [17.9]**
9,189 [56.1]	8,774 [55.8]	10,915 [55.4]	11,849 [55.8]	12,774 [55.2]	13,363 [55.6]	**103,629 [55.4]**
3,369 [20.6]	2,829 [18.0]	4,027 [20.4]	4,259 [20.1]	4,654 [20.1]	4,554 [18.9]	**36,394 [19.5]**
						2,076 [1.1]
9,266 [55.2]	8,873 [56.4]	10,881 [55.2]	11,775 [55.4]	13,036 [56.3]	13,677 [56.9]	**104,268 [55.8]**
7,536 [44.9]	6,854 [43.6]	8,812 [44.7]	9,460 [44.5]	10,097 [43.6]	10,375 [43.1]	**82,703 [44.2]**
						38 [0.02]
2,667 [15.9]	2,506 [15.9]	3,101 [15.7]	3,401 [16.0]	3,816 [16.5]	4,001 [16.7]	**29,934 [16.0]**
1,805 [10.7]	1,697 [10.8]	2,259 [11.5]	2,389 [11.3]	2,558 [11.1]	2,817 [11.7]	**20,490 [11.0]**
1,874 [11.2]	1,605 [10.2]	2,053 [10.4]	2,211 [10.4]	2,278 [9.9]	2,330 [9.7]	**20,338 [10.9]**
10,325 [61.5]	9,767 [62.1]	12,183 [61.9]	13,118 [61.8]	14,338 [62.0]	14,747 [61.4]	**11,4745 [61.4]**
131 [0.8]	156 [1.0]	101 [0.5]	123 [0.6]	137 [0.6]	133 [0.6]	**1,449 [0.8]**
						59 [0.03]
3,363 [20.3]	3,554 [22.9]	4,789 [24.6]	4,957 [23.6]	5,382 [23.6]	5,577 [23.5]	**40,639 [21.7]**
3,672 [22.2]	3,316 [21.4]	4,050 [20.8]	4,406 [21.01]	4,984 [21.8]	4,900 [20.6]	**39,497 [21.1]**
3,412 [20.6]	3,003 [19.4]	3,696 [19.0]	4,005 [19.1]	4,403 [19.3]	4,500 [19.0]	**36,383 [19.5]**
3,021 [18.2]	2,790 [18.0]	3,521 [18.1]	3,778 [18.0]	4,004 [17.5]	4,329 [18.2]	**33,452 [17.9]**
3,104 [18.7]	2,843 [18.3]	3,420 [17.6]	3,826 [18.2]	4,074 [17.8]	4,442 [18.7]	**34,418 [18.4]**
						2,620 [1.4]

