



Hospital Births in Canada: A Focus on Women Living in Rural and Remote Areas

The page features decorative wavy lines in grey and teal that flow across the background, framing the central content area.

Our Vision

Better data. Better decisions.
Healthier Canadians.

Our Mandate

To lead the development and maintenance of comprehensive and integrated health information that enables sound policy and effective health system management that improve health and health care.

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Respect, Integrity, Collaboration,
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About the Canadian Institute for Health Information

The Canadian Institute for Health Information (CIHI) collects and analyzes information on health and health care in Canada and makes it publicly available. Canada's federal, provincial and territorial governments created CIHI as a not-for-profit, independent organization dedicated to forging a common approach to Canadian health information. CIHI's goal: to provide timely, accurate and comparable information. CIHI's data and reports inform health policies, support the effective delivery of health services and raise awareness among Canadians of the factors that contribute to good health.

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Executive Summary

Ensuring the adequacy of services for pregnant women who live in Canada's rural and remote areas can be a challenge for health planners. Communities with few births may not be able to support the array of complex care required by mothers and their newborns. Pregnant women in such communities often face the prospect of travelling great distances to deliver, especially if identified risk factors suggest they will need intervention by a specialist. This report provides information about the delivery experience and birth outcomes of women from rural and remote areas who gave birth in hospitals across Canada over a five-year period. The purpose of the report is to assist health care decision-makers as they plan services for women and newborns in their health regions and jurisdictions.

From 2007–2008 to 2011–2012, there were 242,550 in-hospital deliveries for women from rural areas in Canada (excluding Quebec), representing 18% of all hospital deliveries. However, in many of Canada's health regions, especially those in the Far North, the majority of deliveries were for women living in rural and remote areas. The following findings are based on the linkage of hospital records of mothers to those of their live births for the five-year period 2007–2008 to 2011–2012 (excluding Quebec).

The Birth Experience

The intrapartum experience of rural women was quite distinct from that of their urban counterparts—rural women were more likely to have lengthy travel times to give birth, to experience a hospital transfer and to have their birth attended by a family physician rather than an obstetrician/gynecologist. The majority (67%) of rural women gave birth in urban hospitals, and 17% travelled more than two hours to deliver their baby.

Maternal Characteristics

Women living in rural areas had certain characteristics that placed them at increased risk of poor maternal and infant birth outcomes, such as relatively high rates of teen births and living in socio-economically disadvantaged neighbourhoods. However, from a pan-Canadian perspective, rural women had a risk profile similar to that of urban women in terms of the prevalence of diabetes and hypertension, either pre-existing or gestational.

Mode of Delivery

Women from rural areas were less likely than those from urban areas to have a Caesarean section (25.6% versus 28.6%) or assisted vaginal birth (8.6% versus 10.6%), and they were more likely to have a spontaneous vaginal birth (65.8% versus 60.8%).

Providers

Deliveries for rural women were more likely than deliveries for urban women to be attended by a family physician (44.8% versus 26.0%) and less likely to be attended by an obstetrician/gynecologist (57.7% versus 79.1%) or midwife (4.0% versus 5.7%).ⁱ Among women with a Caesarean section, rural women were less likely than urban women to have their birth attended by an obstetrician/gynecologist (75.8% versus 97.7%).

Maternal and Infant Outcomes

After controlling for socio-demographic characteristics, comorbidity and aspects of the delivery, the study found that

- While relatively rare in Canada, severe maternal morbidity was a somewhat more common occurrence for rural women than for urban women (2.4% versus 1.7%; odds ratio [OR] 1.4; 95% confidence interval [CI] 1.3 to 1.4). Similarly, unplanned hospital readmissions were rare, affecting 1.2% of urban women and 1.4% of rural women (1.4% versus 1.2%; OR 1.2; 95% CI 1.1 to 1.2).
- Newborns born to women living in rural areas were more likely to be large for gestational age (12.5% versus 9.4%; OR 1.4; 95% CI 1.4 to 1.4) but were less likely to be small for gestational age (8.2% versus 10.3%; OR 0.7; 95% CI 0.7 to 0.7) or preterm (7.6% versus 8.1%; OR 0.9; 95% CI 0.9 to 1.0).

There was significant variation in these delivery and birth outcomes among rural health regions, with some regions doing significantly better and others significantly worse; few clear regional patterns emerged.

Travel time to delivery beyond two hours was associated with higher rates of preterm and large for gestational age births among rural women. This could reflect success in referring high-risk pregnancies from rural and remote areas to distant specialized care. It could also indicate that lengthy travel times to delivery are a risk to pregnancies. The data available for this report cannot distinguish between these potential explanations.

Rural women who delivered in urban hospitals had markedly higher rates of preterm birth than those delivering in rural hospitals (9.7% versus 3.1%). This could potentially be due to effective triaging of women at high risk of this outcome. However, this data cannot be used to explain the observed differences.

Conclusions

From a pan-Canadian perspective, small but significant differences in birth outcomes of rural and urban women were evident from 2007–2008 to 2011–2012, with some outcomes better for urban women and babies and some outcomes better for rural women and babies. During this period, rural women's birth experiences were quite distinct from those of their urban counterparts; for example, they were more likely to have lengthy travel times to deliver and

i. Percentages in this section sum to more than 100% because births may be attended by more than one type of provider.

were more likely to have intrapartum care provided by a family physician rather than an obstetrician. There was significant variation in maternal and infant outcomes among rural women across Canada's health regions. Information from the administrative data used in this report cannot fully explain this variation. The report's findings can be used by health planners to further explore their outcomes, taking into account regional differences in systems of care.

About This Report

This report follows the publication of a series of special reports prepared by the Canadian Institute for Health Information (CIHI) on the health of and health care provided to Canada's mothers and infants. CIHI reports that address the care of women giving birth in Canada include the following:

- *In Due Time: Why Maternal Age Matters* (2011)
- *Highlights of 2010–2011 Selected Indicators Describing the Birthing Process in Canada* (2012)
- *Highlights of 2009–2010 Selected Indicators Describing the Birthing Process in Canada* (2011)
- *Highlights of 2008–2009 Selected Indicators Describing the Birthing Process in Canada* (2010)
- *Too Early, Too Small: A Profile of Small Babies Across Canada* (2009)

Presents analyses of national preterm birth and small for gestational age rates and provides information about the important health and risk factors associated with these occurrences.

- *Giving Birth in Canada: Regional Trends From 2001–2002 to 2005–2006* (2007)
- *Giving Birth in Canada: The Costs* (2006)

Explores the costs associated with delivering maternity and infant care in Canada, including provincial, national and international comparisons, where available.

- *Giving Birth in Canada: Providers of Maternity and Infant Care* (2004)

Focuses on trends in birthing and maternal and infant care and examines the changing scopes of practice for care providers.

- *Giving Birth in Canada: A Regional Profile* (2004)

Provides selected health care and health status indicators for Canada's mothers and infants. These indicators include new data presented at the regional level for regions with populations of 75,000 or more and at the provincial level.

Please visit www.cihi.ca to download a copy of any of these reports.

Each of these reports presents a fact-based compilation of current research, historical trends, and new data and findings. Their aim is to assist care providers and decision-makers in planning health services for maternity and infant care. They also complement CIHI's ongoing reporting process and the initiatives of partners such as the Canadian Perinatal Surveillance System (CPSS).

The CPSS is part of the Public Health Agency of Canada's initiative to strengthen national health surveillance capacity. The CPSS monitors and reports on perinatal health determinants and outcomes through an ongoing cycle of data collection and acquisition, expert analysis, interpretation and communication.

In 2008, the CPSS released its *Canadian Perinatal Health Report, 2008 Edition*, which includes information on 29 perinatal health indicators on determinants and outcomes of maternal, fetal and infant health.⁵ Statistics for each indicator consist mainly of temporal trends at the national

level and provincial/territorial comparisons for the most recent year for which data is available. The report *Perinatal Health Indicators for Canada, 2011* was produced by CPSS⁶ to update data on key perinatal health indicators described in the 2008 edition and to provide current information on major determinants and outcomes of maternal, fetal and infant health in Canada. The report is available on request by sending an email to cpss-scsp@phac-aspc.gc.ca.

Introduction

Canada is characterized by its vast geography and widely dispersed population. Stretching east to west from the Atlantic to the Pacific oceans and north to the Arctic Ocean, it is the second-largest country in the world. Canada's population, once predominantly rural, has become urbanized, so that by 2011 only 18% of Canada's population of nearly 35 million resided in a rural or remote area (Box 1). These areas are often sparsely populated and disadvantaged in terms of access to medical services.

Although the size of the rural population has declined, the birth rate among rural women is high relative to that of their urban counterparts.⁷ Many rural women do not have ready access to maternity providers and services in the wake of rural hospital closures and the regionalization of maternity services.^{8–11} Health planners in each of Canada's provinces and territories must grapple with issues around providing vital delivery services to women in rural areas.

This report provides a profile of Canadian hospital-based deliveries with a focus on differences experienced by women who reside in rural and remote areas. The concept of "rural" encompasses aspects of population size, density, distribution, and distance to and relationship with urban areas (for example, commuting patterns) (Box 1).

Box 1: Canada's Rural Population

In this report, an urban area was defined as a census metropolitan area (CMA) or census agglomeration (CA) of at least 10,000 residents.* Rural areas and small towns with a population of less than 10,000 persons (not in any CMA or CA) were considered rural.

Census data for 2011 showed that 23,123,441 people, or 69% of the total population, lived in one of Canada's 33 CMAs. In addition, 4,311,524 people (13%) lived in CAs and 6,041,723 people (18%) lived outside CMAs and CAs.

The proportion of people living in rural areas has declined steadily over the past 160 years. It fell below the 50% mark between 1921 and 1931, due to major shifts within the Canadian economy from agricultural to industrial sectors.

In 2011, only four provinces had a proportion of their population living in rural regions that was near to or lower than the national average: Quebec (19.4%), Ontario (14.1%), Alberta (16.9%) and British Columbia (13.8%). The proportion of the population living in rural areas was highest in the Atlantic provinces and in the territories.

Note

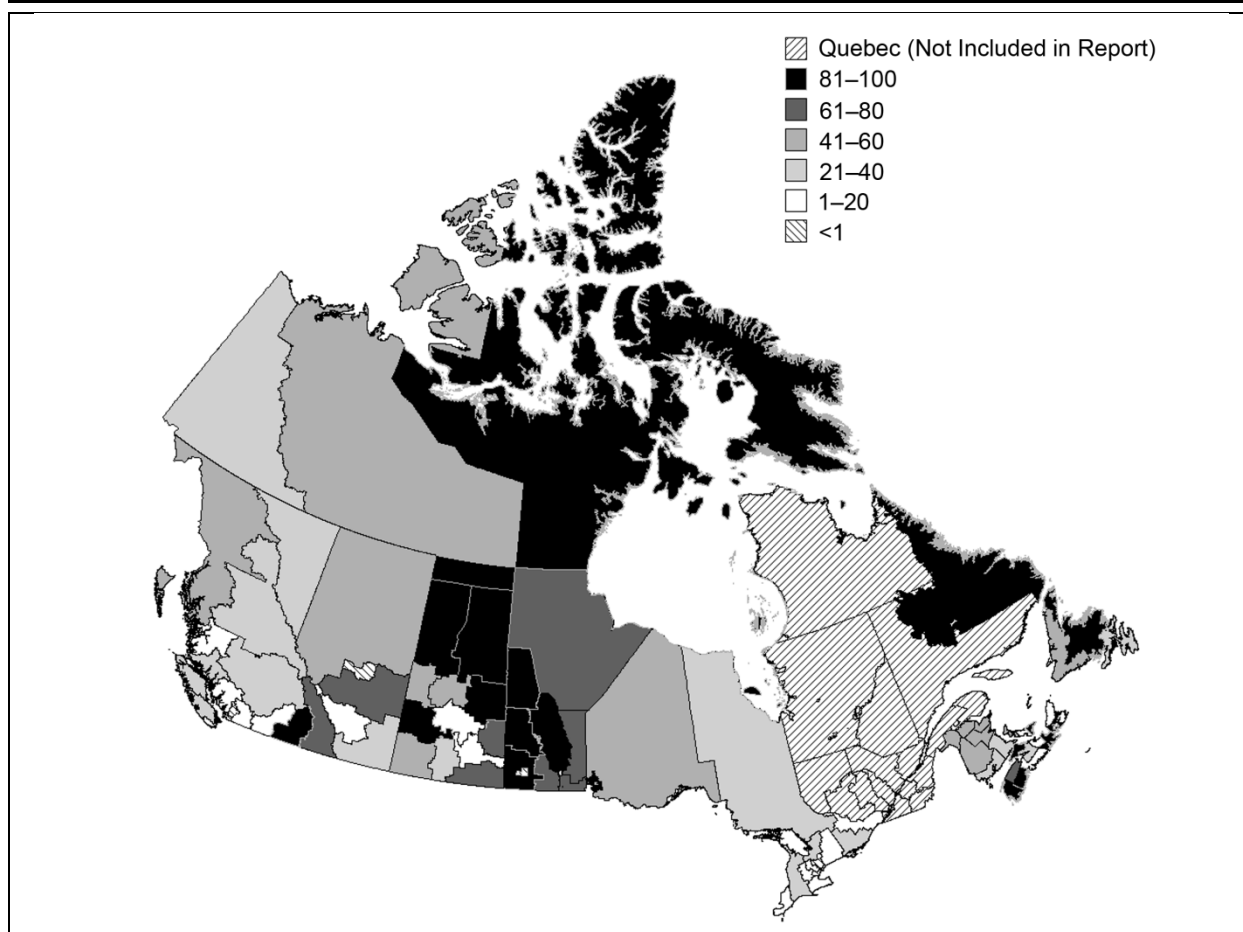
* CMAs and CAs are areas consisting of one or more neighbouring municipalities situated around a core. A CMA must have a total population of at least 100,000, of which 50,000 or more live in the core. A CA must have a core population of at least 10,000 (<http://www12.statcan.gc.ca/census-recensement/2011/ref/dict/geo009-eng.cfm>, accessed November 26, 2012).

Source

Censuses of Population, 1851 to 2011, Statistics Canada.

As shown on the map in Figure 1, in most of Canada's health regionsⁱⁱ (58 of 85 health regions included in this analysis), more than 20% of hospital births involved women living in rural areas during the study period. The 28 health regions with a high concentration of hospital births among rural women (greater than 60%) were primarily spread across central and northern Canada. The map shows marked variation across the territories in the extent to which rural women accounted for all hospital births. In Yukon, relatively few (21%) deliveries were for rural women. The remaining 79% were for women living in Whitehorse, the only urban city in Yukon. In contrast, in the Northwest Territories, 55% of deliveries were for rural women. In Nunavut, there are no urban areas; consequently all deliveries were for rural women. Across the provinces, the percentage of hospital births accounted for by rural women ranged from 10% in Ontario to 46% in Newfoundland and Labrador.

Figure 1: Deliveries for Rural Women as a Percentage of All Deliveries, by Health Region, Selected Provinces/Territories, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

ii. The geographical units of analysis used throughout this report are the patient's province and health region of residence. "Health region" refers to administrative areas defined by the provincial ministries of health. For complete Canadian coverage, each of the territories also represents a health region.

The first section of this report describes the experience of rural and urban women who delivered live births in a hospital in terms of their access to hospital-based services. Differences in the socio-demographic and health risk profiles of rural and urban women who gave birth are described next. The following two sections characterize the mode of delivery and the clinicians who provided care during labour and delivery. The last section presents analyses that compare maternal and infant outcomes for urban and rural women and then focuses on how such outcomes vary for rural women across Canada's health regions.

The purposes of the report are to provide a pan-Canadian perspective on rural deliveries and to generate information that can be used by local health managers and planners to improve care and outcomes. The report identifies some of the unique attributes of the birthing experience of rural women and highlights significant regional variation in selected maternal and infant outcomes. It is the intention of the report to stimulate and inform local investigations to better understand these observed sources of variation. Although the administrative data used to generate the report's findings plays an essential role in surveillance, this source of information is often inadequate when trying to identify which of the many complex social, environmental, health care and clinical factors contribute to local variation in health outcomes. A series of four hypothetical vignettes are presented throughout the report to illustrate some of the challenges faced by planners, providers and women giving birth in rural areas.

Vignette 1: Perspective of a Rural Maternity Care Planner

Pam is the executive director responsible for planning and delivering acute care services for a rural region located in western Canada. She has also worked as a maternity nurse and nurse manager in rural hospitals, and she understands the challenges of providing birthing services for a large, sparsely populated region. She knows that services in rural areas often rely on a few key people and that the service can be jeopardized if one of them leaves and cannot be replaced.

A few years ago, Pam was seconded to the ministry of health to lead the review of strategies for supporting birthing services in rural regions and the required back-up and transfer services. Her team considered a number of questions:

- Would additional funding through negotiated physician agreements be effective in attracting and retaining physicians?
- Would additional training for the health care team (nurses, physicians and midwives) support them to expand or maintain their skills and confidence to provide safe care?
- What strategies can medical schools and midwifery and nursing programs adopt that will attract new practitioners to and retain them in rural communities?
- What legal or regulatory changes are required to support the scope of practice required?
- What else is needed to support collaborative care and provide for a reasonable call schedule?

