Giving Birth in Canada

A Regional Profile

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About the Canadian Institute for Health Information

Since 1994, the Canadian Institute for Health Information (CIHI), a pan-Canadian, independent, not-for-profit organization, has been working to improve the health of the health system and the health of Canadians by providing reliable and timely health information. The Institute's mandate, as established by Canada's health ministers, is to develop and maintain a common approach for health information in this country. To this end, CIHI provides information to advance Canada's health policies, improve the health of the population, strengthen our health system and assist leaders in the health sector to make informed decisions.

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- **Dr. Elizabeth Whynot** (Chair), President, British Columbia's Women's Hospital & Health Centre
- **Mr. Jack Bingham** (Ex-officio member), Director, Health Reports and Analysis, CIHI
- **Dr. Beverley Chalmers**, International Health Consultant, Centre for Research in Women's Health, Sunnybrook and Women's College Health Science Centre, University of Toronto
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It should be noted that the analyses and conclusions in this report do not necessarily reflect those of the individual members of the Expert Group or their affiliated organizations.

The editorial committee for this report included: Kira Leeb, Jennifer Zelmer, Jeanie Lacroix, and Jack Bingham. Other core members of the team included Raghda AlAtia, Akerke Baibergenova, Lynne Duncan, Patricia Finlay, Cheryl Gula, Sharon Gushue, Thi Ho, Luciano Ieraci, Tina LeMay, Geneviève Martin, Mary Neill, Jennifer Phillips, Karin Schoeberle, and Benjamin Taylor.

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CIHI would also like to thank the individuals in health regions and provinces and territories who participated in the validation process for the regional health indicators.

About This Report

This report is the second in a series of four special reports prepared by the Canadian Institute for Health Information (CIHI) on the health and health care of Canada's mothers and infants. The first report, *Giving Birth in Canada: Providers of Maternity and Infant Care*, focused on trends in birthing and maternity care and looked at the changing scope of practice for maternal and infant care providers. It was released in spring 2004 and can be ordered or downloaded from CIHI's Web site (www.cihi.ca).

This second report, *Giving Birth in Canada: A Regional Profile*, profiles selected health service 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 or at the provincial/territorial level. Additional regional health indicators are available through the health indicators e-publication on CIHI's Web site.

The remaining reports in this series include:

- **Giving Birth in Canada: The Costs**—Expenditures on maternal and infant care.
- **Giving Birth in Canada: A Profile of Canada's Mothers**—What we know and don't know about the changing demographics of mothers in Canada and about their experiences in the health care system.

Each of these special 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 (see below).

FIGURE 1

Where the Data Come From

The figure below shows pan-Canadian health data from CIHI, Health Canada, and the College of Family Physicians of Canada that are used in this report.

Sources:
† Collected by CIHI.
‡ Collected by the College of Family Physicians of Canada.
* Collected by Statistics Canada.
** Compiled by Health Canada.
*** Banque de données sur les hospitalisations du système Med-Écho, Ministère de la Santé et des Services sociaux (Med-Écho hospitalization database, Quebec Ministry of Health and Social Services).

FF This report includes a Fast Facts section to provide an expanded range of comparative data from across the country. Whenever the icon appears in the margin beside the text, it indicates that related data can be found at the back of this report (see Appendix A).

Canadian Perinatal Health Report 2003

The Canadian Perinatal Surveillance System (CPSS) is part of Health 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 and interpretation, and communication.

Recently, the CPSS released its *Canadian Perinatal Health Report 2003*, which includes information on 27 perinatal health indicators on determinants and outcomes of maternal, fetal, and infant health. 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 are available. It can be downloaded free of charge from the following link: www.hc-sc.gc.ca/pphb-dgspsp/publicat/cphr-rspc03.

Highlights of This Report

General Overview

- In Canada, pregnancy and childbirth accounted for 14% of all hospitalizations in 2001–2002, second only to circulatory diseases. Each year, approximately 330,000 babies are born; about 99% of deliveries take place in hospitals.
- Approximately one quarter of births in Canada in 2001–2002 occurred without surgical intervention (use of instruments, induction, or epidural/general anaesthetic).

Indicator Highlights

The report focuses on five indicators describing the birthing process. In each case, there were substantial variations in practice across the country, with rates in some regions at least double the rates in other areas. Examples include:

- Epidurals were used in nearly half (45.4%) of all vaginal births in Canada in 2001–2002. Their use varied across the country from 3.9% to 74.6%. A number of factors may explain these variations, including patient and caregiver preferences and the availability of anaesthesiology services.
- Although the overall rate of assisted vaginal delivery in Canada was relatively stable between 1991–1992 and 2000–2001, the methods used have changed over time. The proportion of vaginal deliveries assisted by vacuum extraction increased by 56%, whereas the use of forceps decreased by 45% during the same time period. Other countries, such as England, the United States (U.S.), New Zealand, and Australia, have seen similar trends.
- Primary caesarean section rates varied more than three-fold across health regions from 7.6% to 25.5% of births. Similarly, among the provinces, rates varied from 12.4% in Manitoba to 21.0% in Prince Edward Island.
- The proportion of newborns admitted to neonatal intensive care units (NICUs) in Canada rose from 12.6% in 1994–1995 to 14.4% in 2001–2002. These babies spent a median of two days in the NICU. About 1% did not survive until discharge. Low- and very-low-birth-weight babies tended to stay longer in NICUs and were more likely to die during their stay.