Figure 3. Cohort Creation Flow Diagram for Study 2



BORN, Better Outcomes Registry & Network

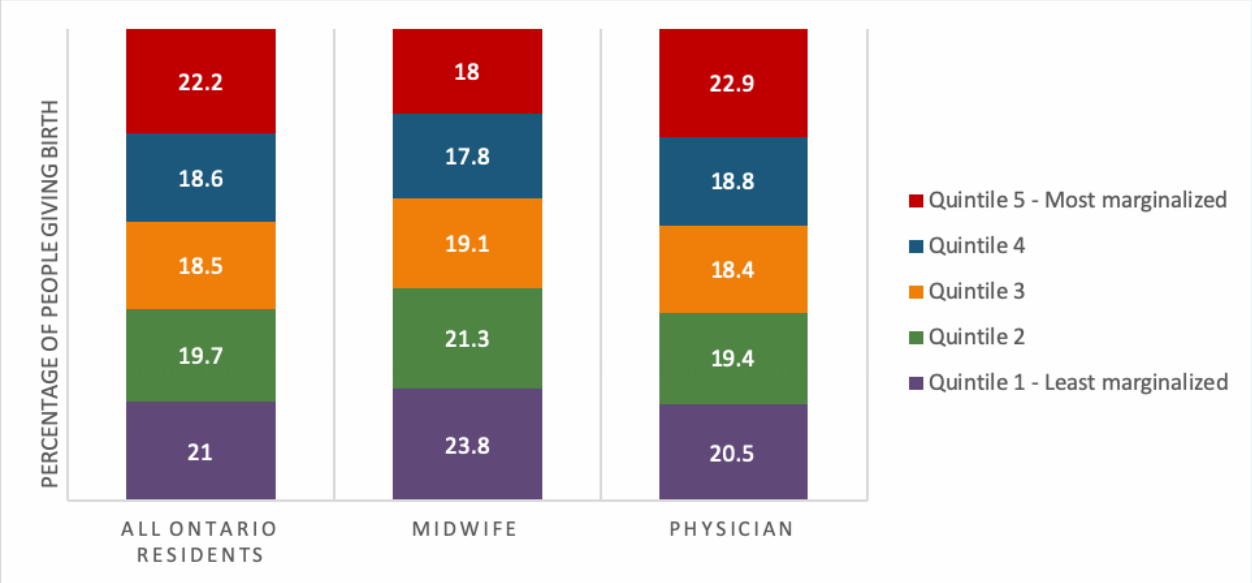
deprivation quintile (i.e., the most-marginalized) from 2012 to 2017 within each census metropolitan area in Ontario. There was wide variation across the 16 census metropolitan areas in the proportion of births that were within the highest deprivation quintile, as well as variation between the provider groups. The proportion of clients in the highest material deprivation quintile was greatest in Windsor (31.8% of the midwife group and 35.5% of the physician group) and lowest in Guelph (9.8% of the midwife group and 9.4% of the physician group). Physicians cared for a higher percentage of clients in the highest material deprivation quintile in all census metropolitan areas except Guelph. The largest discrepancy between provider groups occurred in Brantford (20.7% of the midwife group were in the highest material deprivation quintile, compared to 34.4% of the physician group).

DISCUSSION

To our knowledge this is the first quantitative study to describe the distribution of midwifery clients across neighbourhood socio-economic quintiles in Ontario. Despite public funding for midwifery services and growth over time in the number of midwife-attended births, the proportion of midwifery clients who live in the most materially deprived neighbourhoods did not increase between 2006 and 2017. Our findings provide evidence that Ontario residents of low SES are less likely to receive midwifery care than those of higher SES and that the degree of this disparity varies across the province. This variation likely reflects both the demographics of the local population and the intentional efforts made by some midwifery practice groups to make their care more accessible to people of low SES. Disparity in access to midwifery care in Ontario represents a potential lost opportunity to improve perinatal outcomes and satisfaction for people of lower SES.

No previous research quantifying access to midwifery care in Ontario on the basis of SES has been undertaken. Our findings align with what we anticipated could be concluded from anecdotal experience and previous research on access to prenatal care for people of low SES. In qualitative interviews with people of low SES, our team found that access to midwifery care is constrained for

Figure 4. Ontario Marginalization Index Material Deprivation Quintiles, by Provider, 2012–2017



Sources: Better Outcomes Registry & Network perinatal registry (2012–17); Ontario Marginalization Index

people of low SES because of barriers that include lack of awareness of midwifery services and lack of provision of information about midwifery care by physicians, who are often a person's first contact in the health care system in early pregnancy.[22] These barriers for people of low SES are exacerbated by a lack of knowledge about midwifery within social networks and a tendency to passively move through the health care system, which defaults to physician care.[22] Other qualitative research by our team has shown that midwives who are intentionally working to improve access to midwifery care for people of low SES (particularly for people who are less likely to access prenatal care) encounter barriers to these efforts.[23] The demanding nature of the work, the lack of support from midwifery colleagues, funding arrangements that do not support episodic care, and gaps in education and mentorship to support midwifery outreach all constrain midwives' work to improve access to midwifery care.[23] Research examining policy and organization factors influencing equitable access to midwifery care across Canada identified the following contributing factors: flexibility in funding arrangements, interprofessional relationships, human health resource issues, risk designations and midwives' scope of practice, population density, and midwives' approach to community integration and outreach.[24,25] While that research found an "impressive variety of ways" in which equitable access to midwifery care in Ontario is promoted,[24] our findings clearly indicate that there remains inequity in how Ontario midwifery services are accessed.