Since returning to the region, Pam has been working with the medical director to maintain birthing services at the region's two hospitals. They looked at where women from the region give birth and the quality of services at the local hospitals. They launched a number of initiatives to support quality care, including participation in the [MOREOB Program](#). As well, the provincial perinatal program provided support for a number of other initiatives, which included implementing new referral and transfer protocols for more specialized services. The local hospitals and the community welcomed family practice residents—they hoped the experience would make the residents want to live and practise in the community.

One of the region's family physicians who performs Caesarean sections recently announced his retirement, and Pam and the medical director are worried about finding a replacement. They have a potential candidate and know that many regions will be competing for her. In addition, they understand that the candidate is looking for a better work-life balance and does not want to be on call as much as the physician who is retiring. A midwife has also expressed interest in moving to the community. Pam and the medical director are looking at what type of collaborative care model can be implemented in their community to support the continuation of birthing services at their hospitals.

Important Notes About This Report

Data

Data for all in-hospital-based indicators was obtained from the Discharge Abstract Database (DAD) at the Canadian Institute for Health Information (CIHI) for 2007–2008 to 2011–2012. This data holding captures administrative, clinical and demographic information on inpatient events from acute care hospitals in Canada. All provinces and territories submit to the DAD except Quebec, which submits data to CIHI's Hospital Morbidity Database.

Quebec's ministère de la Santé et des Services sociaux submits a data file to CIHI at the end of each year. This data does not contain postal codes, which prevented us from deriving several key variables used in this report. Due to this limitation, information about residents of Quebec is not reported here.

All provinces and territories that submit to the DAD use the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada* (ICD-10-CA) and *Canadian Classification of Health Interventions* (CCI).

This report presents data based on women's place of residence, which may differ from the place of hospitalization.

Several health regions have small numbers of deliveries per year. In order to maximize region-level reporting, all results are for five years of pooled data.

This report is limited to hospital-based deliveries, as the vast majority of live births (98.5%) in Canada take place in hospitals.¹² The jurisdictions with the highest percentages of out-of-hospital births are Nunavut (6.4%) and the Northwest Territories (3.7%).

DAD records do not include information that permits us to identify deliveries for Aboriginal women.

Analyses

Analyses of in-hospital deliveries and birth statistics, as well as logistic regression models, were based on a population of live newborns who could be linked to their mothers. More details on how this population was defined are provided in the *Technical Notes*, which can be found online at www.cihi.ca.

All rates are crude unless otherwise stated.

The term "delivery" refers to a single in-hospital event in which one or more births occurred. For example, a mother delivering twins would be counted as one delivery.

The term "birth" refers to a single in-hospital birth. For example, a mother delivering twins would be counted as having two births.

Geographical information for deliveries and births was derived from the maternal delivery record.

MapQuest was used to calculate drive time, in minutes, between the mother's residence and the hospital in which she delivered. Deliveries where drive time could not be determined, but for which the associated Vincenty distance was greater than the maximum observed Vincenty distance in the 60-to-120-minute group, were assigned to the 121+ group. The Vincenty distance is calculated as the crow flies using a formula that considers latitude and longitude points on the Earth's surface.

Maternal outcomes were identified throughout episodes of care. An episode of care refers to all contiguous acute care hospitalizations. To construct an episode of care, transfers within and between facilities were linked. Newborn outcomes were identified using information on the birth record. Episodes of care for newborns were not constructed due to limitations in the ability to link newborn records across time.

Analyses of newborn size—small for gestational age (SGA) and large for gestational age (LGA)—were limited to singletons and twins only.

Health Region

The analysis included 85 health regions (all health regions in Canada excluding those in Quebec). Region-level summaries provided throughout the report include 75 of these 85 health regions. Summaries exclude the following 10 regions because either the total number of deliveries or the number of deliveries for rural women was too small:

- Fraser South, B.C.;
- Richmond, B.C.;
- Vancouver, B.C.;
- Fraser North, B.C.;
- Edmonton Zone, Alberta;
- Winnipeg, Manitoba;
- Brandon, Manitoba;
- Churchill, Manitoba;
- Mississauga Halton, Ontario; and
- Toronto Central, Ontario.

For more information on data and methods used for this report, please refer to www.cihi.ca. Province-, territory- and health region-level results are available as supplementary tables online.

Accessing Hospital-Based Maternity Services

The birthing experience of women living in rural and remote areas of Canada often differs from that of their urban peers. Hospital closures and the regionalization of perinatal services have left many women in small and remote communities without an option for a local hospital-based delivery. For example, 17 of the 98 acute care hospitals in Alberta lacked an elective obstetric service in 2000.¹³ By 2004, the number of hospitals without such services had grown to 29.¹⁴ In rural B.C., 17 maternity care services closed between 2000 and 2007.¹⁵

Concerns related to cost, efficiency and quality of care may be raised when an area's population declines relative to its health care infrastructure. Analyzing these factors may lead to a decision to close facilities or regionalize services. Retaining physicians and other health personnel in rural communities following hospital closures can be difficult. And as older rural physicians retire, some communities find it difficult to recruit new physicians to provide intrapartum care in a rural setting that doesn't have many colleagues to share the time-consuming, sometimes unpredictable and potentially stressful responsibilities.

Rural and remote areas with few residents and births cannot usually sustain medically supported maternity services. Pregnant women in these communities must travel outside of their community to a facility offering such care before delivery, sometimes a great distance. Other areas may be able to accommodate a low-risk pregnancy with local services but need to refer high-risk pregnancies to hospitals with specialized services such as Caesarean section (C-section) and neonatal intensive care capacity.

Some rural and remote communities have overcome resource challenges by developing innovative multidisciplinary collaborative maternity services that engage the expertise of nurses, nurse practitioners, midwives, specially trained family physicians and others in shared-care maternity practices. Some communities without hospital-based elective obstetric services have been able to accommodate low-risk pregnancies. For example, birthing centres have been established in remote communities to permit delivery closer to home^{16, 17} (Box 2).

Box 2: Birthing Centres Serving Remote Communities¹⁴

A birthing centre is a health care facility that provides labour and delivery services; it is generally staffed by midwives. Four birthing centres have been established in Canada to provide maternal care services based in traditional Aboriginal health and birthing practices, complemented by modern forms of medical care, in unique manners specific to their respective community.

- The Inuulitsivik Health Centre in Puvirnituq, Quebec, was the first centre to open in 1986.
- The Rankin Inlet Centre in Nunavut opened in 1995.
- The Tsi Non:we Ionnakeratstha* Ona:grahsta† Six Nations Maternal and Child Centre opened in Ohsweken, Ontario, in 1996.
- The Kitikmeot Birthing Centre in Cambridge Bay, Nunavut, opened in 2010.

CIHI does not receive data from these centres, and births in these centres are not reflected in the analyses presented in this report.

Notes

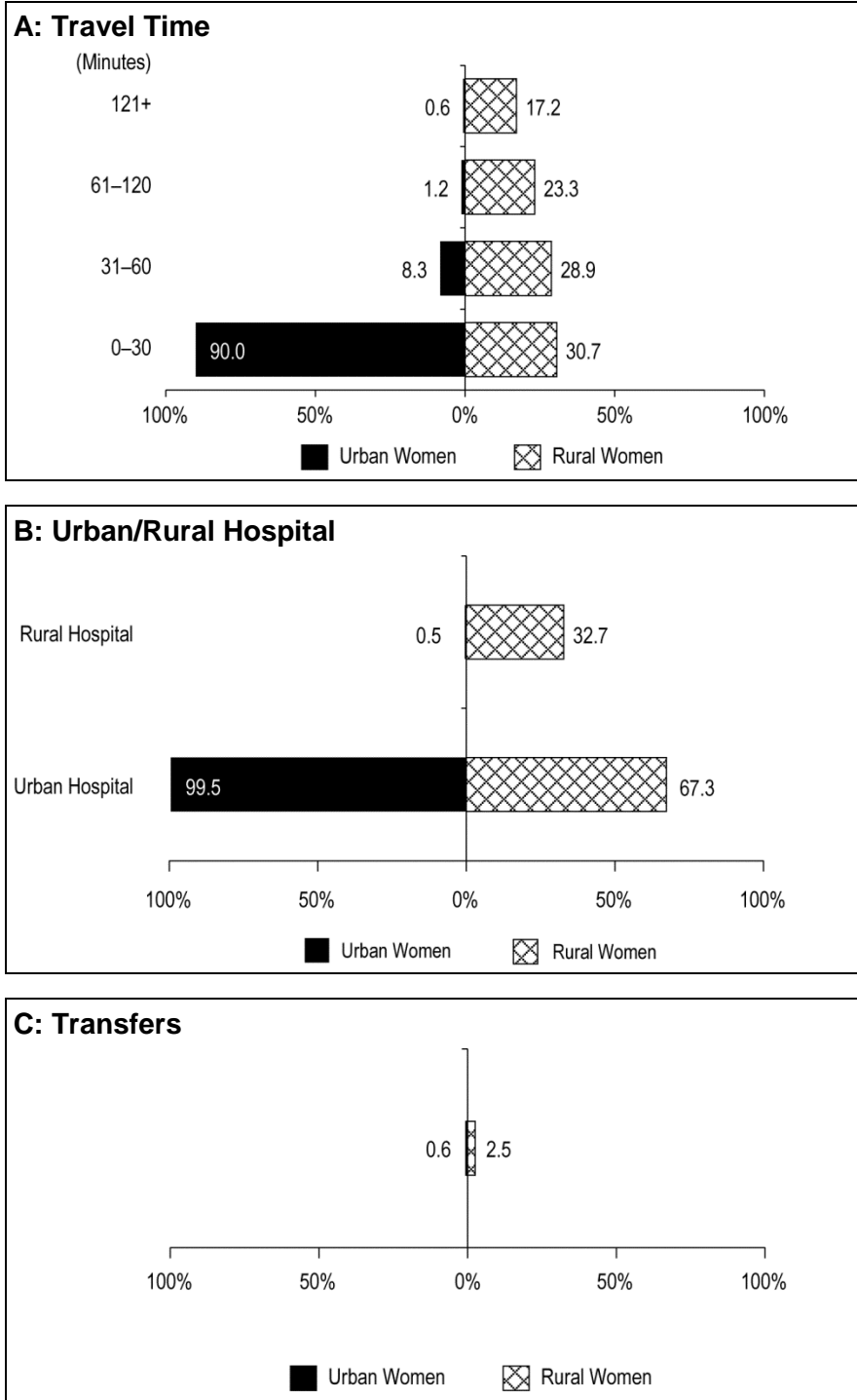
* “The place they will be born” in Mohawk.

† “A birthing place” in Cayuga.

A recent joint position paper issued by professional societies and organizations representing obstetricians and gynecologists, midwives, nurses and family physicians highlights diminishing access to maternity programs in rural and remote communities in Canada and recommends policies to help ensure high-quality maternity care as close to home as possible.¹⁸

In this section of the report, estimates are presented of the time it takes for rural and urban women to arrive at their hospital of birth. Next, the extent to which women residing in rural and urban areas deliver in hospitals located in rural or urban areas is examined. The section concludes with a description of the frequency of hospital transfers for rural and urban women.

Figure 2: Percentage of Deliveries for Urban and Rural Women, by Travel Time, Location of Hospital of Delivery and Hospital Transfers, Selected Provinces/Territories, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

How Long Does It Take for Women to Reach Their Hospital of Birth?

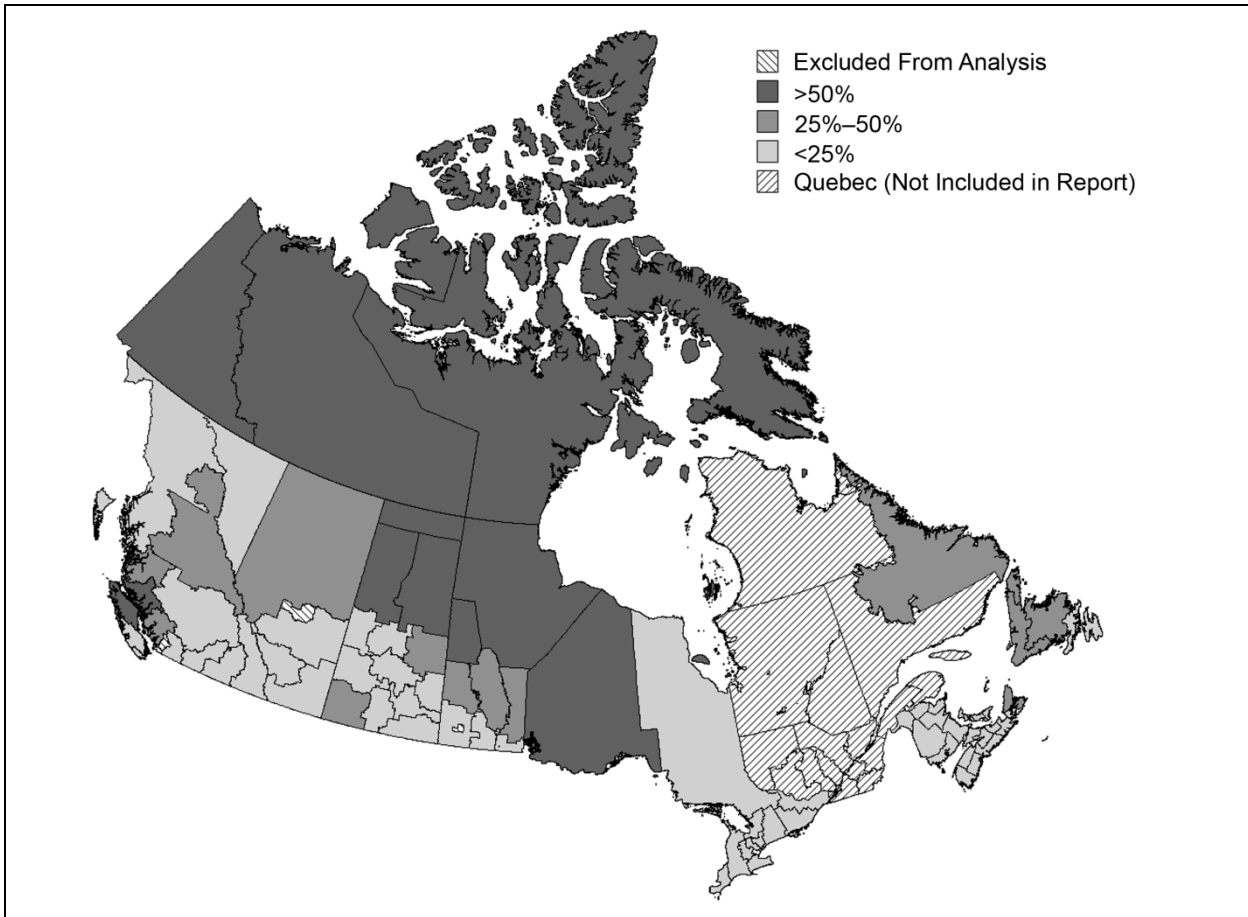
Among 1,372,708ⁱⁱⁱ hospital deliveries between 2007–2008 and 2011–2012, 17.6%, or 241,162, were for women who lived in rural areas. As shown in Figure 2, having a lengthy travel time to deliver was a distinctly rural experience, with 40.5% of rural deliveries involving more than one hour of travel to hospital, compared with less than 2% of deliveries for urban women. The vast majority (90.0%) of urban women travelled 30 minutes or less to deliver. The mode of transportation for women who experienced these prolonged travel times was quite variable and included boat, plane, train or snowmobile in addition to travel by automobile or bus.

Across Canada, 17.2% of rural women travelled more than two hours to deliver. Lengthy travel times were most pronounced in Canada's territories—almost all (99.5%) rural women in Yukon and the majority of rural women in Nunavut (84.1%) and the Northwest Territories (61.9%) experienced this travel time. Across the provinces, rural women in Prince Edward Island were least likely and those in Manitoba most likely to spend this much time travelling to the hospital of their delivery (2.0% and 30.2%, respectively).

Figure 3 shows the proportion of rural women who travelled more than two hours for their delivery during the five-year study period, by health region. In 10 health regions, more than half of women had this lengthy travel time (see Box 3 for a list of these 10 health regions). In roughly two-thirds of health regions included in the analysis (53 of 75), less than one in four rural women had to travel more than two hours to deliver.

iii. Of the 1,374,127 deliveries included in this report, 1,419 deliveries were excluded from the travel time analysis because information needed to calculate travel time was missing (for example, postal code).

Figure 3: Percentage of Rural Women Travelling More Than Two Hours, by Health Region, Selected Provinces/Territories, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Vignette 2: Perspective of a Young Mother Who Travels to Give Birth

Susie, who is 22 years old, is from a remote community in the western (Kitikmeot) region of Nunavut, and is expecting her third child. She lives with her parents and younger siblings, and most of her extended family is nearby.

During her pregnancy, Susie has received prenatal care at the local Community Health Centre, where she's been seen by a midwife from the Kitikmeot Birthing Centre in Cambridge Bay. She's developed a good relationship with the midwife, and she's very disappointed to learn that she will not be able to give birth at the centre because she has developed hypertension and is considered high risk. Instead, she needs to fly to Yellowknife (900 km away) about four weeks before the baby is due. Her medical travel and accommodation costs are covered by the Nunavut Medical Travel Program, but because she is older than 18, the program will not pay for a companion to travel and stay with her in Yellowknife.

