

Midwifery Care in Rural and Remote British Columbia: A Retrospective Cohort Study of Perinatal Outcomes of Rural Parturient Women With a Midwife Involved in Their Care, 2003 to 2008

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Introduction: Midwifery has been regulated and publicly funded in British Columbia since 1998. Midwives are currently concentrated in urban areas; access to care is limited in rural communities. Rural midwifery practice can be challenging because of low birth numbers, solo practice, lack of on-site cesareans and specialist backup, and interprofessional tensions resulting from the integration of midwives into rural maternity care systems. Despite these barriers, rural midwives have made a substantial contribution to rural maternity care in British Columbia. The purpose of this retrospective cohort study is to examine outcomes of midwife-involved births in rural British Columbia in the postregionalization era.

Methods: We analyzed the outcomes of all parturient women with postal codes outside of the core urban areas of the province, and their singleton infants without a diagnosed congenital anomaly, who had a midwife involved in their care between April 1, 2003, and March 31, 2008. Outcomes are reported for 6 obstetric service levels. Service levels are assigned to parturient women via maternal postal codes. Women who reside further than 60 minutes from a hospital with maternity services were assigned a distance category (2 levels: >2 hours, 1-2 hours); women residing within one hour of a hospital with maternity services were assigned the level of service available at their catchment hospital (4 levels, ranging from maternity care without cesarean to cesarean provided by general surgeons or obstetricians).

Results: Eight percent of rural parturient women had a midwife involved in their care. Rates of planned home birth exceeded the provincial average (26.1%) in 5 of the 6 service levels. Rates of actual home birth were lowest among women who resided 2 or more hours away from maternity services. Obstetric intervention rates were lower for women residing in communities without cesareans or with intermittent access to cesareans. The prevalence of adverse neonatal outcomes was very low across service levels; perinatal mortality was elevated among women residing in communities more than 2 hours away from services.

Discussion: Despite numerous challenges, midwives provide safe maternity care to rural parturient women and offer choice of birth place. Given the difficulty of recruiting and retaining maternity care providers to rural settings in British Columbia and across Canada, these findings open the door for a more sustained planning process involving midwives in rural communities. Reasons for the elevated perinatal mortality rate among women who live more than 2 hours away from services should be explored in more detail, perhaps via in-depth interviews with rural midwives who serve this population.

J Midwifery Womens Health 2014;59:60–66 © 2014 by the American College of Nurse-Midwives.

Keywords: midwifery, perinatal mortality, pregnant women, rural

INTRODUCTION

The rural maternity care services–delivery environment in British Columbia has undergone significant restructuring in the past decade, marked most starkly by the closure of 22 rural services.¹ These closures have been precipitated by the increasingly regional centralization of services, difficulty recruiting and retaining medical and nursing personnel to rural communities, and the growing reluctance of many practitioners to offer local births in the absence of cesarean backup.²

This has resulted in constricted access to care for rural parturient women and the need for more women to leave their communities to give birth. Within this context, the nascent profession of regulated midwifery has emerged as a potential solution to fill the maternity service gap in rural communities.

Postregulation, there has been a slow, steady growth of rural midwifery practice. There are currently 189 registered midwives in British Columbia; approximately 65 practice in rural areas of the province.³

Using population data, in this article we report on characteristics and perinatal outcomes of rural women with a midwife involved in their care. This is a first step in understanding the health service implications of the integration of midwives into rural maternity care settings in British Columbia. Findings may serve as a foundation to further support the contribution of midwifery to sustainable rural maternity care services in British Columbia and rural areas in the United States and elsewhere.