A key strength of our research is that it provides the first quantitative description of the distribution of midwifery clients by SES quintiles in Ontario over an 11-year period. Our findings allow comparison of this distribution to the entire population giving birth in Ontario and of regional variations. A limitation of our research is that we did not have access to the postal codes of midwifery clients prior to 2006 and were therefore unable to determine whether there was a change in access to midwifery care before and after the funding of midwifery care in 1994. In addition, a small proportion of both cohorts could not be assigned to an SES quintile, either because of missing postal code data or because

Table 2. Intrapartum Clinical Outcomes of Ontario Midwifery Clients, 2006–2017

Clinical Outcome*	Fiscal Year					
	2006/07	**2007/08**	**2008/09**	**2009/10**	**2010/11**	**2011/12**
	***N* = 10,442**	***N* = 11,734**	***N* = 12,903**	***N* = 13,987**	***N* = 15,515**	***N* = 16,365**
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Labour type						
Spontaneous	8,191 (78.7)	9,137 (78.0)	9,992 (77.5)	10,866 (77.8)	11,984 (77.3)	12,436 (76.0)
Induced	1,382 (16.2)	1,956 (16.7)	2,212 (17.2)	2,374 (17.0)	2,719 (17.5)	3,003 (18.4)
No labour	531 (5.1)	629 (5.4)	690 (5.4)	735 (5.3)	803 (5.2)	916 (5.6)
Missing						
Delivery type						
Spontaneous vaginal	8,174 (78.6)	9,225 (78.8)	10,123 (78.5)	11,023 (78.8)	12,274 (79.1)	12,820 (78.3)
Assisted vaginal	608 (5.8)	646 (5.5)	714 (5.5)	801 (5.7)	828 (5.3)	945 (5.8)
No labour or induced or spontaneous labour cesarean section	1,617 (15.5)	1,841 (15.7)	2,056 (15.9)	2,157 (15.4)	2,412 (15.6)	2,600 (15.9)
Missing						
Planned homebirth at onset of labour						
Yes	2,536 (24.3)	2,791 (23.8)	2,988 (23.2)	3,324 (23.8)	3,519 (22.7)	3,760 (23.0)
No	7,906 (75.7)	8,943 (76.2)	9,915 (76.8)	10,663 (76.2)	11,996 (77.3)	12,605 (77.0)
Midwife attended birth						
Yes	10,257 (98.2)	11,503 (98.0)	12,662 (98.1)	13,718 (98.1)	15,191 (97.9)	16,048 (98.1)
No	185 (1.8)	231 (2.0)	241 (1.9)	269 (1.9)	324 (2.1)	317 (1.9)
Unknown						

*Data not available for 5,144 records (e.g., client miscarried or was discharged from midwifery care prior to labour).

the postal code is not included in the index. Another limitation of our analyses is that we did not examine the prevalence of clinical factors that may have necessitated physician care. People of childbearing age are generally a healthy population, but given the association between low SES and adverse health outcomes, people of low SES may have more clinical reasons for seeking physician care than people of high SES. A related limitation is that we did not adjust for important socio-demographic and clinical factors when presenting the clinical outcomes by provider group; it is important to interpret the crude comparisons with caution, as clinical differences between the groups likely account for some of the observed differences in clinical outcomes. Finally, we did not have access to individual-level SES data. We used a neighbourhood-level SES variable, which is accepted as a reasonable approach because there are similar associations between health outcomes and both individual- and neighbourhood-level SES.[26,27] The SES variable we used is most appropriately conceived as a neighbourhood-level variable rather than a substitute for individual-level data, because it measures contextual rather than individual factors and may be associated with different effect sizes than individual factors.[26,28]

Our findings have several implications for midwifery practice, policy, and research. We argue