The thought of going through childbirth alone is terrifying, and she wishes that her mother could come. The problem is that her mom takes care of her frail grandmother. Her sister and cousin want to come with her, but they both have children to look after. In the end, a cousin looks after Susie's two children while she's away, and she goes to Yellowknife alone in January, after a snowmobile ride to the local airstrip.

Susie stays at the government-run Larga Kitikmeot Boarding Home, and it's some relief to learn that the boarding home has an interpreter and a driver to take her to her appointments. However, she's worried about expenses that are not covered by the Medical Travel Program.

It is very stressful for her to be away from her large extended family—she doesn't know anyone in Yellowknife. Staying in touch with her family and friends is a challenge but, thanks to the internet, Susie can communicate with them using Skype and Facebook.

After three weeks, Susie goes into labour and gives birth to a baby girl. Her baby is jaundiced, which means that she has to stay in Yellowknife an extra three days before being able to go home. The time away from her other children seems endless.

Susie's boyfriend, family and friends meet her at the airstrip upon her arrival home. She's happy to see her boyfriend, show off her baby and catch up on what happened while she was away. After such a long absence, it takes a while to readjust to her routine, but fortunately her family and friends are a big help.

Box 3: “Hot Spots” for Lengthy Travel Time to Delivery

In 10 health regions, the majority of rural women travelled more than two hours to deliver (shown in Figure 3). These women accounted for 42% of the 41,408 women who travelled two or more hours to hospital for delivery.

Table 1: Health Regions Where the Majority of Women Travelled More Than Two Hours to Deliver

Health Region	Percentage of Rural Women Travelling More Than Two Hours
1. Yukon	99.5
2. Athabasca, Sask.	96.8
3. Burntwood, Man.	90.7
4. Keewatin Yatthé, Sask.	89.5
5. Nunavut	84.1
6. Mamawetan Churchill River, Sask.	63.8
7. North Vancouver Island, B.C.	62.5
8. Northwest Territories	61.9
9. North West, Ont.	57.2
10. NOR-MAN, Man.	51.1

Notes

The Burntwood and NOR-MAN health regions in Manitoba merged in May 2012.

See the supplementary tables for provincial/territorial/regional analyses.

Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

A provincial-/territorial-funded medical travel benefit is available to eligible residents who may not be covered through an employer or other federal program (such as the Non-Insured Health Benefits for First Nations and Inuit). Common areas of coverage for medical travel include transportation to the nearest appropriate health professional or facility for health services. Non-medical escorts are covered when specific criteria are met. Coverage of accommodation, return travel and meals varies by jurisdiction.

There are relatively few pan-Canadian published studies with which to compare these results. The Canadian Maternity Experiences Survey asked women how far they had to travel to deliver their baby. In 2006–2007, 23% of women from Yukon and 40% of women from the Northwest Territories said that they had to travel more than 100 km to give birth.^{19, iv} In Manitoba, factors associated with lengthy travel times (more than 113.8 km) to give birth between 2007–2008 and 2008–2009 included younger age (24 and younger), residence in a lower-income neighbourhood, lone parenthood and multiparity.²⁰

iv. The survey excluded women living on First Nations reserves, many of which are located in geographically remote areas with limited access to maternity care. This exclusion results in an underestimation of the proportion of women who travel to give birth.

Are Women From Rural Areas Delivering in Urban or Rural Hospitals?

Delivering a baby in one's community of residence has many advantages, medically, psychologically, socially and culturally. However, the ability to deliver close to home is determined largely by the geographic distribution of birthing facilities, the range of services available within these facilities and the availability of staff with obstetric training within communities. This section of the report describes where urban and rural women delivered in terms of their hospital of birth's urban or rural location.

During the study period, 438 acute care hospitals in Canada reported at least one live birth. Of these, 231 (or 53%) were located in rural areas. Of the 75 health regions summarized, 18 (or 1 in 4) did not have a rural hospital during the study period. Among the 10 health regions with the highest concentration of rural women travelling more than two hours, only Yukon did not have a rural hospital where at least one live birth was delivered.

Among deliveries for rural women, roughly two-thirds (67.3%) occurred in urban hospitals (Figure 2). The remaining one-third of deliveries, an estimated 15,870 per year, occurred in rural hospitals. About one-fifth (21.3%) of the rural women who delivered in urban hospitals travelled more than two hours for their delivery. The need to travel more than two hours for delivery among rural women is largely accounted for by these women travelling to urban hospitals (that is, 83.5% of all travel of more than two hours among rural women occurred for travel to urban hospitals).

How Often Do Rural Deliveries Involve a Transfer From One Hospital to Another?

Women living in rural and remote communities with medical services to support low-risk pregnancies may choose to deliver their baby locally, with the option of a transfer to a higher level of care if necessary. If a complication arises during pregnancy or labour, such women can be transferred to another hospital for delivery. In other cases, a pre-delivery transfer may be needed for women who present for the first time to prenatal care with an urgent, complex medical need.

Post-delivery transfers may occur when a woman elects to travel from her rural area of residence to give birth in an urban hospital and is then transferred back to her community following her delivery to convalesce closer to home. A post-delivery transfer may also occur if a woman delivers her baby in her community hospital but either the woman or her baby then requires specialized care elsewhere.

As shown in Figure 2, rural women were four times more likely than urban women to be transferred from one hospital to another (2.5% versus 0.6%). However, across Canada, a hospital transfer is not common; approximately 1,236 rural women and 1,467 urban women were transferred annually.

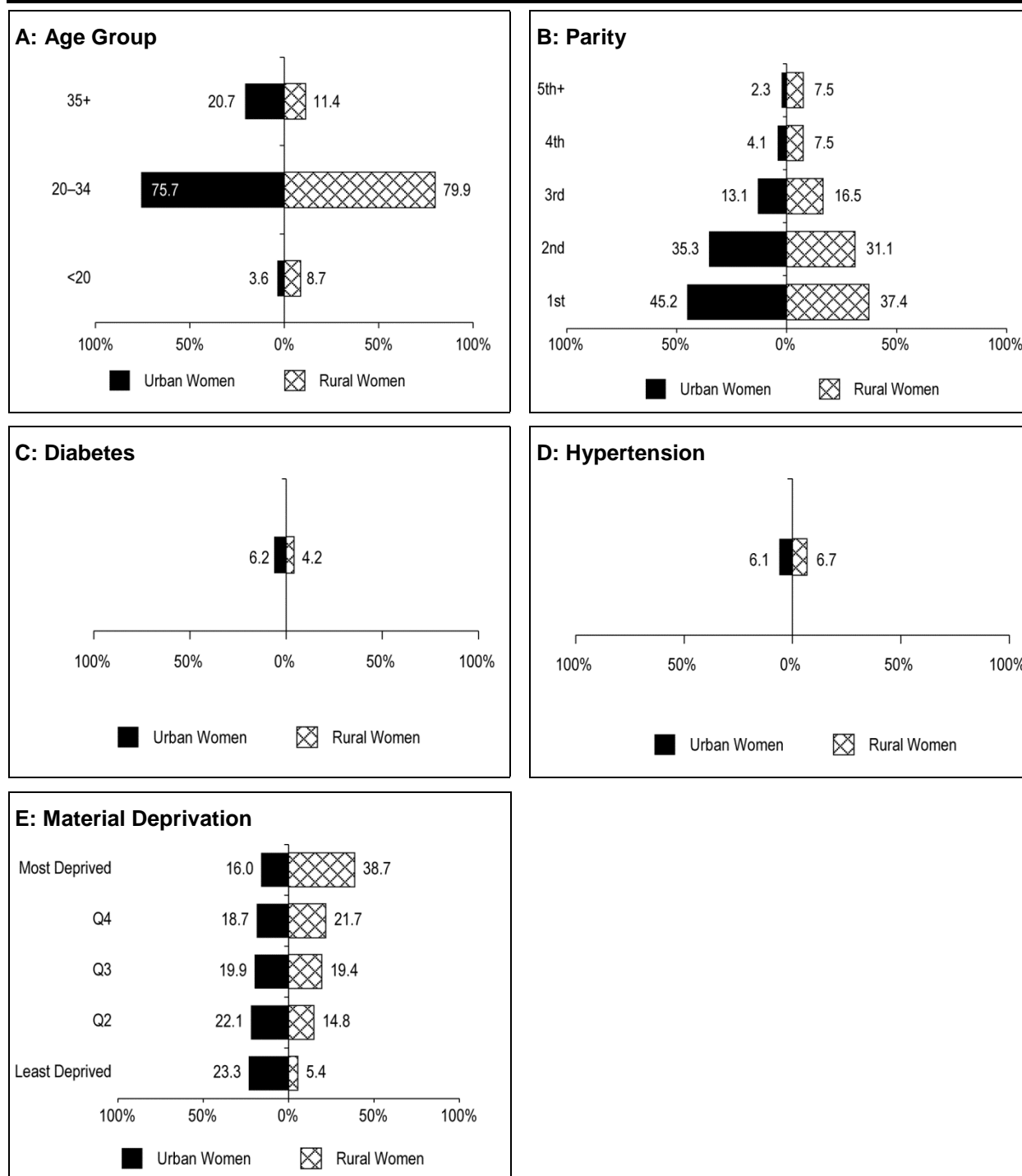
Women Who Deliver in Hospital

How Do Urban and Rural Women Differ by Age, Parity, Risk and Socio-Economic Status?

A number of maternal characteristics are associated with less-favourable birth outcomes for mothers and babies. Giving birth at a very young or older age is a well-documented risk factor. Having an underlying medical condition such as diabetes or hypertension—or developing such a condition during pregnancy—can complicate the pregnancy and compromise the health of the mother and infant. Furthermore, mothers' circumstances in terms of their neighbourhood's socio-economic status (as measured by education, employment and income) are also predictive of perinatal outcomes. In this analysis, parity, defined as the number of previous live births a woman has had, was also associated with outcomes. In this section of the report, the question of whether rural women as a group can be distinguished from urban women on these dimensions is explored.

The factors examined in this report were selected based on associations with maternal and infant outcomes reported in the literature, as well as their availability in the DAD. It is important to note that this is not an exhaustive list—other factors, such as smoking and nutrition, are also associated with maternal and infant outcomes. These factors were not included in the current analyses because they were not captured in the available data.

Figure 4: Percentage of Deliveries for Urban and Rural Women, by Age Group, Parity, Diabetes and Hypertension Prevalence and Material Deprivation, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

It is mandatory to report parity only in Ontario, Manitoba, Saskatchewan, Alberta, Yukon, the Northwest Territories and Nunavut. Due to differential reporting, parity is not adjusted for in the analysis of outcomes presented later.

Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Maternal Age

Giving birth at the extremes of the reproductive age span is associated with risks to both mothers and babies.^{5, 21} Teens face an increased risk of delivering preterm and having a low birth weight or SGA baby when compared with adult mothers.⁵ Factors contributing to these poor outcomes include a disadvantaged social environment, biological immaturity, social deprivation, inadequate prenatal care, physical and sexual abuse, drug use and smoking.⁵ The rate of live births has decreased among women age 15 to 19.²²

Births to mothers at the end of the reproductive age span also pose risks. For example, pregnant women age 35 and older are more likely than younger pregnant women to have pre-existing hypertension and to develop hypertension and preeclampsia, a serious pregnancy complication.²³ They are also more likely to develop diabetes during their pregnancy, to experience placenta previa (a complication in which the placenta is located low in the uterus and may block the cervix), to be pregnant with multiples and to have a C-section delivery.^{5, 24–29} Poor infant health outcomes associated with births at advanced maternal age include preterm births and low birth weight or SGA babies.^{25, 27} Although advanced maternal age is associated with an increased risk of giving birth to a baby with a chromosomal abnormality, the widespread use of prenatal screening for these and other birth defects may have resulted in fewer live births of infants with congenital anomalies.³⁰ Economic and social factors in Canada have contributed to women delaying child-bearing, which has resulted in a shift in the age distribution of women giving birth.²¹ The rate of live births has increased among women age 35 and older.²²

The distribution of rural versus urban women giving birth at the extremes of the reproductive age span was quite distinct and characterized by a shift to younger ages. As shown in Figure 4, delivery as a teen was more than twice as likely for rural than urban women (8.7% versus 3.6%). Nunavut, where all deliveries were to rural women, had the highest share of hospital deliveries for teens in Canada (22.2%); a delivery for a rural teen was much less likely in Yukon (9.8%) and the Northwest Territories (12.1%). Across the provinces, deliveries for rural teens ranged from 6.5% in Ontario to 12.1% in Manitoba. At the other end of the age spectrum, delivery at advanced maternal age (35 and older) was almost half as likely for rural women than for their urban counterparts (11.4% versus 20.7%). This pattern of reduced likelihood of delivery at advanced maternal age among rural women was evident in all provinces and territories.

Parity

Grand multiparity, the previous delivery of five or more live births, has been linked to poor birth outcomes; however, this association tends to disappear when characteristics of the mother and her health care are taken into account (for example, her age, socio-economic status and levels of prenatal care).³¹ Extreme multiparity (prior delivery of 10 or more live births) has been associated with certain medical complications and placental pathologies.³² Parity has been found to modify the effect of maternal age on preterm birth and SGA. Older nulliparous women (those giving birth for the first time) face a higher risk of preterm birth and SGA than older multiparous women (those with one or more previous live births).³³

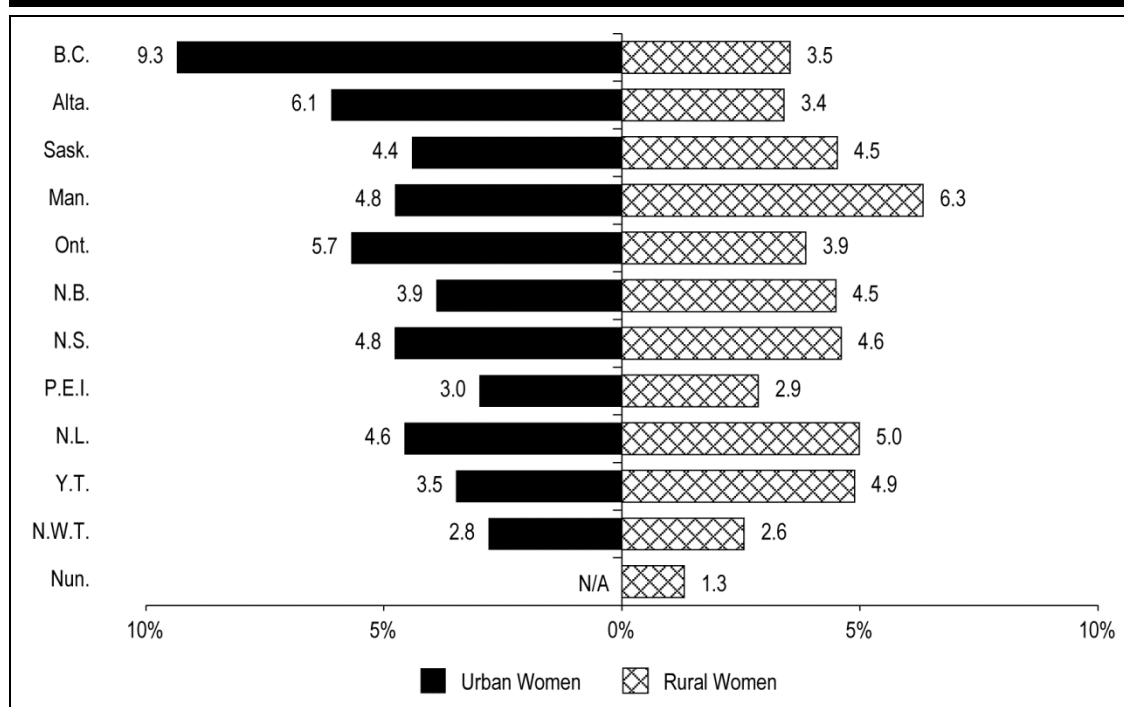
Although they were more likely to be younger, rural women were somewhat less likely to experience their first birth than urban women (37.4% versus 45.2%) and more than three times more likely to deliver a fifth or higher birth (7.5% versus 2.3%) (Figure 4). Across the territories, delivering a fifth or higher birth among rural women ranged from 5.5% in Yukon to 9.3% in the Northwest Territories to 17.0% in Nunavut. Across the four provinces reporting parity, Ontario had the lowest rate of rural women delivering a fifth or higher birth (4.5%), while Manitoba had the highest rate (12.4%).

Risk Factors/Comorbidities

Diabetes

Women who have diabetes as a pre-existing condition or who develop it during pregnancy are at increased risk of poor maternal and infant outcomes. Gestational diabetes (GDM) is defined as high blood sugar (hyperglycemia) with onset or first recognition during pregnancy. Babies born to mothers with GDM are at risk for being LGA, a condition that contributes to higher rates of C-section deliveries.