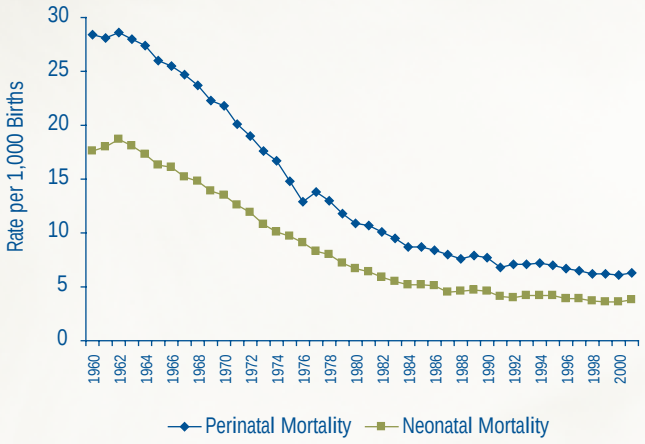
Birthing Practices: A Look Backwards

The birth of any child can be life changing, but royal births often change history. Prince Leopold George Duncan, Queen Victoria's seventh child, had little chance of gaining the throne, but his mother's use of chloroform to relieve the pain of childbirth ensured his place in the history of obstetrics.[1]

FIGURE 2

Improved Survival

The risk of death during or immediately after childbirth is much lower than it used to be for both mothers and their babies. The figure below shows changes in perinatal mortality (death of a child under one week of age or a stillbirth at 28 or more weeks' gestation) and neonatal mortality (death of a child 0 to 27 days of age) rates in Canada over time.



Notes: Perinatal mortality is expressed as a rate per 1,000 total births.
Neonatal mortality is expressed as a rate per 1,000 live births.
Neonatal mortality rate is estimated for 1975 and 1976.

Sources: OECD Health Data 1975–1976,
Selected Infant Mortality and Related Statistics, Canada, 1921–1990, (82–549 Occasional) Statistics Canada
Births, 1991 (84–210) Statistics Canada
Births and Deaths, 1993 (84–210) Statistics Canada
Births and Deaths, 1996 (84F0210XPB) Statistics Canada
Mortality—Summary List of Causes, 1992,1995 (84–209) Statistics Canada
Mortality—Summary List of Causes, 1996–1998 (84F0209XPB) Statistics Canada
Deaths, 1998–1999 (84F0211XPB) Statistics Canada
Canadian Vital Statistics, Birth, Death and Stillbirth Databases, Statistics Canada

The introduction of anaesthesia is just one of the many ways that childbirth has changed over time. Long before hospitals became focal points of care, mothers gave birth at home with support from midwives, relatives, and/or friends. Knowledge about childbirth, and the uses of herbs and preparations related to the birthing process, was passed from person to person. European midwives, for example, sometimes used opium to help women with pain during a difficult labour.[2]

Surgery was historically a high-risk option performed, when necessary, by "barber-surgeons."[3] A French family of barber-surgeons also invented obstetric forceps in the mid-1600s. A closely guarded secret for generations, the family used forceps to perform the first assisted vaginal deliveries.[4]

Between the 18th and 20th centuries, birthing practices continued to evolve. General anaesthesia was introduced in the mid-1850s with the use of ether and later chloroform as a tool for reducing pain.[5] At first, the use of anaesthesia met with resistance, but by 1914–1915, staff at the Ottawa Maternity Hospital reportedly gave 75% of mothers either chloroform or ether during labour to control pain.[6]

Outcomes for mothers and babies also improved significantly over this period, partly because of advances in obstetrical care.[7] Experts suggest that some of the gains can also be attributed to improved nutrition and other factors.[8]

Giving Birth in Canada Today

Pain management in childbirth is now commonplace, as are caesarean sections and assisted vaginal births. Many other innovations have also become an integral part of the birthing process. For example, even before birth, many parents seek technological help to conceive. More take advantage of advanced fetal monitoring, amniocentesis, and ultrasound for pre-birth screening. By 2002, 99% of babies in Canada were born in hospitals.[9] After birth, highly sophisticated care for very sick newborns is also now available.

Assisted Reproductive Technologies

The 1993 Royal Commission on Reproductive Technologies estimated that 1 in 14 Canadian couples experience infertility (as measured after a two-year period).[10] These couples have many more options now than in the past.