Fiscal Year					Total
2012/13	**2013/14**	**2014/15**	**2015/16**	**2016/17**	
***N* = 15,249**	***N* = 19,119**	***N* = 20,631**	***N* = 22,492**	***N* = 23,428**	***N* = 181,865**
n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	***n* (%)**
12,038 (78.9)	14,936 (78.1)	15,804 (76.6)	16,944 (75.3)	17,360 (74.1)	**139,688 (76.8)**
2,377 (15.6)	3,145 (16.5)	3,637 (17.6)	4,228 (18.8)	4,570 (19.5)	**31,903 (17.6)**
822 (5.4)	1,038 (5.4)	1,190 (5.8)	1,320 (5.9)	1,498 (6.4)	**10,172 (5.6)**
					102 (0.0)
12,022 (78.8)	14,994 (78.4)	16,069 (77.9)	17,421 (77.5)	18,023 (76.9)	**142,168 (78.2)**
857 (5.6)	1,072 (5.6)	1,197 (5.8)	1,298 (5.8)	1,408 (6.0)	**10,374 (5.7)**
2,370 (15.5)	3,052 (16.0)	3,365 (16.3)	3,773 (16.8)	3,995 (17.1)	**29,238 (16.1)**
					85 (0.0)
3,297 (21.6)	4,099 (21.4)	4,029 (19.5)	4,016 (17.9)	3,982 (17.0)	**38,341 (20.5)**
11,952 (78.4)	15,020 (78.6)	16,602 (80.5)	18,476 (82.1)	19,446 (83.0)	**143,524 (76.7)**
14,934 (97.9)	18,656 (97.6)	20,094 (97.4)	21,908 (97.4)	22,741 (97.1)	**177,712 (97.7)**
301 (2.0)	442 (2.3)	525 (2.5)	576 (2.6)	667 (2.9)	**4,078 (2.2)**
					75 (0.0)

that it is incumbent upon midwives to improve the accessibility of their services, and we have described approaches that might be used by midwives to do this.[29] Intentional work by midwives to improve access to midwifery will be most effective if supported at a policy level by government, midwifery education programs, and professional associations through appropriate funding, relevant education and mentorship, and allocation of resources to support knowledge translation activities to raise awareness of midwifery among both the general public and other health care providers. Increases in the overall availability of midwifery services are likely to support increased access for people of low SES; however, without targeted efforts to improve access, inequities are likely to persist. Efforts to improve access to midwifery care for people of low SES should be monitored by regular comparison of the SES distribution of people accessing midwifery services to that of the overall pregnant population. Further quantitative research should also examine the assumption that there are clinical reasons why people of low SES are less likely than people of high SES to receive maternity care from a midwife.

CONCLUSION

People of low socio-economic status (SES) in Ontario are less likely to receive midwifery care than people of high SES. This pattern changed little over an 11-year period (from 2006 to 2017). Across the

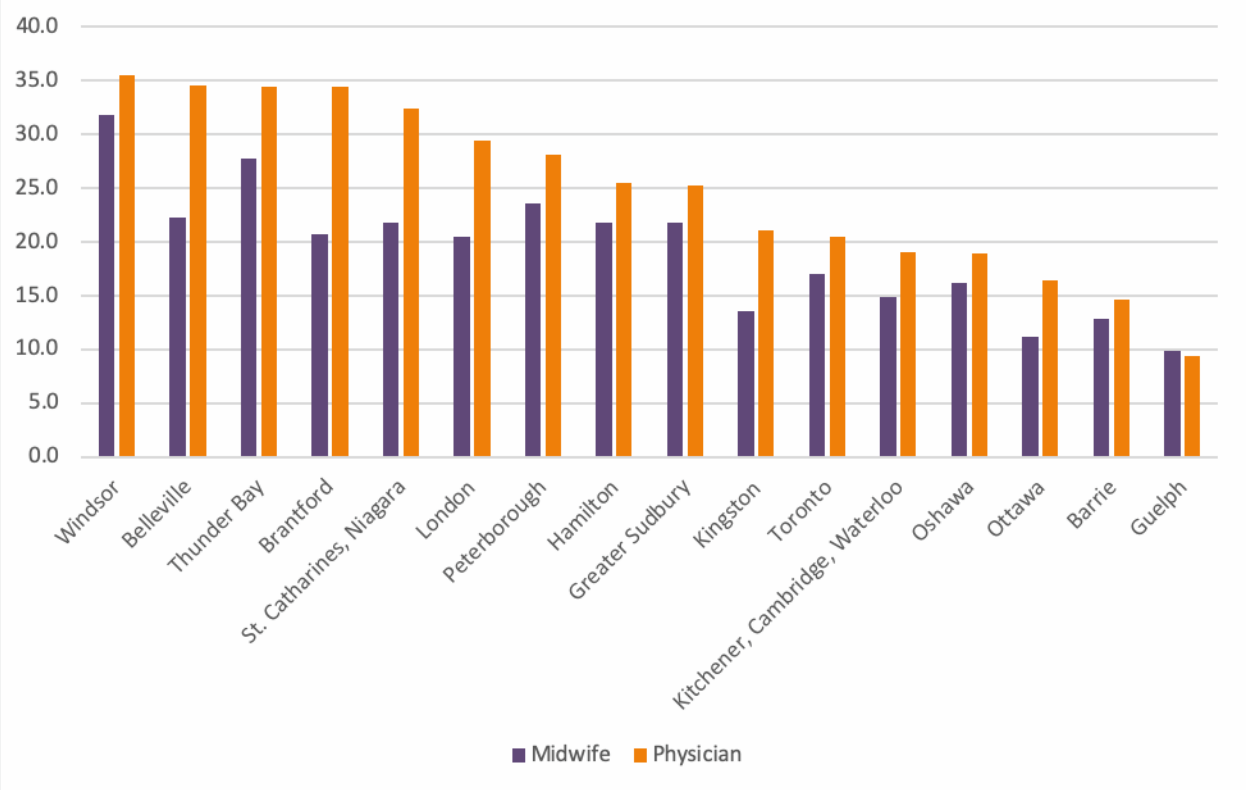
Table 3. Characteristics of All People Who Gave Birth in Ontario, by Care Provider Group, 2012–2017