Figure 5: Percentage of Deliveries for Urban and Rural Women With Diabetes (Combined Rate of Type 1, Type 2 and Gestational), by Province/Territory, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Diabetes appears to be somewhat less of a problem for rural women than urban women (4.2% versus 6.2%) when assessed from a pan-Canadian perspective (Figure 4). By jurisdiction, the prevalence of diabetes was higher among rural than urban women in Yukon and Manitoba, and it was higher among urban than rural women in B.C., Alberta and Ontario (Figure 5). Urban/rural differences in screening for or reporting diabetes on the hospital discharge record could potentially account for some of these observed differences. When diabetes was present, it was most likely to be GDM (88.7%).

Hypertension

High blood pressure during pregnancy may

- Increase the risk of a low birth weight baby because of decreased blood flow to the placenta;
- Cause the placenta to prematurely separate from the uterus, which may deprive the baby of oxygen and cause heavy maternal bleeding; and
- Lead to a preterm delivery (for example, when the delivery must be induced to avoid medical complications).

Preeclampsia, a serious condition characterized by high blood pressure and protein in the urine after 20 weeks of pregnancy can, if left untreated, lead to serious, even fatal, complications for mother and baby.

The prevalence of hypertension, either as a pre-existing condition or when developed during pregnancy, among deliveries for rural and urban women was similar (6.7% versus 6.1%) (Figure 4). This pattern was seen for all provinces and territories except the Northwest Territories, where urban women were 1.5 times more likely to have hypertension than rural women (5.7% versus 3.8%). When hypertension was present, it was almost always gestational hypertension (87.2%).

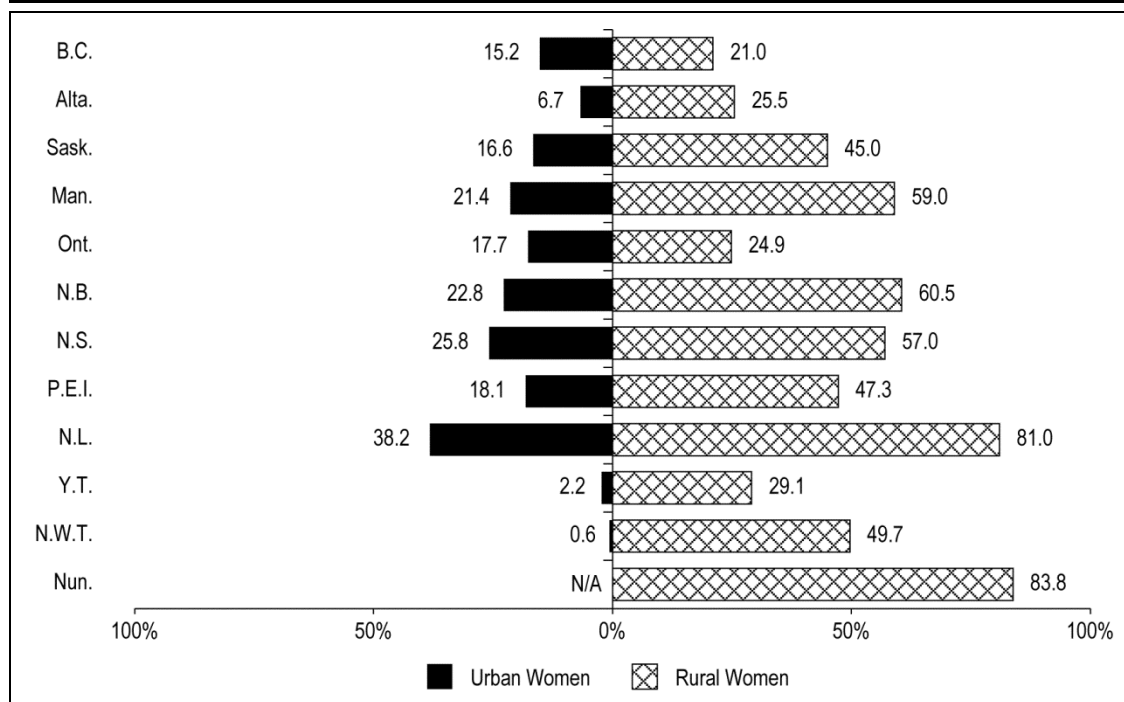
Material Deprivation

The association between lower socio-economic status and less-favourable health and birth outcomes has been well documented.^{34–37} For this report, a material deprivation index was constructed based on the following three characteristics of the mother's area of residence:³⁸

- The proportion of the population age 15 and older without a high school diploma or equivalent.
- The employment-to-population ratio for the population age 15 and older.
- The average income of the population age 15 and older.

Neighbourhoods were ranked into quintiles. After adjusting for household size, neighbourhoods assigned to quintile 1 represent the least-deprived neighbourhoods, while neighbourhoods assigned to quintile 5 represent those that are most deprived.

Figure 6: Percentage of Deliveries for Urban and Rural Women Living in the Most-Deprived Quintile, by Province/Territory, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Women from rural areas who delivered in hospital were more than twice as likely as those from urban areas to reside in neighbourhoods considered to be most deprived according to their levels of education, employment and income (38.7% versus 16.0%, Figure 4). Relatively few women from rural areas resided in the least-deprived neighbourhoods, compared with their urban counterparts (5.4% versus 23.3%). As shown in Figure 6, there was substantial variation in material deprivation across the provinces and territories. The percentage of deliveries for rural women living in the most-deprived neighbourhoods ranged from 29.1% in Yukon to 49.7% in the Northwest Territories and 83.8% in Nunavut. In five jurisdictions, more than half of the population of rural women who delivered were from the most-deprived neighbourhoods (Newfoundland and Labrador, Nova Scotia, New Brunswick, Manitoba and Nunavut). B.C. had the lowest share of deliveries for rural women residing in the most-deprived neighbourhoods, as well as the rural population that was most similar to their urban counterparts in this quintile (21.0% versus 15.2% living in the most-deprived neighbourhoods).

Mode of Delivery

Are Rural Women More Likely Than Their Urban Counterparts to Have a Caesarean Section, Assisted or Spontaneous Vaginal Birth, Induction or Multiple Birth?

The mode of delivery—spontaneous vaginal birth, assisted vaginal birth or C-section—and steps taken to hasten or ensure the birth of the baby influence the risk of poor maternal and birth outcomes. A multiple birth (the delivery of twins, triplets or a higher number of babies per delivery) is also associated with adverse outcomes.

Spontaneous Vaginal Birth Versus Caesarean Section

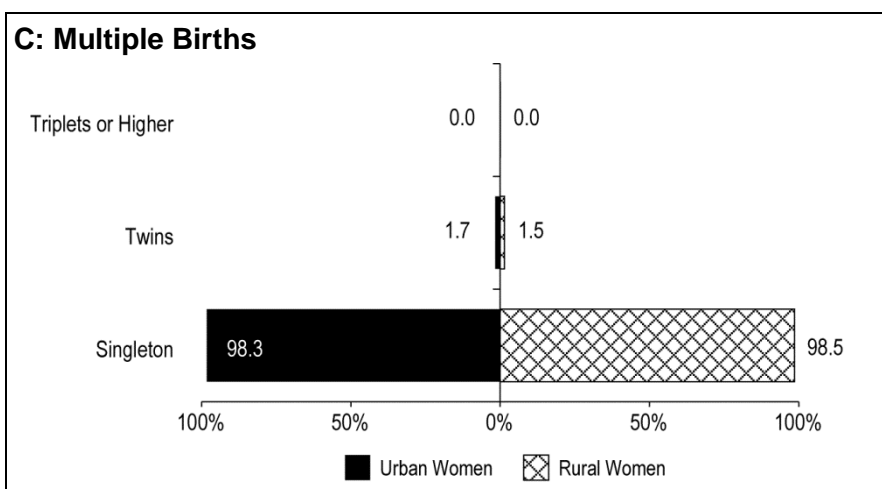
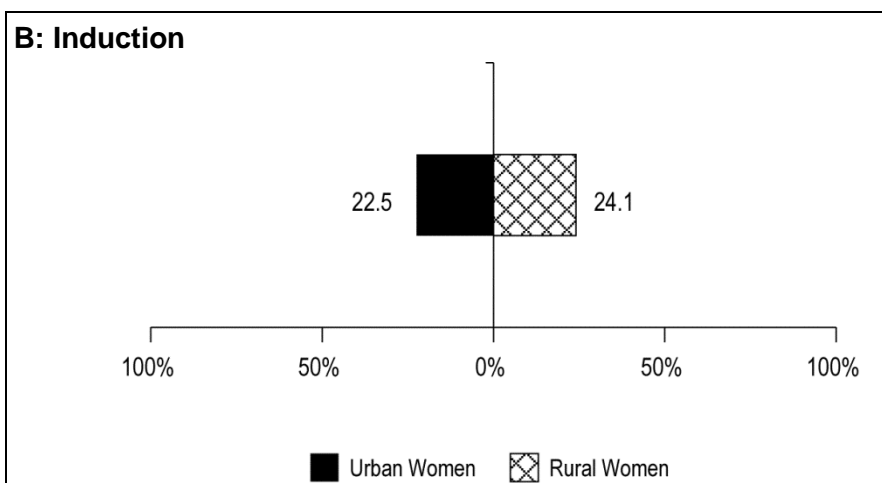
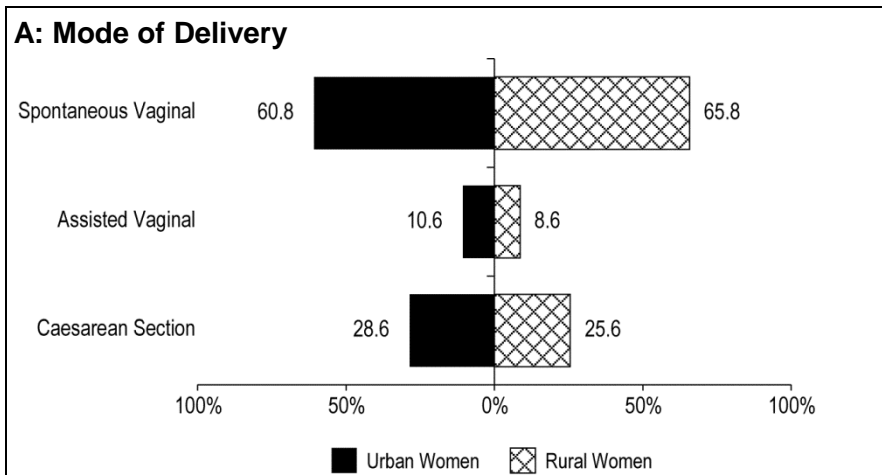
More than one in five births in Canada are delivered by C-section—this rate has steadily increased since the mid-1990s.^{5, 6, 16, 39} High rates of C-section births are concerning because the procedure carries some risk to the mother and baby and is associated with increased health care costs.^{16, 39, 40} Characteristics of women that place them at a greater risk of a C-section include older maternal age and undergoing a first birth. Factors shown to influence the decision to perform a C-section include fetal presentation (such as breech position), multiple births and how often technologies such as electronic fetal monitoring and labour induction are used.¹⁷ Because of the potential risks associated with C-section deliveries, elective “on demand” C-sections for non-medical indications have been discouraged by the Society of Obstetricians and Gynaecologists of Canada (SOGC).⁴¹

For these analyses, no distinction was made between primary C-section—women who have never delivered by C-section—and repeat C-section—women who have had a previous C-section. Vaginal delivery following a previous C-section can usually be accomplished safely if the appropriate clinical indications are met.⁴²

Women from rural areas were less likely to have C-sections than women from urban areas (25.6% versus 28.6%) and were more likely to have vaginal (spontaneous) births (65.8% versus 60.8%) (Figure 7). The rates of C-section for women in rural versus urban areas were similar for all provinces and territories.

Among rural women who delivered by C-section, 70.3% received the surgery in an urban hospital. In the territories, this ranged from 100% in Yukon to 49.2% in both the Northwest Territories and Nunavut. Across the provinces with at least one rural hospital (all provinces except P.E.I.), the range among rural women was from 44.4% in Newfoundland and Labrador to 87.0% in Saskatchewan. All rural residents of P.E.I. who had a C-section had their surgery in an urban hospital (P.E.I. did not have a rural hospital during the study period).

Figure 7: Percentage of Deliveries for Urban and Rural Women, by Mode of Delivery, Induction and Multiple Births, Selected Provinces/Territories, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Assisted Vaginal Birth

Obstetric forceps and vacuum extractors can be used to assist in vaginal deliveries where non-reassuring fetal status and inadequate progress during labour is observed. In many countries, the rate of instrument-assisted deliveries is low, and forceps use in particular appears to be declining.^{5, 39}

Vaginal deliveries for women from rural areas were somewhat less likely to be assisted than those for urban women (8.6% versus 10.6%) (Figure 7). There was little variation in assisted vaginal births by jurisdiction or by urban or rural hospital of birth.

Induction

When labour does not begin spontaneously, clinicians may recommend artificially starting the process by inducing labour. Induction may be necessary, for example, when babies are overdue, if the mother or the fetus has medical issues or when the mother's water breaks too early.¹⁶ Guidelines issued by the SOGC recommend that women with an uncomplicated pregnancy be offered induction at 41 to 42 weeks, given evidence that in such cases there is a decrease in perinatal mortality without an increased risk of C-section.⁴³

As shown in Figure 7, induction was used in just less than one in four births in Canada, with little difference seen among women living in rural versus urban areas (24.1% versus 22.5%). This pattern was consistently seen across the provinces and territories.

In some rural areas, higher rates of induction have been attributed to the desire or the need to plan the date and location of birth for mothers in remote areas.⁴⁴ A study of induction rates for women living in rural B.C. found induction to be 1.3 times more likely for those needing to travel outside of their hospital's local health area.⁴⁵ Women who have travelled from rural and remote areas to a referral community and are awaiting the onset of labour may elect induction when it is offered to reduce time away from home.^{46, 47} In our cohort, induction rates for rural first-time mothers who travelled more than two hours were similar to those travelling an hour or less (24.3% versus 25.3%). However, induction rates for deliveries for mothers with previous live births (who are presumed to have other children at home) were higher among those who travelled more than two hours (22.7%) compared with those travelling an hour or less (18.5%).

Among rural women who were induced during their hospital stay, 73.1% delivered in an urban hospital. Rural women delivering in an urban hospital were 1.3 times more likely to be induced than those delivering in a rural hospital (26.2% versus 19.8%).

Multiple Births

An increase in the use of medical interventions to enhance fertility and the shift toward older mothers giving birth has contributed to rising rates of multiple births.⁵ Women carrying multiple pregnancies are at increased risk of anemia, preeclampsia, preterm labour and C-section.⁵ Multiple-birth infants are at higher risk of having low birth weight, poor fetal growth, preterm birth and perinatal death.

Fewer multiple births are expected in rural areas, given the younger ages at which mothers in rural areas have their babies. Multiple births were relatively rare, occurring in 1% to 2% of all deliveries. Multiple-birth deliveries for mothers from rural and urban areas were essentially identical (1.5% versus 1.7%) (Figure 7).

Providers

This section of the report first discusses the role of various obstetric health care providers—obstetricians/gynecologists (OB/GYNs), family physicians (FPs) and midwives—and then describes how the providers of intrapartum^v care vary in deliveries for urban and rural women. In addition, data is provided on trends in the role of FPs in the delivery of Canadian obstetric care.

How Do Urban and Rural Women's Providers of Intrapartum Care Differ?

A diverse set of practitioners assist women before, during and/or after childbirth. Among those who provide deliveries within hospitals are OB/GYNs, FPs and midwives. This section of the report profiles the health professionals who cared for Canada's mothers and their newborns during their hospital stay for a delivery: their numbers, their distribution, trends in their practices and the services they provide.

Obstetricians/Gynecologists

Women, especially those with a high-risk pregnancy, may receive maternity care from an OB/GYN specialist. Obstetricians in Canada attend more than 80% of births, according to a 2008 SOGC report.⁴⁸ Of the 1,650 OB/GYNs in Canada, 1,050 provided intrapartum care.⁴⁸

Family Physicians^{vi}

Many mothers in Canada receive care from FPs throughout their pregnancy, from the prenatal to postnatal periods. The 35,000 FPs in Canada in 2010 accounted for just more than half (51%) of all physicians in the country.²¹ FPs can be involved in all stages of maternity and infant care—from preconception to prenatal to postpartum and beyond. Some FPs receive special surgical training so that they can perform C-sections.¹⁸ Others may receive training in anesthesia so that they can provide epidurals administered during labour, anesthesia at C-section and neonatal resuscitation. Only 10.5% of FPs reported involvement in intrapartum care in the 2010 National Physician Survey, a drop from 17% in 2001.^{48, 49} FPs in rural areas were twice as likely to offer intrapartum care in 2010 as their urban counterparts (16% versus 8%).⁴⁹

v. "Intrapartum" refers to the time period spanning labour and delivery.