BACKGROUND

Distance to Maternity Services and Perinatal Outcomes in British Columbia

The idea of regionalization—or the trend toward creating local governance structures to oversee health service planning

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Quick Points

- ◆ Structural barriers to rural midwifery practice in British Columbia include challenges of integrating into local maternity care cultures as a new profession and of obtaining privileges at rural hospitals, challenges of geography (rural catchment areas are often vast), and practice sustainability due to low volume of clients in a fee-for-service environment with the attendant requirement of continuous call.
- ◆ Rural parturient women in British Columbia who had a midwife involved in their care experienced low rates of obstetric interventions and adverse neonatal outcomes; demand for home birth is high among women who reside in rural areas.
- ◆ Either as part of interprofessional teams or as stand-alone practitioners, midwives are well poised to contribute to the health human resource challenges facing rural maternity planners.

and delivery⁴—was conceptually developed in most Canadian provinces during the 1980s and 1990s and implemented soon afterward,⁵ following international trends.⁶ The broad goals of regionalization were to increase efficiency and effectiveness of health services organization through a focus on population-based funding, increase system cohesion as marked specifically by increased continuity of care, and respond to the demand for greater accountability and public input.^{4,7,8}

An emerging body of evidence in British Columbia has addressed potential consequences of the regionalization of health services, specifically the relationship between maternal and newborn outcomes and the distance from maternal residence to the nearest hospital with maternity services. Although previous studies have not disaggregated the care provider group,^{9,10} they contribute a contextual understanding to the provision of rural maternity care as they systematically assessed perinatal outcomes by mothers' residence. Although each study defined distance differently, both found statistically significant increases in perinatal mortality among infants born to women who live further away from obstetric services. Lisonkova et al¹⁰ report perinatal outcomes of women aged 35 years or older who gave birth to a singleton infant in British Columbia between 1999 and 2003 (N = 29,698). Outcomes were reported by 1) rural residence (yes/no), defined as residence in a community with a population of less than 10,000; and 2) distance to the nearest hospital with cesarean capacity (<50 km, 50-150 km, >150 km). Compared to urban mothers, rural parturients were more likely to be multiparous, to have given birth to a prior low-birth-weight or preterm infant, to have attended fewer prenatal visits (<4), to have had a prior spontaneous abortion, to smoke and drink alcohol during pregnancy, to live in low-income neighborhoods, and to be Aboriginal. The odds of having a cesarean birth decreased as distance increased, but the odds of perinatal death increased (odds ratio [OR] = 1.5; 95% confidence interval [CI], 1.1-2.1, per distance category).⁹

In a study by Grzybowski et al,¹⁰ all women with a singleton pregnancy beyond 20 weeks' gestation who gave birth between April 1, 2000, and March 31, 2004, and resided outside of the core urban areas of British Columbia were included in the analysis (N = 49,402). Grzybowski et al defined 6 obstetric service levels for rural British Columbia. Parturient women residing more than one hour away from services were categorized by the distance they need to travel to access obstetric services (> 4 hours, 2-4 hours, or 1-2 hours).

Women residing within one hour of an obstetric service were categorized by the level of service available at their catchment hospital (3 levels, ranging from no local specialist access to obstetric care provided by obstetricians or general surgeons). The authors reported a 3-fold increase in perinatal mortality for women residing more than 4 hours away from obstetric services, after controlling for maternal characteristics and medical complications (adjusted odds ratio [aOR] = 3.17; 95% CI, 1.45-6.95). Newborns of women who resided farther away from services also had significantly more days in the neonatal intensive care unit compared to women from communities with ready access to specialist obstetric services. The authors concluded that the distance rural women have to travel matters, as evidenced by more adverse perinatal outcomes among women who reside farther away from services.

Midwifery Care in Rural British Columbia

Midwifery in British Columbia has been regulated and publicly funded since 1998. Although early practice was primarily urban-dominated, key rural communities were instrumental in contributing to the contemporary midwifery model of care.¹¹ Registered midwives complete a 4-year baccalaureate program. In British Columbia, midwife is a protected title and cannot be used by anyone not legally registered with the College of Midwives of British Columbia. In British Columbia, midwives work as primary maternity care providers in community-based practices, are mandated to offer home birth to eligible women, and transfer care to obstetricians when necessary. Midwives provide prenatal, intrapartum, and postpartum care up to 6 weeks following birth; they can bill up to 60 courses of care per year.