"The use of assisted reproductive technology (ART) has increased dramatically since the first in vitro fertilization in 1981."[11] In the U.S., for example, 40,687 infants were born as a result of ART cycles carried out in 2001.[12] That represents a total of 29,344 live-birth deliveries, reflecting the technology's association with multiple births.[13]

In Canada, ART data and statistics are not readily available, although Health Canada believes that our trend of multiple births related to ART is similar to that of the U.S.[14] According to the Canadian Fertility and Andrology Society, which collects data from 21 of the 22 in vitro fertilization centres in Canada, 1,237 infants were born in Canada as a result of in vitro fertilization treatment in 2001 (about 0.4% of live births for that year).[15, 16]

In this report, for the first time, we present a set of indicators describing current maternal and infant care at regional, provincial/territorial, and national levels. We highlight, for example, regional variations in epidural use, as well as in assisted deliveries with forceps or with vacuum extraction. We also compare caesarean section rates across Canada, focusing on mothers having caesarean sections for the first time. Finally, we look at variations in how often babies are admitted to neonatal intensive care units and how often newborns are re-hospitalized after birth.

For each indicator, we present a profile of the topic and current Canadian data. These data highlight striking variations in how often different tools and techniques are used. There are at least two-fold variations between the regions with the highest and lowest rates for most of these indicators. In a few cases, rates in some regions are more than ten times those in others.

In no case do we know what the "right" number is. Clearly, interventions are beneficial, even life-saving, for some mothers and their babies. In other cases, they are contra-indicated. For each indicator, therefore, we present a flavour of what experts say about what might explain variations in use. We encourage interested readers to pursue the references provided for more information.

What Is an Indicator?

Health indicators are single summary measures, most often expressed in quantitative terms, which represent key dimensions of health status, the health care system, or related factors. Like a warning light on the dashboard of a car, they suggest areas for further investigation, rather than definitively confirming that a problem exists. (For specific technical notes on the methodologies used in the calculation of the indicators included in this report, see Appendix B.)

Maintaining and enhancing the quality of incoming data is essential to CIHI's mandate to produce high-quality health information. In addition, CIHI undertook the following steps to develop the maternal infant health indicators that appear in the report:

- *Starting With the Evidence and the Data:* We started with a list of evidence-based indicators derived from administrative data identified by the Canadian Perinatal Health Surveillance Group at Health Canada. For each indicator, we conducted a feasibility study to see whether the indicator could be reported at regional, provincial/territorial, and/or national levels using Canadian data. This step involved a literature review; clinical definition review; and identification of potential issues related to sample size, coding, data quality, and reporting.

- *Talking to the Experts:* Working with our expert panel, we reviewed the maternal and infant health indicators and updated some definitions to make them more relevant to this report.

- *Extracting and Verifying the Data:* Based on the agreed specifications, at least two analysts independently extracted indicator results from our databases. Where possible, these results were checked for face validity against external sources (e.g. research studies or international data). Outliers and other anomalies were investigated, either by using CIHI data or by contacting relevant health care facilities. Throughout this and other stages of the process, coding, database, and indicators specialists reviewed the indicators in order to ensure high quality.

- *External Verification:* Preliminary results and technical specifications were sent to health regions, ministries of health, and their partners for verification. Where questions arose, we worked together to resolve them.

- *Catching the Gremlins:* Indicator results appearing in this or other publications were checked by at least two staff members to ensure that no transcription or other errors occurred in the production process.

And those are just the highlights! It can be a long process, but it is an important one to ensure that we make the best possible data available to decision-makers. Nevertheless, indicator results are best viewed as screening tests that may produce false positives and false negatives. They can be helpful in triggering more detailed investigations into specific aspects of care and identifying best practices across the country.

When Mothers Need Help

From the initiation of contractions, to managing labour pain and delivering a baby, women may need help along the way. This help can come in many forms. It could be simply the support of a "labour coach," or it could include the use of methods to start the birthing process or to help the mother deliver the baby. In this section, we consider how often two procedures—labour induction and epidural analgesia—are used across Canada.

A Kick-Start to Labour

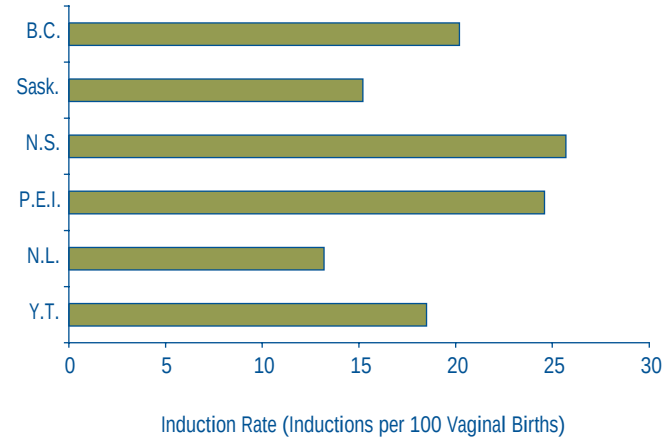
At around nine months, labour typically begins spontaneously by ever-increasing numbers of contractions of the uterus and eventually the breaking of waters. When labour doesn't begin spontaneously, clinicians may recommend artificially starting the process by inducing labour. Induction may be necessary, for example, when babies are overdue or too large, if the mother or the fetus have medical issues, or when the mother's water breaks too early.[17] Labour can be induced using drugs (medical induction) or special tools to artificially break the water (surgical induction).[18, 19]

Like many other obstetrical interventions, the rate of labour induction has increased steadily over the last 10 to 15 years.[20] Between 1991–1992 and 2000–2001, medical induction increased to approximately one in five births. Surgical induction was less common (8% of vaginal births).[21] These rates vary provincially/territorially.