Characteristic	Midwife	Physician	All
	***N* = 101,571**	***N* = 598,272**	***N* = 699,843**
	***n* (%)**	***n* (%)**	***n* (%)**
Maternal age			
< 20	1,440 (1.4)	15,057 (2.5)	16,497 (2.4)
20–24	9,728 (9.6)	67,993 (11.4)	77,721 (11.1)
25–29	29,620 (29.2)	161,970 (27.1)	191,590 (27.4)
30–34	40,478 (39.9)	212,960 (35.6)	253,438 (36.2)
35–39	17,689 (17.4)	113,387 (19.0)	131,076 (18.7)
40+	2,615 (2.6)	26,751 (4.5)	29,366 (4.2)
Missing			155 (0.02)
Gestational age			
< 20 weeks	50 (0.0)	766 (0.1)	816 (0.1)
20–34 weeks	1,120 (1.1)	14,515 (2.4)	15,635 (2.2)
34–36 weeks	3,498 (3.4)	33,162 (5.5)	36,660 (5.2)
37–38 weeks	18,520 (18.2)	163,607 (27.3)	182,127 (26.0)
39–40 weeks	57,948 (57.1)	318,947 (53.3)	376,895 (53.9)
41+ weeks	20,427 (20.1)	67,232 (11.2)	87,659 (12.5)
Missing			51 (0.007)
Maternal parity			
Multiparous	57,178 (56.3)	345,564 (57.8)	40,2742 (57.5)
Primiparous	44,392 (43.7)	252,704 (42.2)	297,096 (42.5)
Missing			< 6 (0.07)
Rurality			
Rural area	16,471 (16.2)	67,523 (11.3)	83,994 (12.0)
Small population centre (1,000–29,999)	11,442 (11.3)	54,671 (9.1)	66,113 (9.4)
Medium population centre (30,000–99,999)	10,180 (10.0)	45,369 (7.6)	55,549 (7.9)
Large urban population centre (≥ 100,000)	62,048 (61.1)	423,332 (70.8)	485,380 (69.4)
Not classified	1,429 (1.4)	7,363 (1.2)	8,792 (1.3)
Missing			15 (0.02)
Maternal deprivation quintile			
1 (least deprived)	23,644 (23.3)	118,279 (19.8)	141,923 (20.3)
2	21,178 (20.9)	111,997 (18.7)	133,175 (19.0)
3	19,053 (18.8)	106,134 (17.7)	125,187 (17.9)
4	17,717 (17.4)	108,327 (18.1)	126,044 (18.0)
5 (most deprived)	17,950 (17.7)	132,211 (22.1)	150,161 (21.5)
Missing	2,029 (2.0)	21,324 (3.6)	23,353 (3.3)