While midwifery emerges as a potential solution to the shortage of rural maternity care providers in British Columbia, it is crucial to have an understanding of rural practice outcomes and rural practice conditions. Many rural midwives experience challenges integrating into local maternity care cultures as a new profession¹² and obtaining privileges at rural hospitals. This is because of the Medical Advisory Boards' unfamiliarity with the scope of practice and training of midwives, as well as perceptions that additional providers could not be supported in a fee-for-service environment when birth numbers are low.¹³ In addition, in British Columbia a significant number of rural midwives work in solo practices

without established coverage for personal time off or continuing medical education.¹⁴ Rural midwives also must assess appropriate candidates for local hospital birth (when local operative birth is not available), recognizing that in some cases this may require the same criteria as assessing clients for home birth. Time of year, weather, and time of day (when communities rely on daylight for ferry or plane transport) are crucial variables in this decision-making process as many rural communities in British Columbia experience periods of complete isolation due to inclement weather.

The safety and efficacy of midwifery care in the home and hospital setting, compared to physician care, for low-risk women has been demonstrated in British Columbia in previous studies.^{15,16} Women who are cared for by midwives experience low rates of adverse maternal and newborn outcomes and obstetric interventions. What is missing from the literature is a report of the characteristics and labor and birth outcomes of rural women and infants under the care of midwives in British Columbia.

METHODS

Defining Maternity Service Levels

We identified 77 rural catchment areas, based on the distance from the center of the geographic area associated with the mother's postal code to the nearest hospital that offers maternity services. Postal codes of core urban areas (Greater Vancouver Regional District and Greater Victoria Region) were excluded. For women residing more than one hour away from services, the distance between the home community and the nearest hospital with maternity services was calculated using geographic information systems and Google maps. Travel times were adjusted for travel conditions (eg, mountainous roads, travel by ferry, potential inclement weather) (see levels 1 and 2 in Table 1). Women residing within one hour of a hospital with maternity services were assigned the level of service at their catchment hospital (see levels 4-6 in Table 1 for a definition of these service levels). Service levels were assigned for each fiscal year to recognize changes in service levels over time. Level 6 corresponds to the highest level of maternity service and most closely reflects the level of care available in urban areas.

As the data source for this study, we used the British Columbia Perinatal Database Registry, a quality-controlled database that compiles maternal and neonatal records of 99% of births in British Columbia. Data is abstracted from maternal (up to 42 days postpartum) and newborn (up to 28 days after birth) records from over 60 hospitals. Births that occur at home and are attended by registered midwives are also captured; planned and unplanned home births can be distinguished.

We requested a linkage of women's maternity service level to selected maternal characteristics (eg, age, parity, smoking and alcohol use during pregnancy, pre-existing and pregnancy induced medical conditions), labor and birth outcomes (eg, induction of labor, mode of delivery), and perinatal outcomes (eg, perinatal mortality and Apgar scores). For details about the creation of rural catchments and levels of service, see Grzybowski et al.⁹

Cohort Specifications and Data Analysis

Our analysis focused on women with a midwife involved in their care. Planned home births are almost always attended by midwives; hospital births may be attended by a midwife, family physician, or obstetrician. When transfer of care to a physician is indicated for clinical reasons, midwives continue to provide supportive care.

All women who resided outside of the core urban areas of the province; who gave birth to a singleton after 20 weeks' gestation between April 1, 2003, and March 31, 2008; and who had a midwife involved in their care were included in the study. Late terminations and infants with any recognized congenital anomalies were excluded from the analysis.

We report descriptive statistics for rural midwifery clients by maternity service levels. The proportion of women who gave birth at their catchment hospital was determined by examining discrepancies between the catchment hospital code and the birth hospital code. Home births were excluded from this particular analysis.

When possible, provincial statistics from Perinatal Services British Columbia are cited to contextualize our findings.^{17,18} These statistics pertain to all midwife-involved births in the province, averaged over 5 years (2003-2008). Multiple births and infants with congenital anomalies are included in these provincial reports. This study was approved by the Clinical Research Ethics Board at the University of British Columbia (#H09-03003-A004).

RESULTS

Between 2003 and 2008, 63,277 women who gave birth to singletons resided outside of the core urban areas of the province. Of these women, 5031 (8.0%) had a midwife involved in their care. This percentage mirrors the proportion of women in British Columbia with a midwife involved in their care (8.3%), reported in 2006/2007.¹²

Most women who accessed midwifery care outside of the core urban areas of the province resided in communities with specialist backup (obstetricians or general surgeons) (level 6). Approximately 5% of women lived farther than one hour away from a hospital with maternity services; 2.6% lived at least 2 hours away (see Table 1).