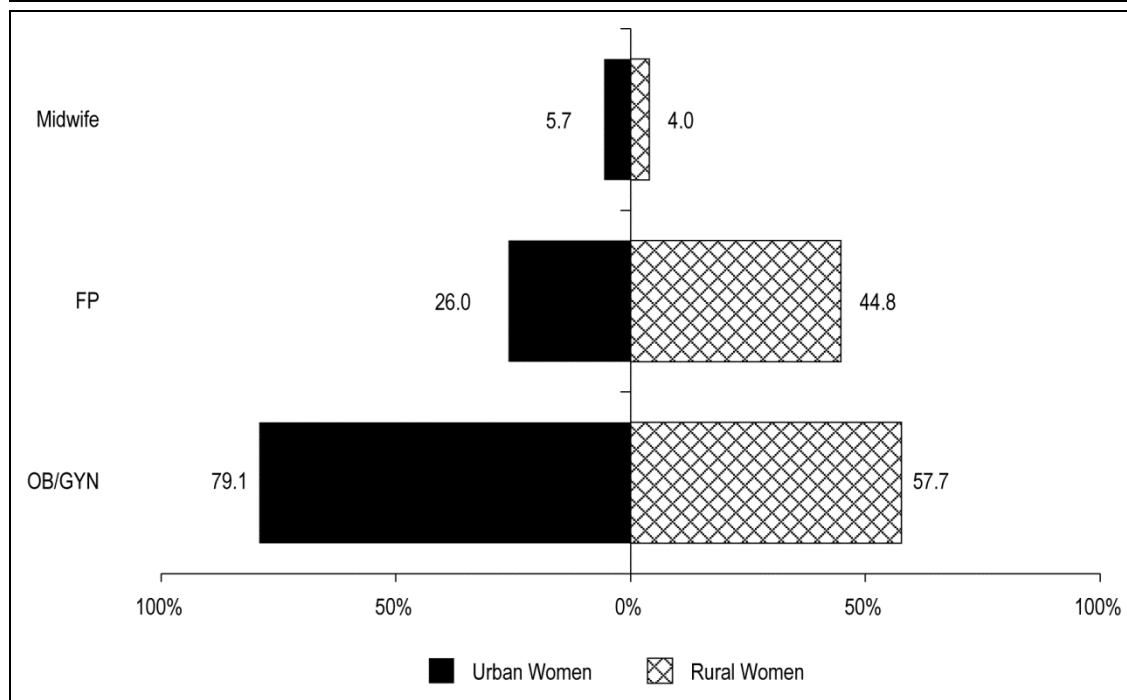
vi. Throughout this report, references to family physicians include both physicians practising family medicine and those practising general medicine. The term "family physician" has been used in recognition of the fact that, in Canada, family physicians and not general practitioners are most likely to provide maternity and infant care.

Midwives

Midwives are primary health care providers for women; they provide care from the prenatal phase of pregnancy to six weeks postpartum. Most provinces and territories have regulated midwifery. This means that midwives practising in these jurisdictions must have formal training and be licensed to practise. Regulation does not necessarily mean that a jurisdiction publicly funds care provided by midwives. Jurisdictions may also differ in the settings in which they allow midwifery to be practised (for example, home, hospital or birthing centre).^{17, 50} As of 2010, there were almost 900 midwives working in Canada and 100 students admitted annually to university midwifery programs.⁵¹ Midwives have been instrumental in offering maternity care in birthing centres serving remote Aboriginal communities.

A birth may be attended by a single provider or by several different types of providers, depending on the nature of the birth, its complexity and its duration. In the following section, data is provided on the providers recorded on the hospital discharge record as being directly involved in care during the hospital stay.

Figure 8: Percentage of Deliveries for Urban and Rural Women, by Type of Provider Attending, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

FP: family physician.

OB/GYN: obstetrician/gynecologist.

Attending provider types sum to greater than 100.0% because a delivery may be attended by more than one type of provider.

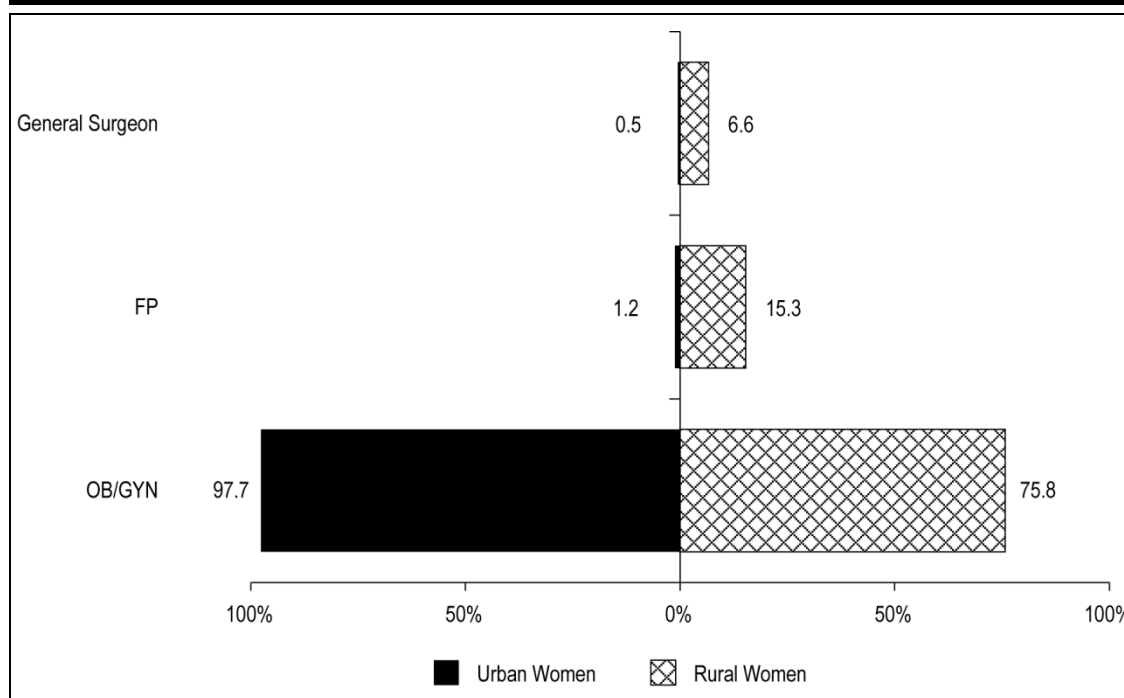
Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

As shown in Figure 8, deliveries for rural women were more likely than those for urban women to be attended by an FP (44.8% versus 26.0%) and less likely to be attended by an OB/GYN (57.7% versus 79.1%) or midwife (4.0% versus 5.7%). Most deliveries for rural women in the territories were attended by an FP (Yukon, 90.7%; the Northwest Territories, 85.5%; Nunavut, 68.1%). Across the provinces, the attendance of rural women's births by an FP ranged from 23.7% in Newfoundland and Labrador to 64.3% in B.C.

Compared with rural women who delivered in an urban hospital, rural women who delivered in a rural hospital were 2.7 times more likely to have their delivery attended by an FP (78.3% versus 28.6%) and 0.2 times as likely to have their delivery attended by an OB/GYN (17.8% versus 77.1%).

Figure 9: Percentage of Deliveries for Urban and Rural Women, by Caesarean Section Provider, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

FP: family physician.

OB/GYN: obstetrician/gynecologist.

C-section provider types are mutually exclusive but sum to less than 100.0% because a small percentage of C-sections were missing provider information.

Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

As C-sections involve additional resources and specialized personnel, they are provided in only a subset of hospitals. Of all C-section deliveries, 16.1% (a total of 62,046 deliveries) were performed for rural women. As shown in Figure 9, virtually all (97.7%) C-sections among urban women were attended by OB/GYNs. In contrast, 75.8% of C-sections among rural women were attended by OB/GYNs. The balance of C-sections among rural women was attended by FPs (15.3%) or general surgeons (6.6%). Among deliveries for rural women, the share of C-sections

attended by an FP or a general surgeon ranged from 52.1% in Nunavut to 39.0% in the Northwest Territories to 0% in Yukon. Across the provinces, this ranged from less than 1% in P.E.I. and Nova Scotia to 40.6% in Alberta.

Compared with rural women delivering in an urban hospital, rural women delivering in a rural hospital were 12.1 times more likely to have their C-section attended by an FP or a general surgeon (61.6% versus 5.1%). C-sections among rural women in rural hospitals accounted for 83.7% of all C-sections among rural women attended by FPs or general surgeons.

Vignette 3: Perspective of a Rural Family Physician

Jim is a family physician who grew up in a small community; he has spent the last 30 years practising medicine in rural communities. The first community he practised in was a challenge—the two other physicians in the community did not work well together and he did not feel supported by them. He also found that being on call for emergencies every third day and covering all calls for his own obstetric patients was hard on his family. There were no surgical services available in the community; consequently, women with high-risk pregnancies were transferred to a larger regional hospital. In addition, a decline in the resource sector created instability in the community and the local hospital had difficulty retaining staff.

Despite this situation, Jim found that he enjoyed providing a full range of services, including obstetrics, in a rural setting, so he decided to leave to pursue additional training to expand his practice. He completed a year of additional training with the obstetrics department in a large centre, which allowed him to deal with more difficult cases and subsequently move to a larger community where surgical services were available. He is now able to perform C-sections and provide anesthesia services, including epidurals. The five family physicians in the community have a group practice and a shared call model that includes obstetric coverage. This allows Jim to be on call only once a week during the week and every fifth weekend. The physicians and hospital staff work well together. The health region provides opportunities for ongoing education, and the local hospital and physicians have a good relationship with the obstetricians and staff at the larger regional hospital.

Jim's additional training and relocation allowed him to fulfill his career aspirations and spend more time with his family. However, his decision to leave the small community where he formerly practised left the remaining, already-overburdened physicians with additional responsibilities. Following Jim's departure, pregnant women in the community found it difficult to access timely prenatal care from the remaining two family physicians, who continued to struggle to serve the medical needs of their community.

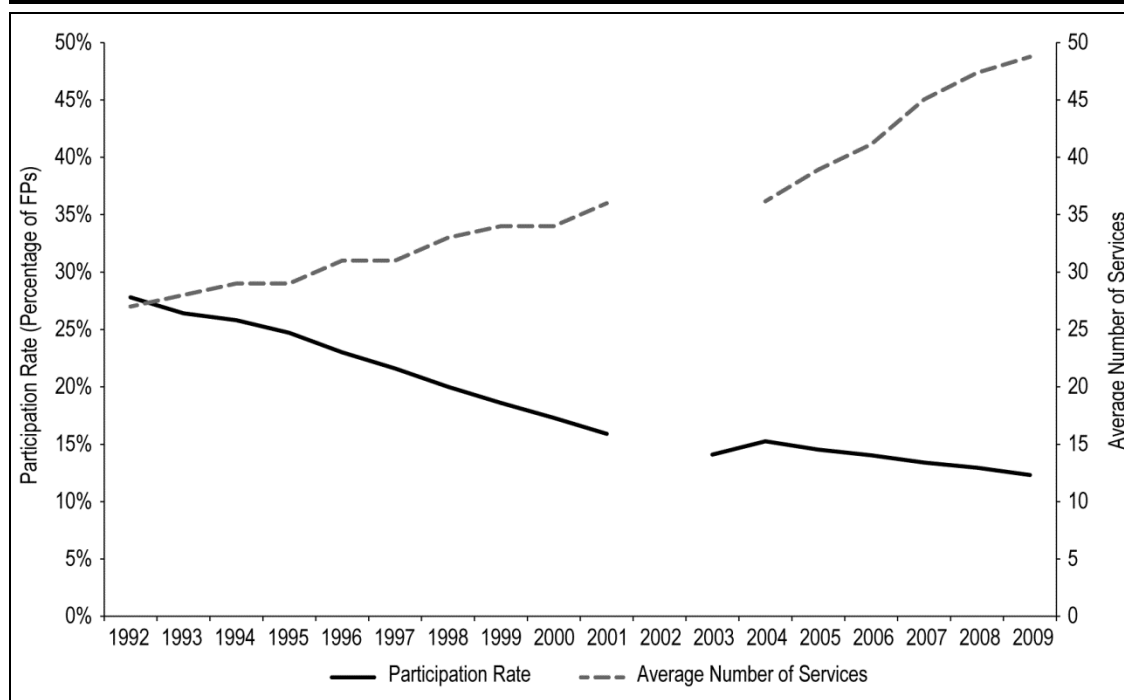
Trends in the Type of Caregiver Providing Labour and Delivery Care and the Number of Services Provided

To gauge the extent to which FPs are participating in obstetric care, and the intensity of that care, analyses were conducted using the National Physician Database (NPDB). The NPDB contains data on physicians' fee-for-service (FFS) claims provided to CIHI by provincial/territorial medical service plan administrative systems. NPDB files contain, for each physician within each jurisdiction, the total number of clinical services provided and payments made for each fee service code billed. All fee service codes within the NPDB are mapped to 1 of 120 National Grouping System (NGS) categories. NGS categories are further classified under 14

broad clinical service areas, one of them being obstetric services. These obstetric services include delivery, services at time of delivery (such as repairing lacerations and removing a retained placenta) and other obstetric services (such as doing a stress test and fetoscopy).

As shown in Figure 10, there was a steady decrease in FP participation in obstetrics from 1992 to 2009, combined with an increase in the average number of services provided by those family doctors who continued to provide care. While the trend in FP participation was consistent across provinces (Table 2), the trend in the number of services varied across jurisdictions (Table 3).

Figure 10: Trends in Family Physician Participation in Obstetric Care, Selected Provinces/Territories, 1992–1993 to 2009–2010



Notes

For this analysis, 2002–2003 and 2003–2004 were previous to the years studied; as such, this data was not requested from the NPDB. The data for 1992–1993 to 2001–2002 presented here was taken from a previous report.⁵²

Source

National Physician Database, 1994–1995 to 2009–2010, Canadian Institute for Health Information.

Table 2: Trends in Family Physician Participation Rate (Percentage) in Obstetric Care, by Province, 1994–1995 to 2009–2010

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
B.C.	49	46	41	40	36	33	30	27	25	22	21	20	19	18	19	18
Alta.	36	35	34	33	32	31	28	27	25	24	23	21	21	20	18	18
Sask.	48	47	45	41	39	38	33	31	30	25	26	24	23	23	25	21
Man.	27	26	25	24	22	21	22	23	23	23	22	20	19	18	17	17
Ont.	19	19	17	16	14	13	13	12	11	10	9	9	9	9	8	8
N.B.	29	27	27	25	23	21	19	19	16	14	13	13	12	11	10	8
N.S.	41	37	34	31	29	27	25	22	21	18	17	16	14	14	13	13
N.L.	26	24	21	21	20	16	17	12	10	9	6	6	6	5	4	4
Can.	26	25	23	22	20	19	17	16	—	14	15	15	14	13	13	12

Note

— Data not available.

Source

National Physician Database, 1994–1995 to 2009–2010, Canadian Institute for Health Information.

Table 3: Average Number of Services Provided by Family Physicians Involved in Obstetric Care, by Province, 1994–1995 to 2009–2010

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
B.C.	18	18	19	19	20	21	21	23	25	27	36	38	39	42	44	43
Alta.	32	33	33	35	40	42	44	46	53	55	60	70	78	85	95	96
Sask.	22	22	23	24	23	21	21	21	20	21	19	21	22	23	23	26
Man.	27	27	29	29	27	25	27	25	28	27	28	34	35	35	38	40
Ont.	25	26	27	26	26	27	25	26	27	28	30	29	28	31	31	31
N.B.	23	25	24	23	25	23	23	20	24	25	24	24	26	28	29	34
N.S.	19	21	23	23	24	25	23	25	23	26	26	26	29	33	33	33
N.L.	27	31	30	30	21	30	21	24	24	24	21	20	20	19	22	24
Can.	29	29	31	31	33	34	34	36	—	—	36	39	41	45	47	49

Note

— Data not available.

Source

National Physician Database, 1994–1995 to 2009–2010, Canadian Institute for Health Information.

With the NPDB, we can calculate the percentage of family doctors that provides obstetric care and the average number of services they provide. The NPDB, however, does not provide a comprehensive view. In 2003, an estimated 19.5% of total clinical payments for all physicians were made through alternative payment plans (non-FFS); examples include capitation, salary and hourly wages. The NPDB also cannot be used to distinguish between FPs who practise in urban and rural areas.

Maternal and Infant Outcomes

As the number of rural hospitals and maternity services has declined, questions have been raised and concerns expressed about the implications of resource policies for pregnant rural mothers and their babies.⁵³ While answers to these questions cannot be fully answered with available data, this section of the report provides some insights and examines two maternal health outcomes: severe maternal morbidity and unplanned maternal readmissions. In addition, analyses of three infant outcomes are presented: preterm live births, and live births that are either SGA or LGA. First, multivariate analyses of differences between urban and rural maternal and infant outcomes are presented that control for the underlying differences between mothers from urban and rural areas. Next, unadjusted rates for these outcomes are presented for rural women by health region. Separate analyses are then presented to examine the relationship between rural women's travel time to hospital of birth and outcomes. Finally, rural women's delivery outcomes are compared according to whether the delivery occurred in an urban or rural hospital. Many outcomes of interest were either not available on hospital discharge records (such as psychosocial and family outcomes) or were not comprehensively captured (for example, maternal and perinatal mortality).

How Do Outcomes Compare for Urban and Rural Women?

Given the marked differences in demographic and health characteristics of urban and rural women, several maternal characteristics are controlled for in the following multivariate analyses of maternal and infant outcomes: age, hypertension, diabetes, mode of delivery, induction, plurality (singleton versus multiple birth) and material deprivation. Odds ratios adjusted for these factors are used to interpret these findings (Box 4). Adjusted odds ratios and associated confidence intervals for all factors included in the analysis are presented in the appendix.