Table 4. Clinical Outcomes of Midwifery, Physician, and Total Ontario Clients, 2012–2017

Characteristic	Midwifery Clients	Physician Clients	Total Clients
	N = 10,1571	*N* = 598,272	*N* = 699,843
	n (%)	*n* (%)	*n* (%)
Type of labour			
Induced	18,124 (17.8)	150,411 (25.1)	168,535 (24.1)
Spontaneous	77,580 (76.4)	352,262 (58.9)	429,842 (61.4)
None	57,96 (5.7)	94,498 (15.8)	100,294 (14.3)
Missing	71 (0.1)	1,101 (0.2)	1,172 (0.2)
Type of birth			
Assisted vaginal	5,937 (5.8)	55,869 (9.3)	61,806 (8.8)
Induced or spontaneous labour–cesarean section	10,837 (10.7)	79,450 (13.3)	90,287 (12.9)
No labour–cesarean section	5,865 (5.8)	94,961 (15.9)	100,826 (14.4)
Spontaneous vaginal	78,874 (77.7)	367,183 (61.4)	446,057 (63.7)
Missing	58 (0.1)	809 (0.1)	867 (0.1)

Figure 5. Proportion of Births in the Most-Marginalized Material Deprivation Quintile, by Provider, in Ontario's Census Metropolitan Areas, 2012–2017



province, the proportion of people of low SES who access midwifery services varies. Efforts to reduce inequities should be prioritized and will require a multipronged approach that is supported by practicing midwives, government, midwifery stakeholder organizations, and other health care providers.

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REFERENCES

1. Heaman MI, Moffatt M, Elliott L, Sword W, Helewa ME, Morris H, et al. Barriers, motivators and facilitators related to prenatal care utilization among inner-city women in Winnipeg, Canada: a case-control study. BMC Pregnancy Childbirth. 2014;14:1-16.
2. Trivedi A, Ayanian J. Perceived discrimination and use of preventive health services. J Gen Intern Med. 2006;21(6):553-8.
3. Bird S, Bogart L. Perceived race-based and socioeconomic status (SES)-based discrimination in interactions with health care providers. Ethnic Dis. 2001;11(3):554-63.
4. Cook C, Selig K, Wedge B, Gohn-Baube E. Access barriers and the use of prenatal care by low-income, inner-city women. Soc Work. 1999;44(2):129-39.
5. Blumenshine P, Egerter S, Barclay CJ, Cubbin C, Braveman PA. Socioeconomic disparities in adverse birth outcomes a systematic review. Am J Prev Med. 2010;39(3):263-72.
6. Kramer MS, Seguin L, Lydon J, Goulet L. So5cio-economic disparities in pregnancy outcome: why do the poor fare so poorly? Paediatr Perinat Epidemiol. 2000;14:194-210.
7. Heaman MI, Sword W, Elliott L, Moffatt M, Helewa ME, Morris H, et al. Perceptions of barriers, facilitators and motivators related to use of prenatal care: A qualitative descriptive study of inner-city women in Winnipeg, Canada. SAGE Open Med. 2015;3(0).
8. Sheppard V, Zambrana R, O'Malley A. Providing health care to low-income women: a matter of trust. Fam Pract. 2004;21(5):484-91.
9. Haviland M, Morales L, Dial T, Pincus H. Race/ethnicity, socioeconomic status, and satisfaction with health care. Am J Med Qual. 2005;20(4):195-203.
10. Heaman MI, Sword W, Elliott L, Moffatt M, Helewa ME, Morris H, et al. Barriers and facilitators related to use of prenatal care by inner-city women: perceptions of health care providers. BMC Pregnancy Childbirth [Internet]. 2015 Jan;15:2. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-015-0431-5#Sec6
11. McRae DN, Janssen PA, Vedam S, Mayhew M, Mpofu D, Teucher U, et al. Reduced prevalence of small-for-gestational-age and preterm birth for women of low socioeconomic position: A population-based cohort study comparing antenatal midwifery and physician models of care. BMJ Open [Internet]. 2018;8(10):e022220. Available from: http://bmjopen.bmj.com/content/early/by/section
12. McRae DN, Muhajarine N, Janssen PA. Improving birth outcomes for women who are substance using or have mental illness: a Canadian cohort study comparing antenatal midwifery and physician models of care for women of low socioeconomic position. BMC Pregnancy Childbirth [Internet]. 2019;19(1):279. Available from: https://doi.org/10.1186/s12884-019-2428-y
13. Van Wagner V. Why legislation? Using regulation to strengthen midwifery. In: Benoit C, Bourgeault IL, Davis-Floyd R, editors. Reconceiving midwifery. Montreal and Kingston: McGill-Queen's University Press; 2004. p. 71-90.
14. Rochon FA, Van Wagner V. Access to midwifery: reflections on the Ontario Equity Committee experience. In: Bourgeault