About 2 in 3 women in British Columbia who see a midwife during pregnancy also give birth with a midwife. Women who resided the furthest away from services were least likely to deliver with a midwife (67.7% in level 1), and women who lived in communities where midwives practice alongside general practitioner surgeons and/or specialists who offer cesarean delivery were most likely to give birth with a midwife (88.7% and 79.4%, respectively).

The rate of planned home birth in 5 of the 6 service levels was higher than the provincial average for the same time period (26.1%). Planned home birth rates fell below the provincial average (24.1%) in communities where obstetricians and general surgeons practice (level 6). The percentage of rural women who planned a home birth and subsequently gave birth at home was similar to the provincial average (75%)¹³ for women residing in level 2-6 communities; parturient women who lived farthest away from services were least likely to actualize their desire for a home birth (56.1%). Rates of accidental

Table 1. Definitions of Maternity Service Levels in Rural Areas of British Columbia (N = 5031)

Maternity Service Level	Definition	No. Rural Catchment Areas	No. Women With Midwife-Involved in Care	% of Total Midwifery-Involved Births
1 No local services	> 2 hours from maternity services	18	130	2.6
2 No local services	1-2 hours from maternity services	14	124	2.5
3 Primary maternity care without cesarean	No local cesarean availability	11	366	7.3
4 General practitioner surgery	Cesarean provided by general practitioner surgeons only	10	302	6.0
5 Mixed Model	Cesarean provided by general practitioner surgeon or obstetrician	7	671	13.3
6 General surgeon or obstetrician gynecologist	Cesarean provided by general surgeon or obstetrician	17	3438	68.3
Total		77	5031	100

and/or unattended home births, albeit low across service levels, were highest in level 1 and level 3 communities.

As the level of service increased, women were more likely to give birth at their catchment hospital (ie, in their home communities). Not surprisingly, the rate of local birth was lowest for women who live in communities without local access to cesareans. Approximately 60% of women who resided in general practitioner surgery communities gave birth at their catchment hospital (see Table 2). In this context, it should be noted that some general practitioner surgery communities have continuous access to cesareans; others have only intermittent access, depending on the number and availability of general practitioner surgeons.

The average age of women who reside in rural areas and have a midwife involved in their care was comparable to the provincial average, as was the proportion of first-time mothers.¹³ A notable exception is the small percentage of nulliparas residing in general practitioner surgery communities and the somewhat lower age of parturients who sought midwifery services in these communities.

Women who reside in rural communities were less likely to attend the recommended number of prenatal visits compared to the provincial average (3.2% attended 4 or fewer appointments). Attendance was particularly poor in general practitioner surgery communities (9.9% of women attended 4 or fewer appointments). Prenatal smoking rates ranged from 2.6% in general practitioner surgery communities to 14% in communities with primary care access without cesareans. Labor induction rates were comparable to the provincial average (12.0%) in 4 of the 6 strata, but were much lower than the provincial average in communities without access or intermittent access to cesarean birth. Use of epidural anesthesia was also very low among women who reside in these communities.

The provincial vaginal birth rate for women with a midwife involved in their care averaged about 82% (cesarean rate = 18%). Vaginal birth rates in rural areas of the province were comparable to the provincial average, with one exception: Women residing in general practitioner surgery communities had much higher vaginal birth rates and a very low cesarean rate (7.6%) (see Table 3).

The provincial preterm birth rate for midwife-involved births was 5.1%. Compared to the provincial average, this rate was higher for women residing farther than 60 minutes away from maternity services and lower for women residing within 60 minutes of services. The prevalence of low birth weight and Apgar scores <7 at 5 minutes was low across all service levels (see Table 4).

Over the 5-year study period, 19 perinatal mortalities occurred. Fifteen were stillbirths, and 4 were early neonatal deaths (2 neonatal deaths in level 1; 2 in level 6). Women who resided in communities more than 2 hours away from maternity services had elevated perinatal mortality rates compared to other service levels. Provincial perinatal mortality rates for midwife-involved births were not available; the average provincial stillbirth rate for midwife-involved births was 3.2% for the time period 2003 to 2008, comparable to the stillbirth rate among the rural women in our sample.