FIGURE 3

Inducing Labour

In 2001–2002, six jurisdictions started using a new, more precise coding system for diagnoses and procedures that all of Canada is starting to adopt. This system allows calculation of how often labour was induced, medically or surgically. Among these jurisdictions, two Maritime provinces, Nova Scotia and Prince Edward Island, had the highest induction rates.



Source: Discharge Abstract Database, CIHI

A number of possible explanations for rising induction rates have been suggested, including:

- higher use of obstetrical interventions over the last 20 years;[20]
- greater proportion of post-term pregnancies;[22] and
- increasing rates of elective inductions,[23] used, for example, to plan the date and location of birth for mothers in remote areas.[24]

Medically indicated induction of labour may result in a lower risk of death for overdue babies[22] and increases the likelihood of delivery for slow or non-progressing births.[17] However, there is some controversy around inductions done for non-medical reasons. For example, research suggests that, compared to women who are not induced, women who are induced have a higher risk of having caesarean section births[25, 26] and of having painful uterine contractions or uterine ruptures.[27]

The Pain of Labour

"*It is we who are having the baby; and we will have chloroform!*" (Queen Victoria, 1853).[28]

From the beginning, the use of medication to help manage labour pain has been controversial. Today, the World Health Organization recommends alternatives to medication, such as ambulation, changing positions, massage, relaxation, breathing, and acupuncture.[29] Studies suggest that the presence of continuous one-on-one support may also help women minimize their reliance on pain medication. The benefits of labour support—the assistance of a professional (nurse, midwife, or doula) or non-professional caregiver (family member or friend) who offers advice, information, comfort measures, and emotional support to women in labour—was the subject of a systematic review of 15 studies involving 12,791 women from 11 countries. Researchers found that uninterrupted labour support from a professional or non-professional caregiver was associated with significant reductions in caesarean section delivery, assisted delivery, and use of pain medication.[30]

Nevertheless, advances in obstetric anaesthesia have made medicated pain relief a popular option. A recent systematic review of 11 studies found that epidural use does not increase the rate of caesarean delivery, although it may lengthen the first and second stages of labour and increase the rate of assisted delivery, fetal malposition, and oxytocin use to speed up labour.[31] As well, epidural use may be associated with drug side effects in both mothers and babies.[32, 33]

Epidural: The Popular Choice

Epidural analgesia is reported to be the most effective method of medicated pain relief, and its use has become widespread over the last 20 years.[33]

In Canada, epidurals were used in nearly half (45.4%) of all vaginal deliveries in 2001–2002. In the U.S., a national survey of women's childbearing experiences found that they were used in about 59% of vaginal deliveries.[34] England, on the other hand, has a lower rate: 12% of unassisted vaginal deliveries.[35] Some experts suggest that this may reflect the reliance in the United Kingdom (UK) on midwives as the primary caregivers for women giving birth.[36]

What's in a Name?

The "epidural" is the space in the lower spine between the spinal cord and the dura. A small flexible tube (epidural catheter) is inserted into this area and fixed to the back. This allows analgesic medication to flow into the epidural space and provide pain relief throughout the lower half of the body.

A traditional epidural block involves the use of a local anaesthetic alone (such as bupivacaine). In the past, high concentrations of the drug prevented mothers from feeling the need or having the ability to push.[37, 38] Today, however, refined techniques such as low-dose epidural, spinal epidural, and combined spinal-epidural analgesia reduce this problem. Some newer techniques also give women the option to walk around during labour or to control their own drug dosage.[39]

The frequency of epidural use varies within countries, as well as between them. In 2001–2002, epidural rates varied widely across Canada, ranging from a low of 4.0% of all vaginal deliveries in the Northwest Territories to a high of 60.2% in Quebec. Among health regions with a population of 75,000 or more, the range in rates was even greater: from 3.9% in Zone 2 (Kentville area) of Nova Scotia to 74.6% in Region 2 (St. John Region) of New Brunswick.