I, Benoit C, Davis-Floyd R, editors. Reconceiving midwifery. Montreal and Kingston: McGill-Queen's University Press; 2004. p. 244-62.
15. Moat KA, Mattison CA, Lavis JN. Financial arrangements. In: Lavis JN (editor), Ontario's health system: key insights for engaged citizens, professionals and policymakers. Hamilton: McMaster Health Forum; 2016. p. 73-122.
16. Canadian Association of Midwives. Midwifery across Canada [Internet]. 2020 [cited 2020 Jan 24]. Available from: https://canadianmidwives.org/midwifery-across-canada/
17. Mullin M. Need for Ontario midwives "past the tipping point," say pros. CBC News [Internet]. 2017 Jun 17; Available from: https://www.cbc.ca/news/canada/toronto/tipping-point-midwives-1.4166003
18. Better Outcomes Registry & Network (BORN) Ontario. BORN Data Quality Report 2012-2014 - Executive Summary. Ottawa: BORN Ontario; 2016.
19. Flora Matheson AI, Moloney G. 2016 Ontario Marginalization Index User Guide (ON-Marg). User guide publication information, October 2018, 2016. Toronto: St. Michael's Hospital and Public Health Ontario; 2018.
20. Wilkins R, Khan S. PCCF + version 5J user's guide. Ottawa: Health Statistics Division, Statistics Canada; 2011.
21. Statistics Canada. Census metropolitan area (CMA) and Census agglomeration (CA) [Internet]. [cited 2020 Feb 19]. Available from: https://www150.statcan.gc.ca/n1/pub/92-195-x/2011001/geo/cma-rmr/cma-rmr-eng.htm
22. Darling EK, Grenier L, Nussey L, Murray-Davis B, Hutton EK, Vanstone M. Access to midwifery care for people of low socio-economic status: a qualitative descriptive study. BMC Pregnancy Childbirth. 2019;19; 416.
23. Darling EK, MacDonald T, Nussey L, Murray-Davis B, Vanstone M. Making midwifery services accessible to people of low SES: A qualitative descriptive study of the barriers faced by midwives in Ontario. Can J Midwifery Res Pract. 2020;19(3):40-52.
24. Hanson L, Mpofu D, Hopkins L. Toward equity in access to midwifery: a scan of five Canadian provinces. Can J Midwifery Res Pract. 2013;12(2):8-18.
25. Hanson L, Mcrae D. Toward equity in access to midwifery in Saskatchewan : key informants' perspectives. Can J Midwifery Res Pract. 2014;13(3):6-17.
26. Krieger N. Overcoming the absence of socioeconomic data in medical records: validation and application of a census-based methodology. Am J Public Health. 1992;82:703-10.
27. Mustard C, Derksen S, Berthelot J, Wolfson M. Assessing ecologic proxies for household income: a comparison of household and neighbourhood level income measures in the study of population health status. Health Place. 1995;5:157-71.
28. Geronimus A, Bound J, Neidert L. On the validity of using geocode characteristics to proxy individual socioeconomic characteristics. J Am Stat Assoc. 1996;91:529-37.
29. Nussey L, MacDonald T, Murray-Davis B, Vanstone M, Darling EK. Community as client – the work of midwives to increase access to midwifery care: A qualitative descriptive study. Can J Midwifery Res Pract. 2020;19(3):24-39.

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