Box 4: Interpreting Odds Ratios

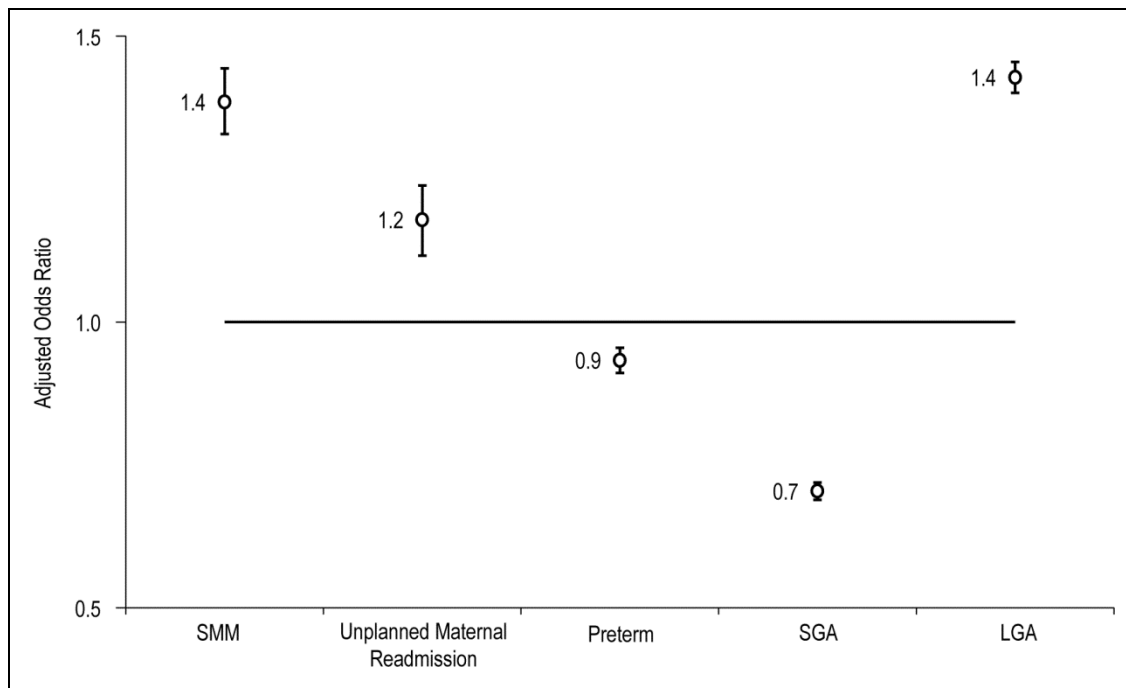
The odds ratio (OR) evaluates whether the odds of a certain event or outcome are the same for two groups. Odds are the probability of an event occurring divided by the probability of the event not occurring. An OR is the odds of the event in one group (for example, rural women) divided by the odds in another group (for example, urban women).

Interpreting ORs

- An OR of 1 indicates that the condition or event under study is equally likely to occur in both groups.
- An OR greater than 1 indicates that the condition or event is more likely to occur in the first group.
- An OR less than 1 indicates that the condition or event is less likely to occur in the first group.

Statistical significance of an OR is identified when its associated confidence interval (CI) does not overlap with 1. Statistically significant differences do not always indicate clinically meaningful differences.

Figure 11: Adjusted Odds Ratios for Deliveries for Rural Versus Urban Women, Maternal and Infant Outcomes, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

SMM: severe maternal morbidity.

SGA: small for gestational age.

LGA: large for gestational age.

Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Severe Maternal Morbidity

A number of conditions threaten the life and well-being of mothers during and after labour. Interest in monitoring maternal morbidity has heightened, as changes in the characteristics of mothers and births—such as advancing age of mothers; higher prevalence of obesity; and changes in obstetric practice, such as increased use of epidural anesthesia, labour induction and C-section—have contributed to an increased risk of these conditions and cumulatively add to the risk of maternal morbidity. A composite measure, severe maternal morbidity, has been developed to capture the occurrence of any of a number of serious conditions related to pregnancy (Box 5).¹ This measure is useful in surveillance of the quality of maternity care, more so than maternal mortality, because maternal mortality rates have declined to such an extent that they are too low to reliably present.

Box 5: Examples of Conditions Included in the Measure of Severe Maternal Morbidity¹

- Cardiac arrest, cardiac failure or myocardial infarction
- Complications of anesthesia (pulmonary, cardiac, central nervous system)
- Death, obstetric cause
- Eclampsia
- Hemorrhage and coagulation defect
- Obstetric shock
- Obstetric embolism
- Postpartum hemorrhage and blood transfusion
- Postpartum hemorrhage and hysterectomy
- Puerperal sepsis
- Repair of bladder, urethra or intestine
- Rupture of uterus before or during labour
- Septicemia during labour

As illustrated in Figure 11, deliveries for rural women were more likely than those for urban women to involve severe maternal morbidity (2.4% versus 1.7%; OR 1.4; 95% CI 1.3 to 1.4). Factors that significantly increased the odds of severe maternal morbidity included C-section delivery, having both diabetes and hypertension, having hypertension alone (either pre-existing or gestational) and multiple birth (see the appendix). This increased likelihood means that, relative to deliveries for urban women, an additional 1 of every 151 deliveries for rural women would have been expected to have severe maternal morbidity over the study period.

Unplanned Maternal Readmissions

An unplanned maternal readmission is an unplanned admission (for all causes, excluding hospital transfers) to an acute care hospital within 30 days of being discharged after a delivery. Because such readmissions often occur following serious complications related to childbirth, they are studied to better understand the causes of serious postpartum complications, improve care delivery and outcomes, and prevent potentially avoidable hospitalizations.⁵ Women with a C-section birth and those with a forceps- or vacuum-assisted birth are more likely to be readmitted to hospital than women who had a vaginal delivery.⁵⁴ The most common reason for readmission among women who have had a C-section is infection of an obstetric surgical wound,⁵⁴ whereas postpartum hemorrhage is more often the cause for readmission among women following vaginal delivery.⁵

As shown in Figure 11, women with a rural residence had increased odds of hospital readmission (1.4% versus 1.2%; OR 1.2; 95% CI 1.1 to 1.2). Factors that increased the odds of an unplanned maternal readmission to hospital included having diabetes or hypertension (or both conditions) and having had a C-section, assisted birth, induction or multiple birth. Deliveries for teen mothers (younger than age 20) also had a small but significant effect on the odds of readmission (see the appendix). This increased likelihood means that, relative to deliveries for urban women, an additional 1 of every 423 deliveries for rural women would have been expected to have an unplanned readmission over the study period.

Infant Morbidity

Preterm Births

Babies who are born before 37 completed weeks of gestation are considered preterm (see Box 6 on the derivation of gestational age).⁵⁵ Preterm births are an important public health concern, as they are the leading cause of infant mortality in economically developed countries and account for about three out of four deaths that occur in the perinatal period (from about five months before to one week after birth).^{56, 57} Preterm births also contribute to both short- and long-term morbidity and are associated with considerable health care costs.^{58–60} Given that the last several weeks of normal gestation are responsible for more than one-third (35%) of brain growth,⁶¹ as well as significant lung and general fetal development,⁶² it is not uncommon for preterm babies to have increased rates of respiratory distress, temperature instability, hospital readmission and neuro-cognitive problems, compared with full-term infants.⁶⁰ Moreover, certain health issues—such as cerebral palsy, psychiatric illness and attention disorders—often extend into adulthood.^{60, 63}

Box 6: How Is Gestational Age Derived?

Gestational age may be calculated using the first day of the mother's last menstrual period (LMP) or by using early ultrasound measurements. Ultrasound-based estimates are considered more precise than estimates based on LMP.^{3, 4}

In the DAD, gestational age is recorded in completed weeks and is derived from medical charts—this represents the best clinical estimate of gestation and includes both ultrasound- and LMP-based estimates.

There are many reasons why a baby might be born preterm. Preterm births may be medically indicated or spontaneous. In cases where continuing a pregnancy would lead to serious maternal or fetal risk—about 30% of preterm births fall into this category—a medically indicated preterm delivery by C-section or induction is performed to improve obstetric outcomes.⁶⁴ Complications such as hypertensive disorders, maternal bleeding, intrauterine growth restriction and fetal distress³ are among the most common reasons for medically indicated preterm deliveries.

Spontaneous preterm births—the other 70% of preterm births fall into this category—may also be caused by fetal distress or poor intrauterine growth.⁶⁵ Some of the factors that have been associated with preterm births include low socio-economic status, rural place of residence, younger and older maternal age, multiple births, high or low parity, history of preterm delivery and maternal medical conditions such as hypertension and diabetes.^{65–69} These factors are examined in this report, as this data is available in CIHI's databases. Other factors that can also contribute to preterm births, but that were not included in our analyses, include maternal race/ethnicity, physical and psychological stress, genitourinary infections, placental disorders, substance use and poor prenatal care.^{65, 67, 70}

In North America, preterm birth rates have increased over the last few decades. Several factors, such as delayed child-bearing and the use of assisted reproductive technologies, have contributed to the increase in multiple births and preterm deliveries. Increases in obstetric interventions (that is, those linked to medically indicated preterm births) have substantially contributed to the increase.^{3, 71} In Canada, the preterm birth rate steadily increased from approximately 6% in the early 1980s⁷¹ to 8% in more recent years.⁷²

As shown in Figure 11, a woman's rural residence caused a small but significant reduction in the odds of a preterm birth (7.6% versus 8.1%; OR 0.9; 95% CI 0.9 to 1.0). Factors that significantly increased the odds of a preterm birth included multiple birth and having diabetes and hypertension (see the appendix). This decreased likelihood means that, relative to births for urban women, 1 less preterm birth would have been expected for every 133 births for rural women over the study period.

Small for Gestational Age

Fetal growth restriction is the failure to attain optimal fetal growth. The use of SGA as an indicator of neonatal outcome was proposed several decades ago as a measure of fetal growth restriction, largely due to difficulties estimating intrauterine growth.^{73, 74} An SGA birth refers to a newborn with a birth weight lower than an expected normative threshold, or cut-off, for a given gestational age and sex⁶ (Box 7).

Box 7: Small and Large for Gestational Age

The methodology used to identify SGA and LGA births in our study is limited to singleton and twin births only. SGA and LGA were calculated using the study cohort, rather than a standard growth curve.²

In this study, SGA and LGA births were defined using birth weight percentile by gestational age and sex for all Canadian live births included in this analysis between 2007–2008 and 2011–2012. The rates were limited to singleton births of known birth weight and sex with a gestational age between 22 and 42 weeks and to twin births of known birth weight and sex with a gestational age between 22 and 40 weeks.

SGA means that the fetus or newborn is smaller in size than normal for the baby's sex and gestational age, measured as newborns with birth weight less than the 10th percentile cut-off specific to that gestational age and sex.

LGA means that the fetus or newborn is larger in size than normal for the baby's sex and gestational age, measured as newborns with birth weight greater than the 90th percentile cut-off specific to that gestational age and sex.

Babies born to rural women were significantly less likely than urban newborns to be SGA (8.2% versus 10.3%; OR 0.7; 95% CI 0.7 to 0.7) (Figure 11). These findings from 2007–2008 to 2011–2012 are consistent with those from 2006–2007, where the SGA rate was significantly lower among rural than urban women (7.0% versus 8.7%).⁵⁵ This decreased likelihood means that, relative to births for urban women, 1 less SGA birth would have been expected for every 35 births for rural women over the study period.

SGA births were more likely when the mother had hypertension (either pre-existing or gestational) and had an assisted or induced delivery. Babies born to women with diabetes (either pre-existing or gestational) were significantly less likely to be SGA. An income gradient existed so that babies born to women living in higher-income neighbourhoods were significantly less likely to be SGA (see the appendix).

Large for Gestational Age

Babies that are large given their gestational age are a concern because they can contribute to a difficult or prolonged labour and increase the risk of a C-section delivery. Maternal diabetes is the most common cause of LGA. Excessive weight gain during pregnancy may also contribute to LGA.

Deliveries for rural women were somewhat more likely to result in LGA births than those for urban women (12.5% versus 9.4%; OR 1.4; 95% CI 1.4 to 1.4) (Figure 11). Diabetes is the principal factor that significantly increases the odds of LGA. C-section was also associated with LGA in these analyses (see the appendix). This increased likelihood means that, relative to births for urban women, an additional 1 of every 30 births for rural women would have been expected to be LGA over the study period.

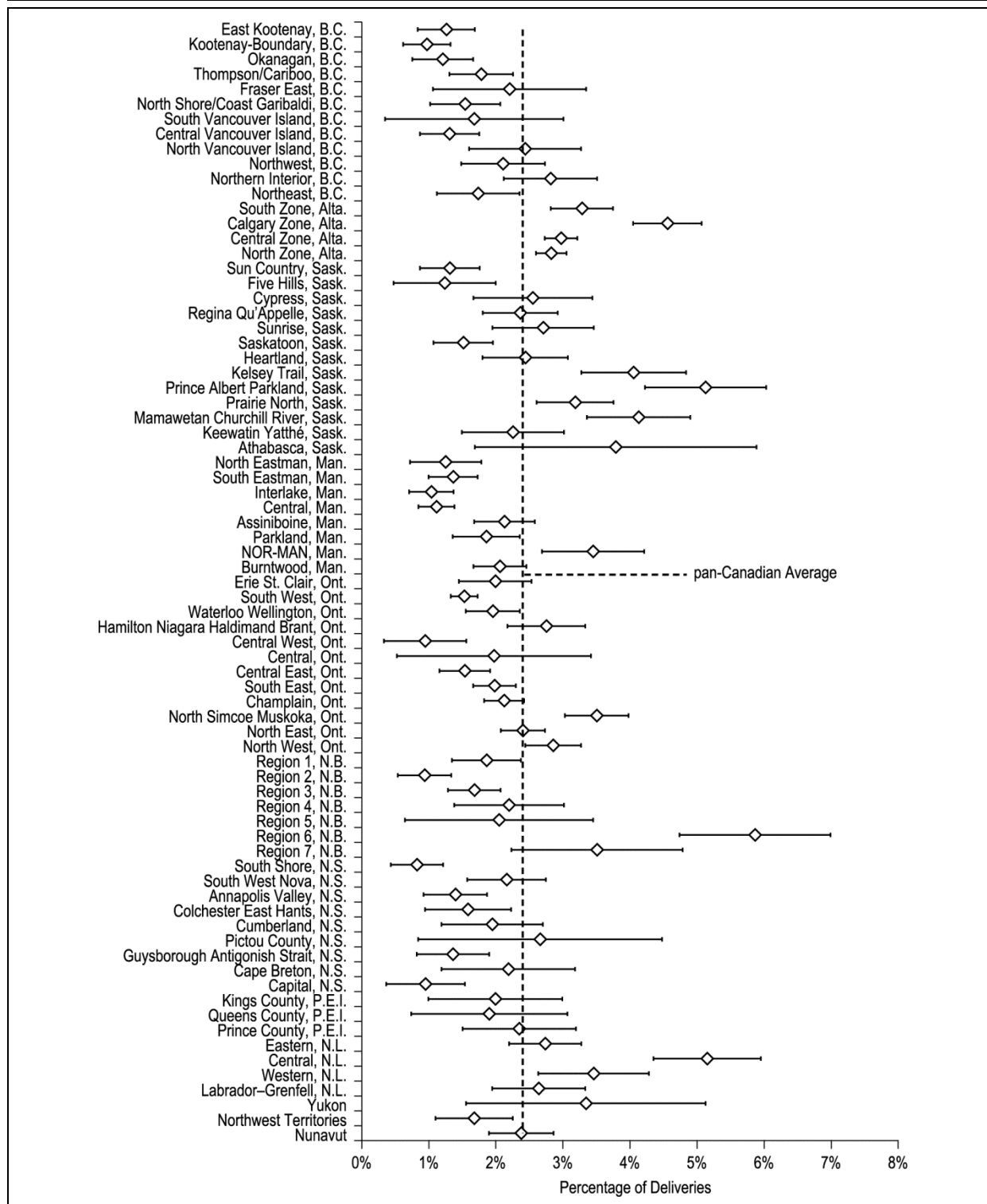
How Do Outcomes for Rural Women Vary Across Canada's Health Regions?

The following section discusses variations in maternal and infant outcomes by health region, focusing solely on rural women.

Severe Maternal Morbidity

Figure 12 shows considerable variation in the unadjusted rate of severe maternal morbidity among deliveries for rural women across Canada's health regions. There is no consistent pattern; however, several regions in Saskatchewan and Newfoundland and Labrador and all the regions in Alberta exhibited higher rates, while several regions in Ontario, Manitoba, B.C. and Nova Scotia had lower rates. Deliveries for rural women from the Northwest Territories had a lower rate of severe maternal morbidity.