FF

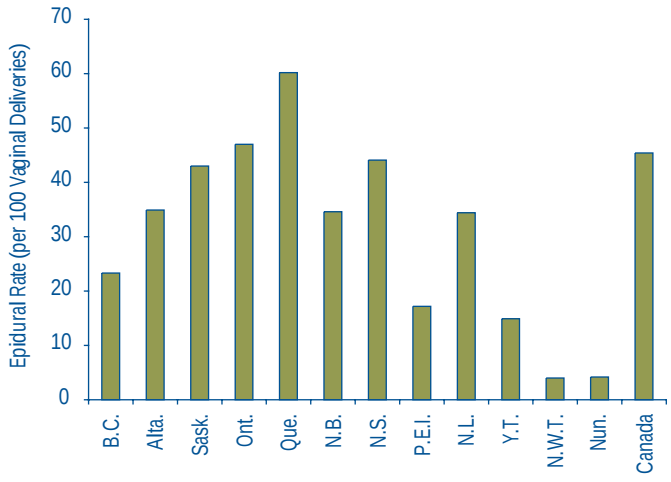
How Epidural Rates Were Calculated

Strict definitions were used to define eligible cases for epidural use. Further details are provided in the technical notes found in Appendix B at the end of this report. Rates and confidence intervals are for regions with at least 75,000 people.

- These data are from CIHI's Hospital Morbidity Database.
- The results are based on where patients live, not where they are treated.
- The 95% confidence intervals for epidural rates (whether vaginal or all delivery types) tend to be wider (i.e. the rate estimate is less precise) for regions that use this procedure less frequently in a given year and also in smaller regions. For example, the epidural rate for vaginal delivery in Toronto is estimated to be accurate within ± 0.64% 19 times out of 20. The rate in the Eastern Region of Newfoundland and Labrador is estimated to be accurate within ± 3.9% 19 times out of 20.

FIGURE 4 **Variation of Epidural Use**

The use of epidurals in labour varied across the country from a low of 4% of vaginal deliveries in the Northwest Territories and Nunavut to a high of 60% in Quebec in 2001–2002. Among the provinces, Prince Edward Island had the lowest rate of epidural use (17%).



Notes: The province of Manitoba, Calgary health region (Alberta), Chinook regional health authority (Alberta), and Palliser regional health authority (Alberta) were excluded due to underreporting. Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

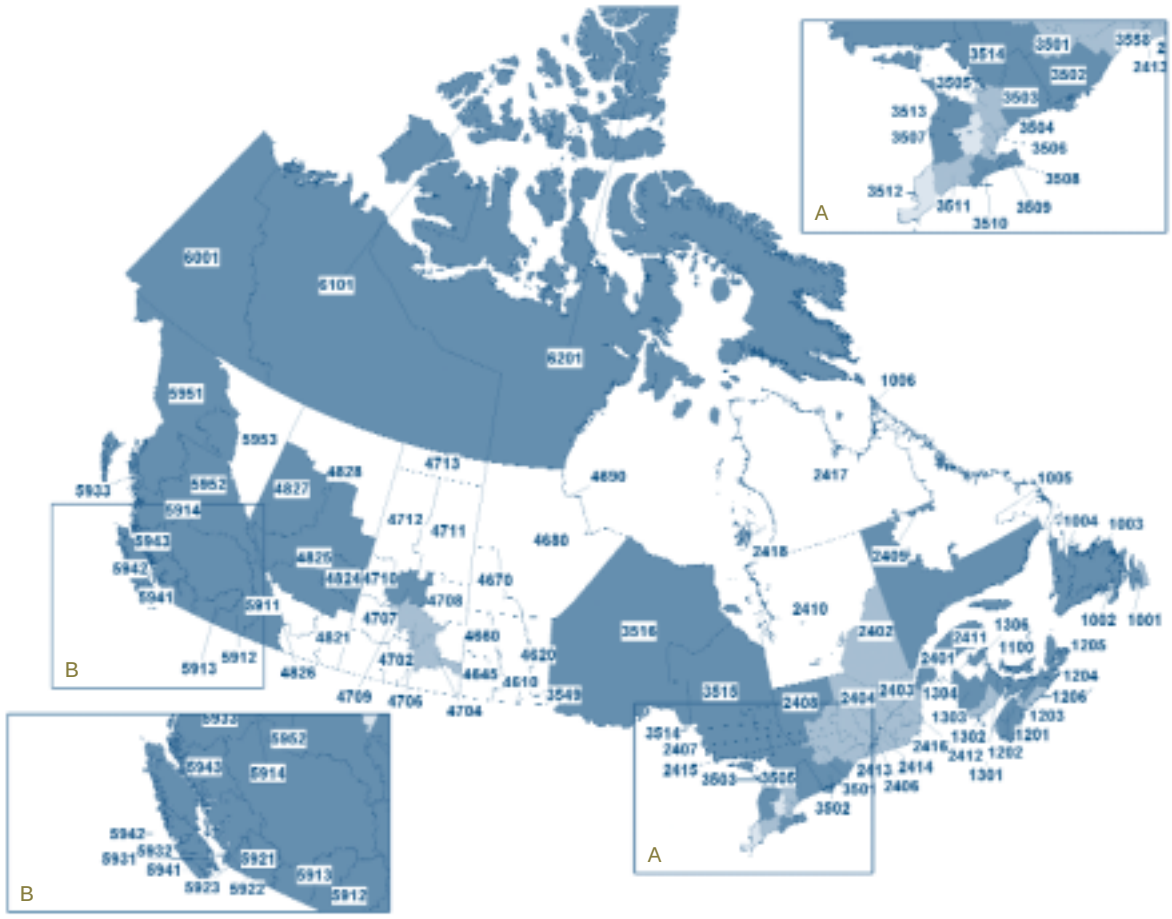
A number of factors explain regional variation in rates, many of which are not well understood. Some physicians, for example, may be more likely to recommend using an epidural than others.[40] As well, women who are giving birth for the first time, are at a later stage in life, or are Caucasian may be more likely to request an epidural.[41]