DISCUSSION

The number of midwife-attended births in British Columbia as a proportion of all births has nearly tripled between 2003 and 2008.¹⁸ Access to midwifery care among rural women has also increased as more midwives graduate and move to rural locations. Anecdotal evidence suggests that pregnant women without local access to midwifery care are willing to travel long distances to secure their preferred maternity care provider. It is not uncommon for women with financial resources to rent a hotel room or house in a community with midwifery services and have a midwife-attended home birth in this setting. This “birth tourism” highlights the demand for midwifery care and planned home birth among women who do not have local access to midwifery care.

One of the tenets of the British Columbia midwifery model of care is choice in place of birth (hospital or home). Within a rural environment, some of the usual challenges of home birth—lack of support by physician providers, ensuring appropriate distance to backup hospital, availability of a second attendant, minimum practice numbers—are more

	1	2	3	4	5	6
	>2 hours	1-2 hours	Primary care	General	Mixed	General surgeon/
	from	from	without	practitioner	model	obstetrician-
	services	services	cesarean	surgery		gynecologist
Service Level	(n = 130)	(n = 124)	(n = 366)	(n = 302)	(n = 671)	(n = 3438)
Birth attended by a midwife or midwifery trainee, n(%)	88 (67.7)	86 (69.4)	253 (69.1)	268 (88.7)	533 (79.4)	2412 (70.2)
Planned home birth, n(%)	41 (31.5)	35 (28.2)	99 (27.0)	103 (34.1)	229 (34.1)	827 (24.1)
Actual home birth, ^a n(%)	23 (18.5)	27 (21.8)	72 (19.7)	82 (27.2)	172 (25.6)	635 (18.5)
Actual home birth as a proportion of planned home births, n(%)	23 (56.1)	27 (77.1)	72 (72.7)	82 (79.6)	172 (75.1)	635 (76.8)
Home birth not attended by midwives, ^b n(%)	4 (3.1)	1 (0.8)	12 (3.3)	1 (0.3)	3 (0.4)	25 (0.7)
Gave birth at catchment hospital, ^c n(%)	N/A ^d	N/A ^d	112 (39.7)	125 (57.1)	398 (80.2)	2490 (89.6)

^a Attended by midwives or midwifery trainees.

^b Birth was attended by "other" (eg, family member, ambulance attendant), homebirth was unattended, or had an unknown attendant.

^c Excludes women who gave birth at home.

^d Statistics were only generated for women residing within one hour of a hospital that offers maternity services.

	1	2	3	4	5	6
	>2 hours	1-2 hours	Primary care	General	Mixed	General surgeon/
	from	from	without	practitioner	model	obstetrician-
	services	services	cesarean	surgery		gynecologist
Service Level	(n = 130)	(n = 124)	(n = 366)	(n = 302)	(n = 671)	(n = 3438)
Maternal age (mean)	30.5	31.4	30.5	27.7	31.0	29.78
Nulliparas, n(%)	63 (48.5)	63 (50.8)	197 (53.8)	60 (19.9)	338 (50.4)	1547 (45.0)
Single parent, n(%)	7 (5.4)	6 (4.8)	11 (3.0)	11 (3.6)	34 (5.1)	183 (5.3)
Smoking during pregnancy, n(%)	11 (8.5)	7 (5.6)	51 (13.9)	8 (2.6)	49 (7.3)	337 (9.8)
Drinking alcohol during pregnancy, n(%)	2 (1.5)	0 (0)	1 (0.3)	0 (0)	3 (0.4)	22 (0.6)
4 antenatal visits or less, n(%)	6 (4.6)	7 (5.6)	29 (4.9)	30 (9.9)	17 (2.5)	133 (3.9)
Induction, ^a n(%)	16 (12.7)	16 (13.4)	31 (9.3)	18 (6.1)	71 (10.8)	448 (13.6)
Epidural, ^a n(%)	18 (14.3)	15 (12.6)	31 (9.3)	14 (4.7)	86 (13.1)	556 (16.8)
Vaginal births, n(%)	104 (80.0)	97 (78.2)	286 (78.1)	279 (92.4)	577 (86.0)	2805 (81.6)
Spontaneous vaginal birth, n(%)	98 (75.4)	90 (72.6)	271 (74.0)	277 (91.7)	552 (82.3)	2655 (77.2)
Cesarean births, n(%)	26 (20.0)	27 (21.8)	80 (21.9)	23 (7.6)	94 (14.0)	633 (18.4)

^a Excludes women with planned cesarean births.

pronounced. Despite this, data indicates that rural midwives have a thriving home birth practice.