Figure 12: Percentage of Deliveries for Rural Women Having Severe Maternal Morbidity, by Health Region, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

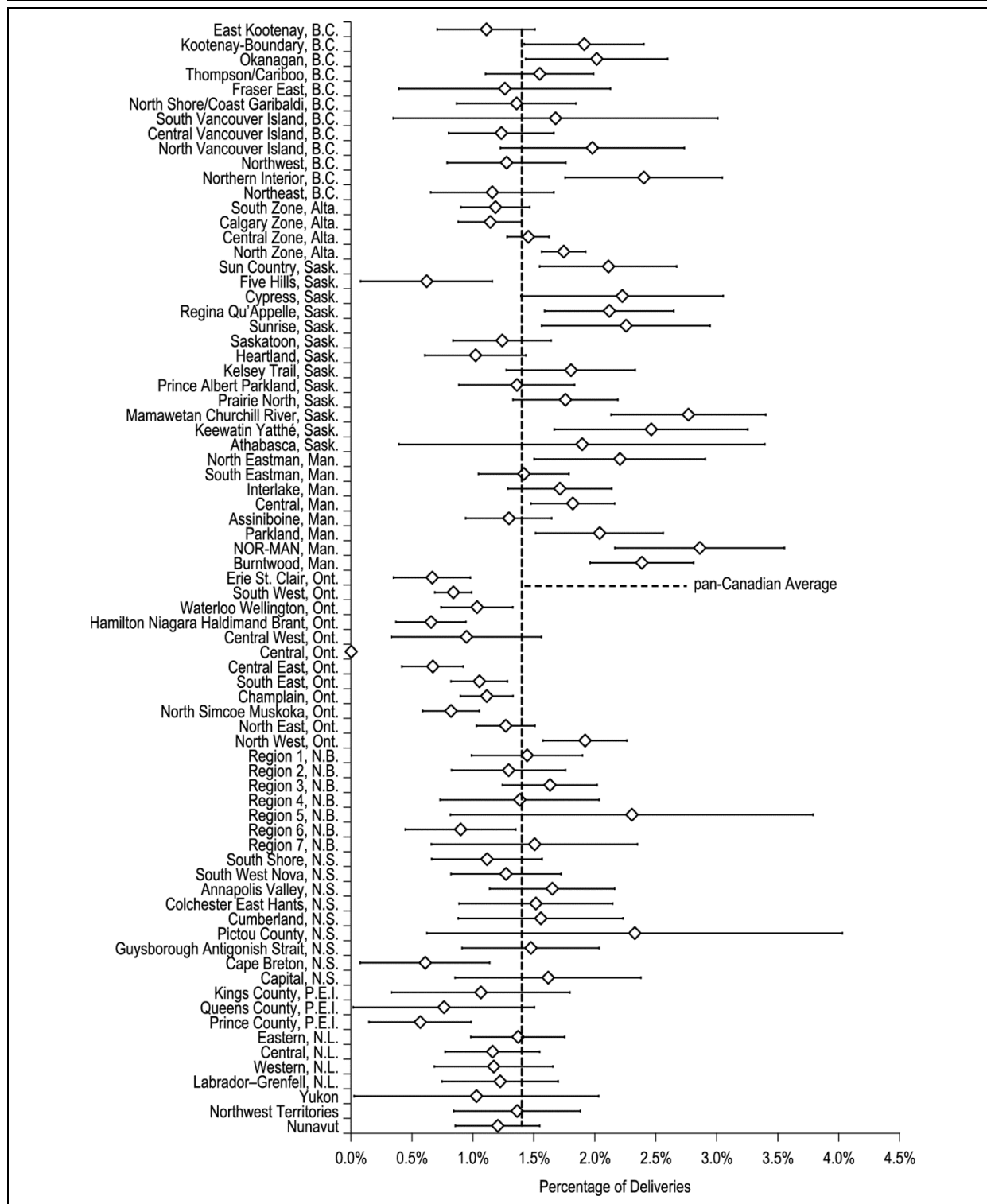
When severe maternal morbidity was assessed from 2003 to 2007, investigators found the overall rate to be 13.8 per 1,000 deliveries in Canada. Five provinces or territories had rates that were significantly higher than those in the rest of the country (Newfoundland and Labrador, Saskatchewan, Alberta, the Northwest Territories and Nunavut).⁷⁵ The results presented in Figure 12 are restricted to deliveries to rural women, which are not directly comparable with those of the earlier study.

Unplanned Maternal Readmissions

Figure 13 shows variation in unadjusted rates of unplanned readmissions by health region for deliveries among rural women across Canada. The majority of regions in Ontario had lower rates of readmissions; the North West region was the only region with a higher rate in Ontario. The majority of regions in Manitoba and several regions in Saskatchewan had higher rates of readmission.

Maternal readmission rates have been shown to vary significantly among provinces and territories, both for women with C-section delivery and for those with vaginal delivery.^{5, 75} These regional differences may be due, in part, to variations in length of stay prior to hospital discharge (following childbirth), admission policies or variations in availability of outpatient and other community-based services.⁵

Figure 13: Percentage of Deliveries for Rural Women With Unplanned Maternal Readmission, by Health Region, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Preterm Births

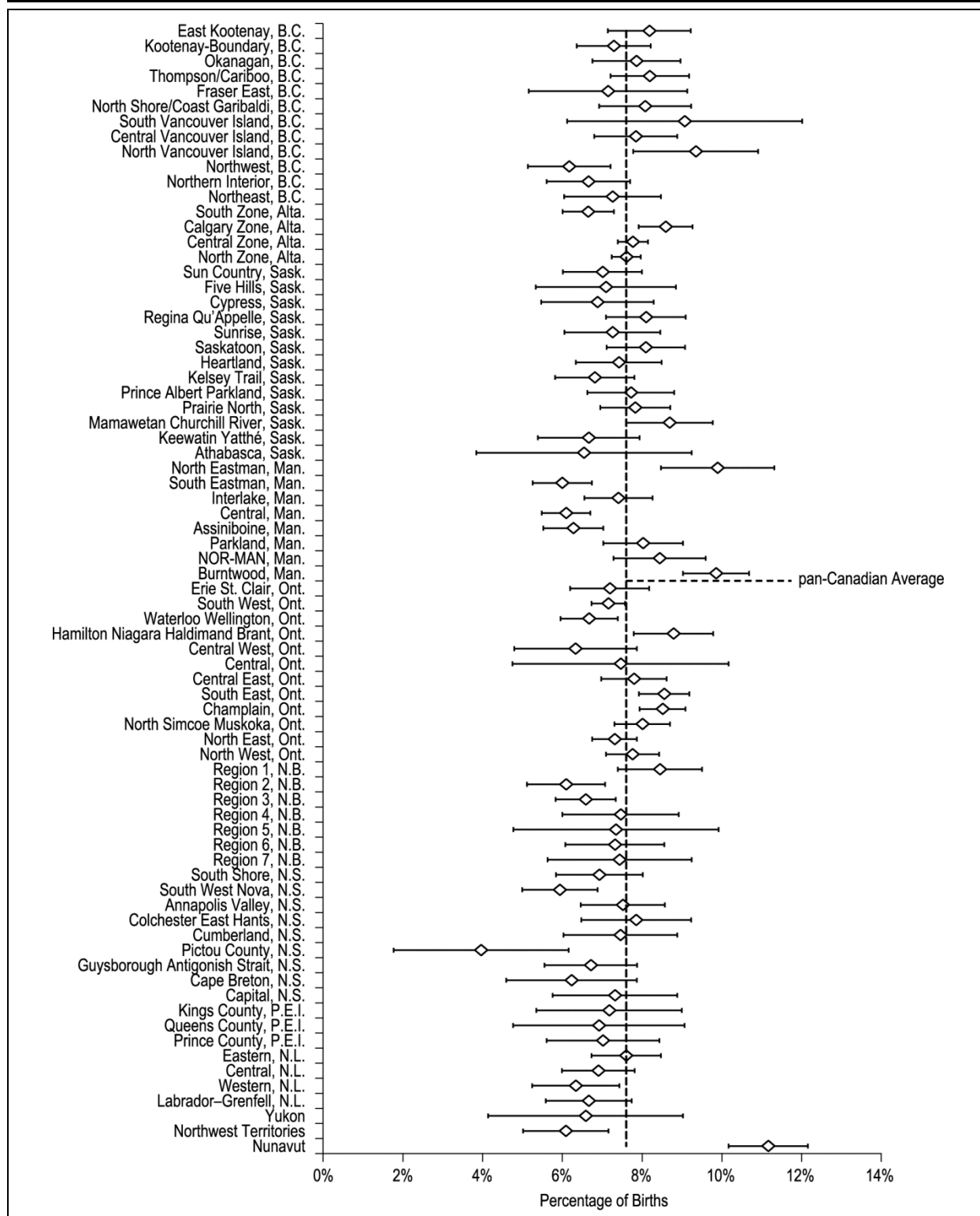
There appears to be very little regional variation in preterm birth rates for rural women (Figure 14). Of note, however, is that babies born to rural women from the Northwest Territories were less likely, while babies from Nunavut were more likely, to experience a preterm birth. In the provinces, 11 regions had lower and 7 regions had higher rates of preterm birth. The regions with lower rates were

- Western, Newfoundland and Labrador;
- South West Nova, Nova Scotia;
- Pictou County, Nova Scotia;
- Region 2, New Brunswick;
- Region 3, New Brunswick;
- Waterloo Wellington, Ontario;
- South Eastman, Manitoba;
- Central, Manitoba;
- Assiniboine, Manitoba;
- South Zone, Alberta; and
- Northwest, B.C.

The regions with higher rates were

- Hamilton Niagara Haldimand Brant, Ontario;
- South East, Ontario;
- Champlain, Ontario;
- North Eastman, Manitoba;
- Burntwood, Manitoba;
- Calgary Zone, Alberta; and
- North Vancouver Island, B.C.

Figure 14: Percentage of Newborns Delivered by Rural Women Preterm, by Health Region, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

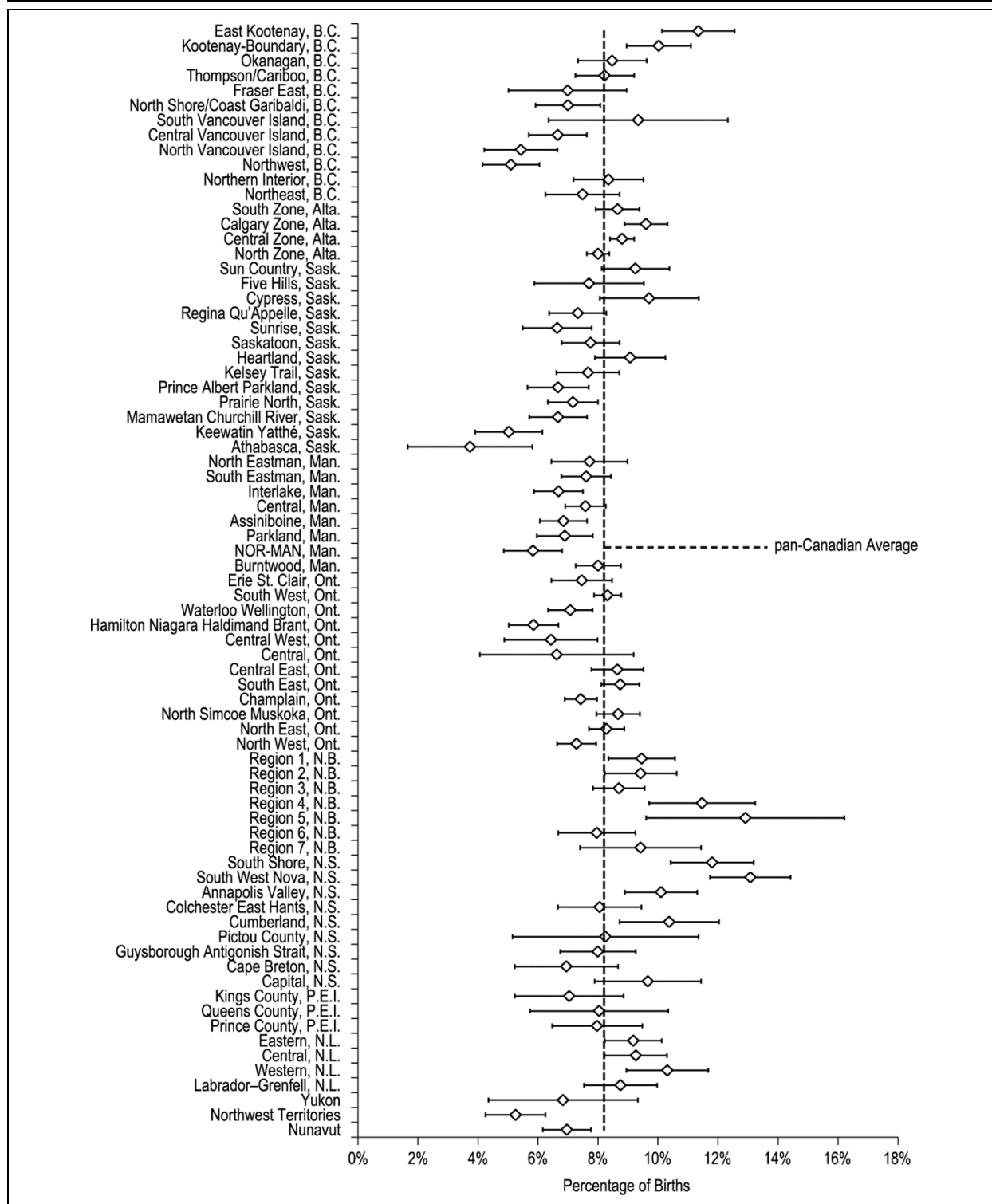
Small for Gestational Age

Figure 15 shows significant variation among rural newborns in rates of SGA across Canada's health regions. In the territories, Nunavut and the Northwest Territories had lower rates of SGA. In the provinces, several regions in Nova Scotia, New Brunswick and Alberta had higher rates of SGA. A pattern was observed in Ontario, Manitoba and Saskatchewan of regions exhibiting lower rates of SGA.

Large for Gestational Age

There was considerable variation in LGA rates across regions (Figure 16). Among the territories, the Northwest Territories had a higher rate of LGA. The majority of regions in Manitoba and Saskatchewan exhibited higher rates, while all regions in Alberta and several regions in Nova Scotia and New Brunswick had lower rates of LGA.

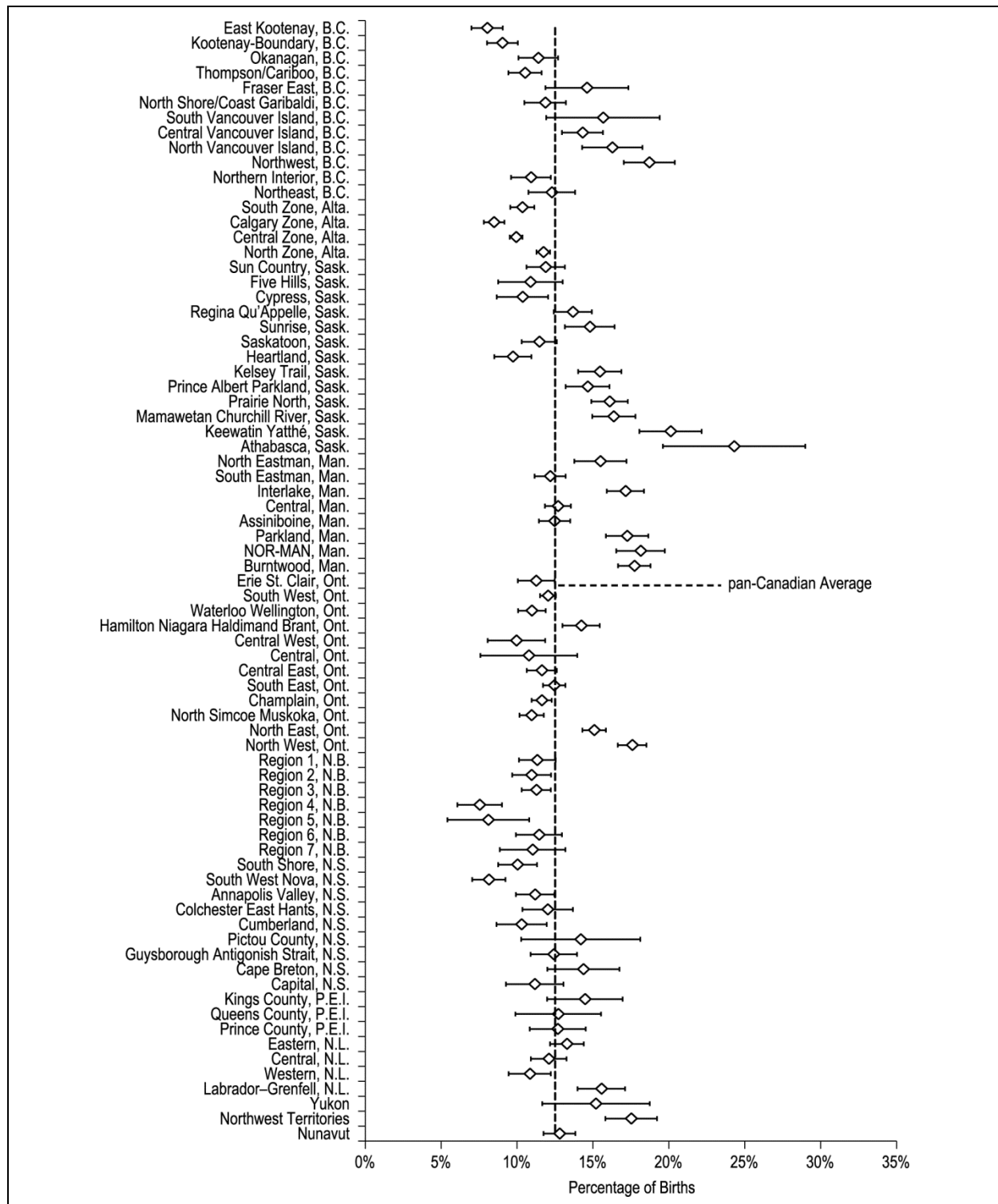
Figure 15: Percentage of Newborns Delivered by Rural Women That Were Small for Gestational Age, by Health Region, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Figure 16: Percentage of Newborns Delivered by Rural Women That Were Large for Gestational Age, by Health Region, 2007–2008 to 2011–2012



Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Vignette 4: Perspective of a Mother From Rural Alberta

Christine lives in rural Alberta with her husband and three children. They have a mixed farming operation on 1,000 acres that includes cattle and a variety of grains. Christine is actively involved with the farming operation and is expecting her fourth child at age 38. She had her first two children at a small hospital an hour away, but she had to travel to Edmonton for her last birth because of bleeding that developed in her last trimester. She is hoping that she will be able to deliver at her local hospital because she is due during harvest season. If she had to go to Edmonton for an extended period, her husband would probably have to hire help. Fortunately, Christine's sisters live nearby and have offered to look after the children while she is in hospital, but she is not sure they could deal with them for three or four weeks.