In addition, the availability of staff and resources may play a role. Because epidural service requires the skills of an anaesthesiologist (or anaesthetist), as well as resuscitation equipment and drugs, not all rural or small community hospitals offer the service.[42, 43] This may help to explain why in eastern and southeastern Ontario in 2003 epidurals were used in 23.6% of vaginal births in small community hospitals, but teaching and large community hospitals had rates of 65.0% and 58.7% respectively.[42] These hospitals are more likely to have anaesthesiologists available "in house" or on call 24 hours a day.[44, 45]

FIGURE 5

Epidural Use in Canada

The map below shows the variation in epidural rates among health regions with a population of 75,000 or more. Most regions had rates that were significantly different than the Canadian average (45.4%).



Notes: The province of Manitoba, Calgary health region (Alberta), Chinook regional health authority (Alberta), and Palliser regional health authority (Alberta) were excluded due to underreporting. Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

When Nature Needs Help

Once labour has begun and decisions about pain management have been made, birthing the baby becomes the focus. In some cases, this means monitoring the baby and supporting the mother as she naturally enters the final stages of labour and delivery. In other cases, however, decisions may need to be made about how to assist the birthing process. This section highlights information on selected methods used to assist vaginal deliveries. The following section includes a profile of caesarean section births.

Pulling Instead of Pushing

Shrouded in secrecy when first invented in the 1600s, forceps and other forms of assisted delivery are now widely used around the world. The failure of labour to progress, fetal compromise, and maternal congestive heart failure or cerebral vascular malformations are some of the reasons that may lead clinicians to consider using forceps or vacuum extraction to help deliver babies vaginally.[46, 47]

Tools of the Trade

Forceps are smooth metal instruments, similar in shape to long narrow spoons. Applied to the baby's head, they are used to extract the baby using traction and/or rotation. Several types of forceps have been developed (e.g. Kielland, Simpson, Tucker-McLane) since Chamberlen's invention of the forceps in the 1600s.[46] With vacuum extraction, a plastic or metal cup is attached to the baby's head. Suction is then used to guide the baby out of the birth canal.

Neither procedure is risk-free.[48–53] For over two hundred years, there has been debate about the indications and safety of forceps, particularly mid-forceps for the management of problems in the second stage of labour.[54] Likewise, in the late 1990s, the U.S. Food and Drug Administration and Health Canada issued warnings about the potential for rare but life-threatening complications (e.g. subgaleal hemorrhage) possibly associated with vacuum-assisted deliveries.[55, 56]

Nevertheless, used appropriately, these instruments can help to ensure a successful outcome for mothers and their babies.[54] Groups such as the Society of Obstetricians and Gynaecologists of Canada have weighed the evidence about when assisted delivery should—and should not—be used. Their latest guidelines[47] suggest that the indications for vacuum extraction are generally similar to those for forceps deliveries. Other factors that have been suggested as playing a role in instrument choice include tradition and training of physicians,[57] as well as the mother's health profile (e.g. presence of pregnancy-induced hypertension).[52]

In 2000–2001, forceps and/or vacuum extraction was used in 16% of vaginal deliveries, down slightly from 17% in 1991–1992.[21] While the overall rate of assisted deliveries has been relatively stable over the last decade, the methods of choice have changed. Forceps-assisted deliveries are on the decline. They accounted for 11% of vaginal deliveries in the early 1990s, but only 6% in 2000–2001. Vacuum extraction rates have risen over the same period, from 7% to 11% of vaginal births. Similar trends have also been noted in the U.S.,[20] Australia,[58] New Zealand,[59] and England.[35] Experts suggest that this shift may reflect changes in clinical guidelines, particularly for mid-forceps deliveries,[60–63] as well as concern about medico-legal issues.[64, 65]