Our data also showed that the transfer of care rate from midwives to physicians was highest among women from communities without access to cesareans within one hour of surface travel time. This finding is not surprising; midwives need to take into account distance to a hospital with cesarean capacity when deciding on the best course of care for rural women. An above average transfer-of-care rate results in a loss of income for midwives who typically get paid on a fee-for-service basis, thus compromising the sustainability of rural midwifery

practice. This has been identified as a significant barrier for rural midwives.^{13,14}

Perinatal mortality rates across service levels 2 to 6 were low and comparable to rates reported by other researchers who study perinatal outcomes of midwife-attended births in British Columbia.¹⁶ Janssen et al¹⁶ reported perinatal death rates of 0.05% for midwife-attended births in British Columbia (extrapolated from perinatal death rates reported in their Appendix 1) for the time period 2000 to 2004.

We found higher rates of perinatal mortality among women in midwifery care who resided the farthest away from

Table 4. Neonatal Outcomes in Rural British Columbia

Service Level	1	2	3	4	5	6
	121-240+ minutes from services (n = 130)	60-120 minutes from services (n = 124)	Primary care w/o cesarean (n = 366)	General practitioner surgery (n = 302)	Mixed model (n = 671)	General surgeon/obstetrician-gynecologist (n = 3438)
Prematurity (<37 wks gestation), n(%)	8 (6.2)	8 (6.5)	8 (2.2)	11 (3.6)	23 (3.4)	148 (4.3)
Low birth weight (<2500 g), n(%)	1 (0.8)	2 (1.6)	7 (1.9)	6 (2.0)	14 (2.1)	65 (1.9)
Apgar scores <7 at 5 minutes, n(%)	0 (0)	0 (0)	3 (0.8)	3 (1.0)	6 (0.9)	60 (1.8)
Perinatal mortality, ^a n(%)	2 (1.5)	0 (0)	0 (0)	1 (0.3)	1 (0.1)	15 (0.4)

^aStillbirth and early neonatal death up to 7 days: Stillbirth is defined as the complete expulsion or extraction after at least 20 weeks of gestation or after attaining a weight of at least 500 grams, of a fetus in which at birth there is no breathing, beating heart, pulsation of the umbilical cord, or unmistakable movement of voluntary muscle.

services (1.5%). These findings are congruent with those reported by Lisonkova et al¹⁰ and Grzybowski et al.⁹ A perinatal mortality rate of 1.8% was reported by Grzybowski et al for women who reside more than 4 hours away from services. Lisonkova et al reported a perinatal death rate of 2.4% among women aged 35 or older who lived more than 150 kms away from a hospital with cesarean capacity and 1.5% among women who lived 50-150 kms away from services.

Pregnant women from British Columbia who have to leave their communities to give birth experience significantly higher levels of stress and anxiety compared to pregnant women who reside closer to services,¹⁹ which may contribute to adverse outcomes. As Grzybowski et al demonstrated, women who reside more than 2 hours away from maternity services are more likely to be socioeconomically vulnerable and of Aboriginal ancestry than women who reside in communities closer to maternity services.⁹ These factors, along with geographic isolation, may contribute to the elevated prematurity rates and perinatal mortality in level 1 communities. In-depth interviews with parturient women who live far away from services, and the midwives who care for them, may identify additional reasons for the higher perinatal mortality rates that were identified in the current and previous studies.