Christine is concerned that her age may make this pregnancy even riskier than her last one. The new doctor in town, a family physician, has been reassuring and Christine is confident in his abilities. But if it seems likely that she will need a C-section, Christine will have to make the four-hour trip to Edmonton in advance of the birth. And with only one other doctor available locally, it is worrisome that either one might not be available in an emergency. It has been difficult for her community to sustain its local hospital obstetric service. Her last doctor left to work outside of Edmonton in a large group practice because she found the amount of on-call time difficult to balance with her family life.

When Christine goes into labour two weeks before her due date, her family physician is available to assure her that the labour looks completely normal and that she can remain at the local hospital. Her husband stays with her and provides support during the labour and birth of their healthy baby boy. Her other children are brought to the hospital by Christine's sister, where they meet their newborn brother. After two days, Christine is able to return home to the farm with her new baby.

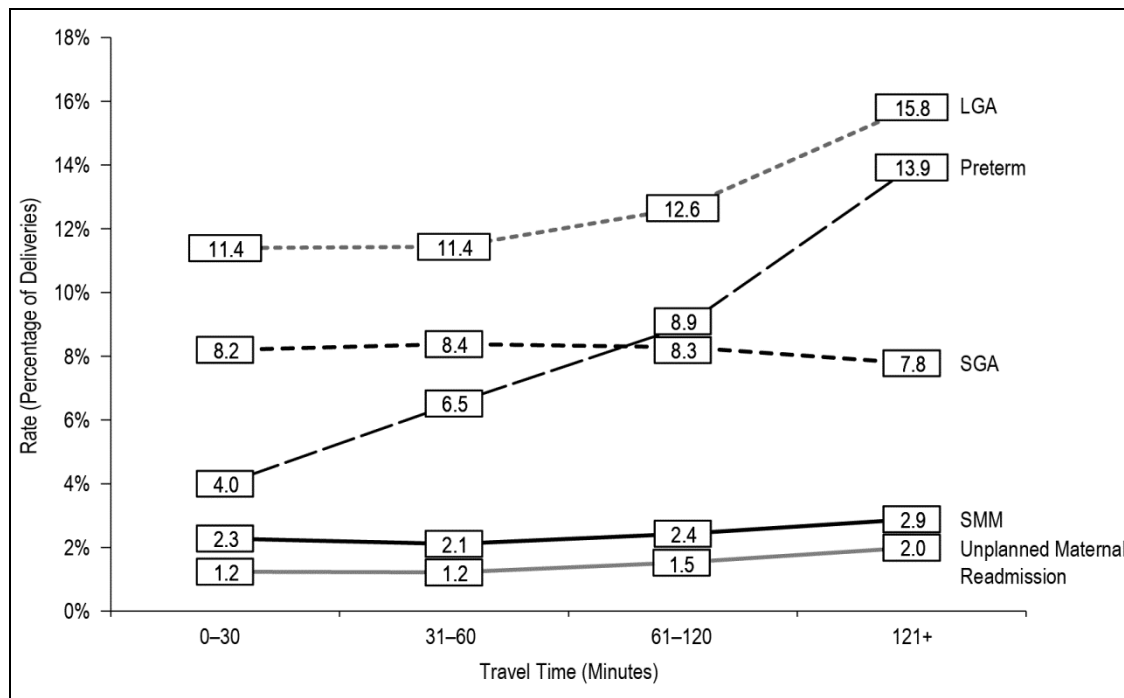
Do Outcomes for Rural Women Vary by Time Travelled to Delivery?

There is evidence that travel to care is associated with poorer outcomes. For example, a study of rural women in B.C. who had to travel for more than one hour to access the nearest maternity service with C-section capability found relatively high rates of induced labour for logistical reasons and more unplanned out-of-hospital deliveries.⁸ The birth outcomes of these rural mothers were poor compared with those for mothers residing in urban areas. There were higher rates of perinatal mortality and, among live births, a greater number of days spent in a neonatal intensive care unit.

Figure 17 shows unadjusted rates for the five outcomes included in this report and suggests that, for all but LGA and preterm births, there does not appear to be a strong relationship between travel time for rural women's deliveries and outcomes. For LGA, there is an increase in the rural rate when travel time exceeds two hours (15.8%). The increase in the rate of preterm births with travel time may reflect the ability to screen for or recognize risk factors for preterm birth (such as bleeding) and then recommend that women travel from their community to a hospital offering services that may be needed. It could also indicate that lengthy travel times to delivery are a risk to pregnancies. The data available for this report cannot distinguish between these potential explanations.

When comparing rural deliveries that occurred in hospitals close to home (travel time within 30 minutes) and urban deliveries, it was noted that the rate of unplanned maternal readmissions was similar (1.2% in both cases). However, the SGA rate was lower for rural deliveries close to home (8.2%) than for urban deliveries (10.3%).

Figure 17: Rates for Maternal and Infant Outcomes by Travel Time for Rural Deliveries, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

SMM: severe maternal morbidity.

SGA: small for gestational age.

LGA: large for gestational age.

Source

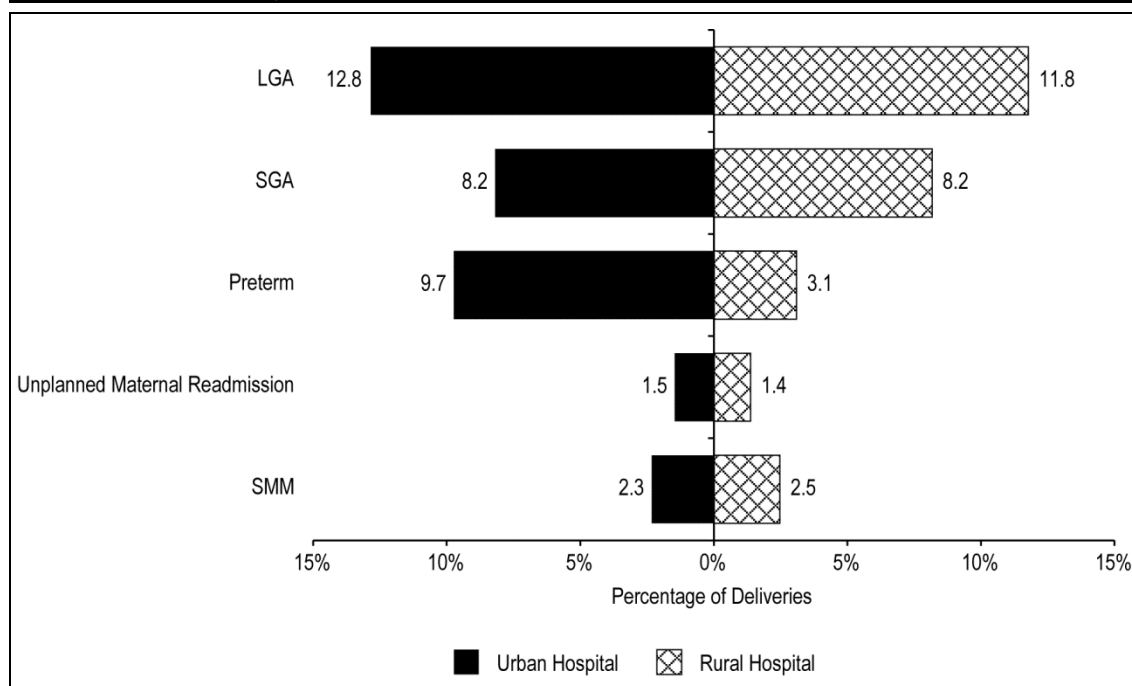
Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Lengthy travel to give birth also poses both practical and emotional hardships. The need to take time off from work with the attendant loss of income and the expenses associated with travel and accommodation may take a financial toll. And being far away from family and friends may be very stressful and isolating for mothers at a time when they are in need of social support. Among the women responding to the Maternity Experiences Survey who had travelled to another city, town or community to give birth, “very negative” ratings of the experience of travelling to give birth were reported by 14% of women who travelled more than 100 km. This is in contrast to only 2% of women who travelled 100 km or less to give birth. A survey of B.C. women who had given birth found that those who had to travel more than one hour to access maternity services were seven times more likely to experience moderate or severe stress than women who had local access to maternity services.⁷⁶

Do Outcomes for Rural Women Vary by Urban Versus Rural Hospital of Birth?

Rural women who delivered in an urban hospital had higher rates of preterm birth than their counterparts who delivered in rural hospitals (9.7% versus 3.1%) (Figure 18). This finding could be explained if rural women who experienced premature labour or another complication were transferred from their rural community to an urban centre for delivery. Other birth outcomes occurred with similar frequency when births took place in either an urban or rural hospital.

Figure 18: Maternal and Infant Outcomes for Rural Women, by Urban or Rural Hospital of Delivery, Selected Provinces/Territories, 2007–2008 to 2011–2012



Notes

LGA: large for gestational age.

SGA: small for gestational age.

SMM: severe maternal morbidity.

Source

Discharge Abstract Database, 2007–2008 to 2011–2012, Canadian Institute for Health Information.

Conclusion

Women giving birth in Canada's hospitals are geographically widely dispersed, with 18% residing in rural and remote areas. A major finding of this report is that women from rural areas have higher odds of severe maternal morbidity, hospital readmission and LGA infants than women from urban areas, after controlling for differences in their socio-economic profiles and delivery characteristics. Roughly two-thirds of women from rural areas commuted to urban hospitals to have their babies. For one in six rural women, reaching their hospital to deliver involved travelling more than two hours. These lengthy travel times were associated with higher rates of preterm births. The rate of preterm birth among rural women was also elevated when deliveries occurred in urban rather than rural hospitals. These findings could possibly reflect effective triaging of high-risk pregnancies from rural areas to distant hospitals staffed with specialists and advanced technology. Unfortunately, the administrative data upon which this report is based is inadequate to explain these associations. The evidence does suggest that the system for caring for rural pregnant women and their newborns is working, or is successful in achieving positive birth outcomes for women from both rural and urban areas.

While the results in aggregate are reassuring, the report provides evidence of significant variation in maternal and infant outcomes across the study's 75 health regions. Health administrators face considerable challenges as they design systems of obstetric and neonatal care that will accommodate the needs of rural and remote communities. Examining health outcomes at the level of the health region can assist health planners as they consider policies related to clinical practice, personnel, infrastructure, transportation, triage and other issues that affect access to delivery services and birth outcomes. Many factors contribute to variations in maternal and infant outcomes by jurisdiction; this analysis had access to just a few of these factors. Focused investigation at the local level is needed to better understand why a jurisdiction's value on a particular outcome differs significantly from the pan-Canadian value.

Appendix: Odds Ratios and Associated Confidence Intervals for Maternal and Newborn Outcomes

Table A.1: Odds Ratios and Associated Confidence Intervals for Maternal Outcomes, Selected Provinces/Territories, 2007–2008 to 2010–2011

	SMM		Unplanned Readmission	
	Adjusted Odds Ratio	95% CI	Adjusted Odds Ratio	95% CI
Rural (vs. Urban)	1.4	1.3–1.4	1.2	1.1–1.2
Age <20 (vs. 20–34)	1.5	1.4–1.5	1.4	1.4–1.5
Age 35–39 (vs. 20–34)	1.1	1.1–1.2	1.0	1.0–1.0
Age 40+ (vs. 20–34)	1.4	1.3–1.4	1.1	1.0–1.2
MDI Quintile 2 (vs. 1)	0.9	0.9–1.0	1.0	0.9–1.0
MDI Quintile 3 (vs. 1)	0.9	0.9–1.0	1.0	0.9–1.0
MDI Quintile 4 (vs. 1)	1.0	0.9–1.0	1.0	0.9–1.1
MDI Quintile 5 (vs. 1)	1.1	1.1–1.2	1.2	1.1–1.2
Diabetes and Hypertension (vs. No Condition)	1.9	1.8–2.1	2.5	2.2–2.7
Pre-Existing Diabetes (vs. No Condition)	1.2	1.0–1.4	1.9	1.6–2.2
Gestational Diabetes (vs. No Condition)	0.9	0.9–1.0	1.1	1.0–1.2
Pre-Existing Hypertension (vs. No Condition)	2.1	1.9–2.4	2.3	2.0–2.7
Gestational Hypertension (vs. No Condition)	1.8	1.8–1.9	1.9	1.8–2.0
Multiple (vs. Singleton)	2.1	2.0–2.2	1.7	1.6–1.9
Induction	1.2	1.1–1.2	1.3	1.2–1.3
Assisted Vaginal (vs. Spontaneous Vaginal)	1.8	1.7–1.9	1.5	1.4–1.6
C-Section (vs. Spontaneous Vaginal)	3.1	3.0–3.2	2.0	2.0–2.1

Notes

SMM: severe maternal morbidity.

MDI: material deprivation index.

Source

Discharge Abstract Database, 2007–2008 to 2010–2011, Canadian Institute for Health Information.

Table A.2: Odds Ratios and Associated Confidence Intervals for Newborn Outcomes, Selected Provinces/Territories, 2007–2008 to 2010–2011

	SGA		LGA		Preterm	
	Adjusted Odds Ratio	95% CI	Adjusted Odds Ratio	95% CI	Adjusted Odds Ratio	95% CI
Rural (vs. Urban)	0.7	0.7–0.7	1.4	1.4–1.4	0.9	0.9–1.0
Age <20 (vs. 20–34)	1.1	1.1–1.2	0.9	0.9–0.9	1.2	1.2–1.3
Age 35–39 (vs. 20–34)	0.9	0.9–1.0	1.1	1.1–1.1	1.0	1.0–1.0
Age 40+ (vs. 20–34)	1.1	1.0–1.1	1.0	1.0–1.0	1.1	1.1–1.2
MDI Quintile 2 (vs. 1)	1.0	1.0–1.0	1.1	1.0–1.1	1.0	1.0–1.0
MDI Quintile 3 (vs. 1)	1.1	1.1–1.1	1.0	1.0–1.0	1.0	1.0–1.0
MDI Quintile 4 (vs. 1)	1.2	1.2–1.3	1.0	1.0–1.0	1.0	1.0–1.1
MDI Quintile 5 (vs. 1)	1.3	1.3–1.3	1.0	1.0–1.0	1.1	1.1–1.2
Diabetes and Hypertension (vs. No Condition)	1.2	1.1–1.2	2.6	2.4–2.7	5.5	5.3–5.8
Pre-Existing Diabetes (vs. No Condition)	0.5	0.4–0.5	5.1	4.9–5.4	4.8	4.5–5.1
Gestational Diabetes (vs. No Condition)	0.9	0.8–0.9	1.7	1.7–1.7	1.5	1.5–1.6
Pre-Existing Hypertension (vs. No Condition)	1.8	1.7–1.9	0.9	0.8–1.0	4.6	4.3–4.9
Gestational Hypertension (vs. No Condition)	1.6	1.6–1.7	1.0	1.0–1.0	3.2	3.1–3.3
Multiple (vs. Singleton)	NA	NA	NA	NA	16.7	16.4–17.1
Induction	1.2	1.2–1.2	1.1	1.1–1.1	0.6	0.6–0.7
Assisted Vaginal (vs. Spontaneous Vaginal)	1.2	1.2–1.2	0.9	0.8–0.9	0.7	0.6–0.7
C-Section (vs. Spontaneous Vaginal)	1.0	1.0–1.0	1.6	1.5–1.6	1.2	1.2–1.3

Notes

SGA: small for gestational age.

LGA: large for gestational age.

MDI: material deprivation index.

NA: not applicable.

Source

Discharge Abstract Database, 2007–2008 to 2010–2011, Canadian Institute for Health Information.

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