Understanding Assisted Delivery Rates

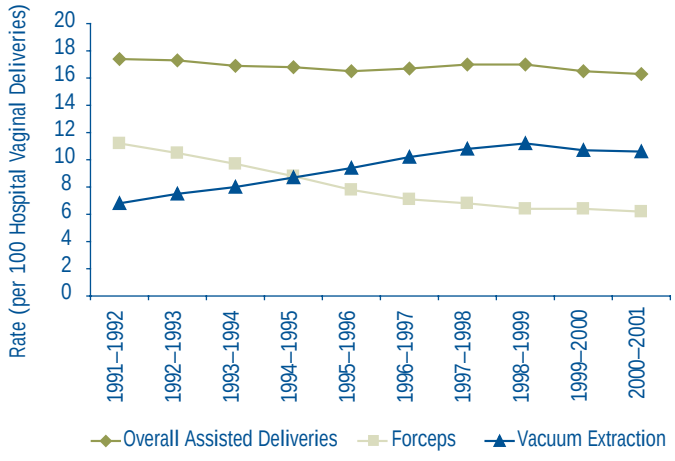
These calculations are adapted from methods developed for the Canadian Perinatal Surveillance System.[21] Further details are provided in the technical notes located at the end of this report (see Appendix B).

- Assisted delivery data are from CIHI's Hospital Morbidity Database for 2000–2001.
- Hospital patients whose vaginal delivery was assisted by means of forceps, vacuum extractor, or both were included. Deliveries in which an abortive or caesarean procedure was provided were excluded.
- Rates and confidence intervals are reported for regions with at least 75,000 people.
- The results are based on where patients live, not where they are treated.
- The overall assisted delivery rate for each health region may not equal the sum of the ratio for use of forceps and vacuum extraction as some patients have both procedures.
- The 95% confidence intervals for assisted delivery (whether overall or individual instrument) tend to be wider (i.e. the rate estimate is less precise) for regions that perform less assisted deliveries in a given year or in health regions that are smaller in population. For example, Waterloo Region–Wellington–Dufferin District Health Council's overall assisted delivery rate is estimated to be accurate within ± 0.93% 19 times out of 20. The rate in Zone 5 (Cape Breton) of Nova Scotia is estimated to be accurate within ± 2.3% 19 times out of 20.

FIGURE 6

National Trends in Assisted Delivery

The graph below shows the rates of use of forceps, vacuum extraction, and overall assisted deliveries (both techniques combined) in Canada between 1991–1992 and 2000–2001. Although the overall rate of assisted delivery was relatively stable during this period, forceps-assisted deliveries decreased by 45%, while vacuum extraction increased by 56%.



Source: Health Canada, *Canadian Perinatal Health Report 2003* (Ottawa: Minister of Public Works and Government Services Canada, 2003).

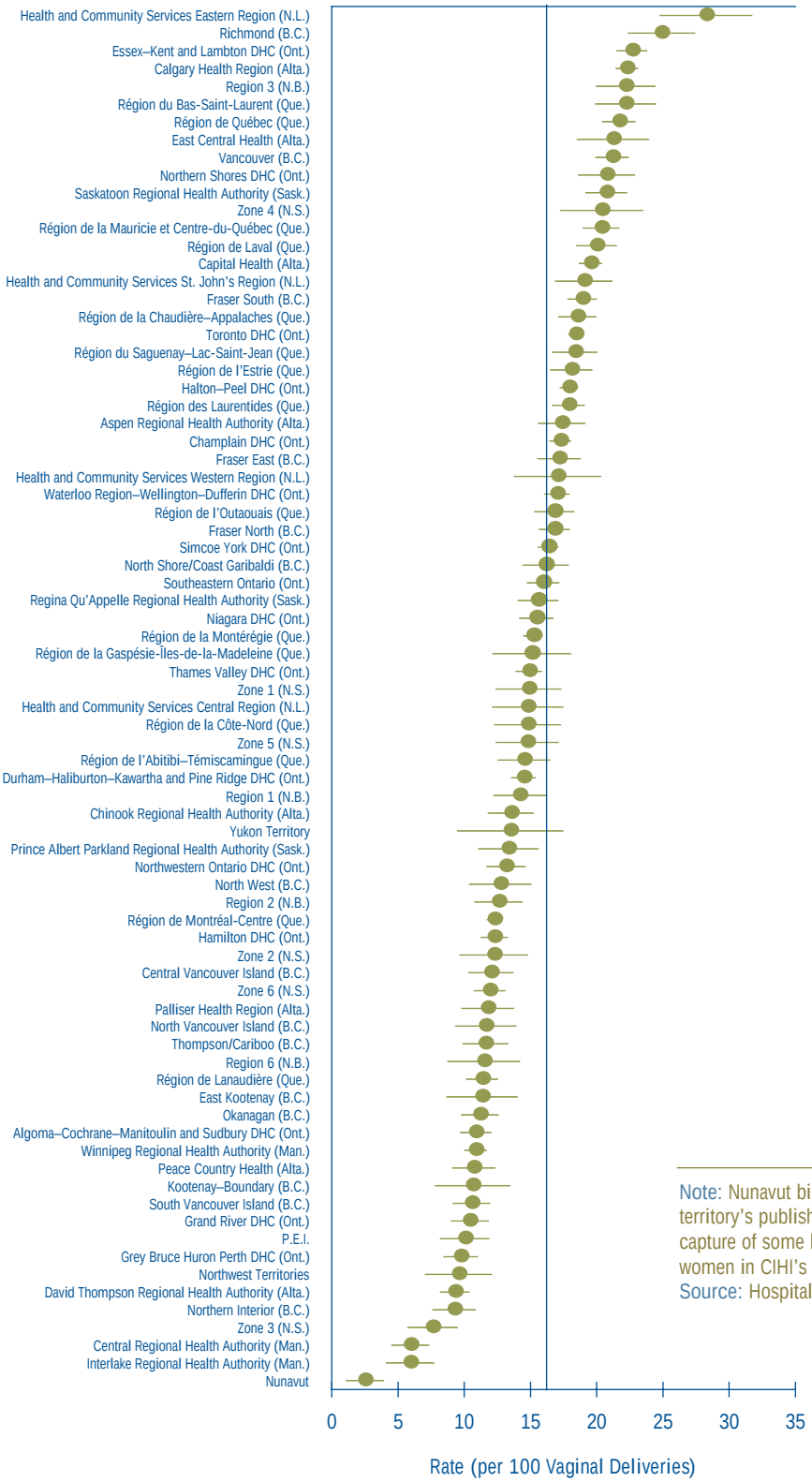
While the national trend is clear, there are substantial variations in practice across the country. Rates for assisted delivery (using either instrument) varied more than eleven-fold—from 2.5% of vaginal deliveries for women from Nunavut to 28.2% for residents of the Eastern Region of Newfoundland and Labrador.