Rates of obstetric interventions for women with midwives involved in their care were low in our sample and particularly low in general practitioner surgery communities (eg, the cesarean rate was 7.6%). Although these findings may in part be explained by the profile of young, mostly multiparous women who sought out midwifery services in these communities, a rural maternity care model that includes general practitioner surgeons and midwives should be explored in more detail. General practitioners with an expanded scope of practice serve an important role in rural settings. Likewise, an expansion of rural midwives' scope of practice would contribute to the sustainability of rural midwifery services. Future research might address whether rural midwives would be interested in an expanded scope of practice that includes cesarean first-assist and women's health services such as Pap tests.

The growth of rural midwifery services in British Columbia is limited by relatively small number of midwives who graduate each year in the province and by multiple barriers to rural midwifery practice. Nevertheless, there is significant commitment from rural women and maternity care providers to return birth to local communities. A leading example is the newly initiated midwifery practice on Haida

Gwaii, a remote cluster of islands located off the northern coast of British Columbia (operative birth is 3 hours away by air; 8 hours by ferry transportation when the ferries are running) and home to the Haida Nation. With a total population of fewer than 5000 people geographically dispersed over 100 km, and approximately 50 births per year, sustainable practice has been challenging. In 2009 a midwife from the community returned to set up practice, and despite logistical and sustainability issues has subsequently attended an average of 20 women a year on the island, more than doubling the on-island births prior to 2009 (C. Laursen, Registered Midwife, oral communication, September 2012).

The current analysis covered a 5-year period: 2003 to 2008. Since 2008, rural midwifery has grown steadily. Because of the recent expansion of our provincial midwifery education program, twice as many midwives will graduate (20 per year). Many of these graduates will relocate to rural areas of the province and find better working conditions. Interprofessional tensions have mitigated over time as nurses, physicians, and other care providers in rural communities become familiar with midwives' contribution to care. Additionally, increasing numbers of rural communities are exploring the viability of interprofessional models of care as a way to alleviate the demands of on-call maternity care. Political advocacy on the part of the Midwives Association of British Columbia has resulted in both trial funding for rural locums to relieve rural midwives for educational or personal leave and also startup funds for new communities.

Assigning women to service levels via postal codes has some limitations. For instance, it is possible that some women who relocated from rural and remote areas of the province to give birth have reported addresses in the referral community rather than in their home community. In addition, some maternal sociodemographic and lifestyle variables reported in Table 3 had above average numbers of missing values and should be interpreted with caution. These include single parent status and tobacco and alcohol consumption during pregnancy. Because we calculated a very rare outcome (ie, perinatal mortality) in a small subset of parturient women (see service levels 1-5), only descriptive statistics were reported. A much larger sample is needed to compare perinatal mortality rates across service levels. It must also be noted that the majority of perinatal mortalities were stillbirths. Stillbirths during pregnancy are not a good indicator of quality of care; intrapartum death rates would be a better

indicator, but this variable is currently not available in our provincial database registry.

CONCLUSION

Our study is the first to disaggregate care provider type in a review of perinatal outcomes based on distances traveled to access services and the level of service available in the woman's home community. Our findings add to the growing evidence base demonstrating the safety of regulated midwifery practice. Given the difficulty of recruiting and retaining maternity care providers to rural settings in British Columbia and across Canada, these findings open the door for a more sustained planning process involving midwives in rural communities. Although currently funding mechanisms and residual disagreements about the safety of home birth continue to present challenges, we anticipate that these structural barriers will be mitigated in response to the crisis in rural maternity care, fostering rural models of interprofessional practice. Either as part of such teams or as stand-alone practitioners, midwives are well poised to contribute to the health human-resource challenges facing rural communities.

Findings from the current study are relevant to maternity professionals in the United States, where planners are confronted with similar challenges in developing successful models of rural maternity care,²⁰ and rural midwives have reported similar barriers to practice as Canadian registered midwives.²¹ The latest American College of Nurse-Midwives benchmarking survey identified that 22% of certified nurse-midwives practice rurally,²² yet little has been published about rural midwifery practice and practice outcomes in the United States.

The current study could be replicated in the United States with perinatal data sets that include midwife involved deliveries and maternal zip codes.²³

AUTHORS

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CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

ACKNOWLEDGMENTS

We would like to acknowledge Ashley Love for contributing to the analysis of the results that are presented in this article.

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