FF

FIGURE 7

Assisted Deliveries in Canada

The figure below shows rates of assisted delivery (forceps and vacuum extraction combined) across Canada's health regions with a population of 75,000 or more in 2000–2001. The rates (shown by the dots) are estimated to be accurate to within the range shown by the horizontal bars 19 times out of 20. The solid line shows the national average (16.2 per 100 vaginal deliveries). Most regions were significantly different than the Canadian average. Regional rates varied more than eleven-fold—from 2.5 per 100 vaginal deliveries in Nunavut to 28.2 in Newfoundland and Labrador's Eastern Region.



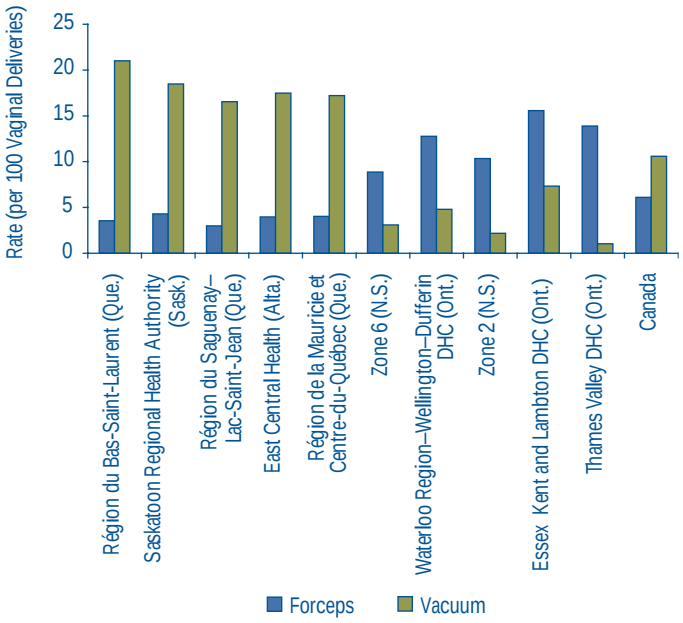
Note: Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

FF Both types of assisted delivery were used across all health regions, but the extent to which each was used varied. Forceps-assisted delivery rates, for example, ranged from 1% to 16%, whereas vacuum-extraction rates ranged from 1% to 21%. When we compared the use of one tool over the other we found that, in general, health regions that had a high use of forceps tended to have a lower use of vacuum extraction, and vice versa.

FIGURE 8

Forceps Use Versus Vacuum Extraction

Even within provinces, there are substantial variations in how often forceps and vacuum extraction are used. The graph below shows 10 large health regions with the greatest differences in rates of use between the two procedures. The national rates of forceps and vacuum extraction are 6% and 11%, respectively.



Source: Hospital Morbidity Database, CIHI

The reasons for variations in assisted deliveries are not entirely clear. We do know, however, that performing assisted deliveries requires highly skilled health professionals,[47] as well as the availability of certain types of equipment and other resources.[66] These and other factors, such as physician preference,[67] changes in the medico-legal environment,[68, 69] and recent research findings,[49, 51, 52] may drive some of the regional variations in use.

Who Does What?

Most physicians who deliver babies have performed both forceps- and vacuum-assisted vaginal deliveries. According to the 2001 National Family Physician Workforce Survey by the College of Family Physicians of Canada (known as the Janus Project), almost 18% of family physicians provided intrapartum care (i.e. delivered babies). Among those who did so:†

- 94% reported that they used vacuum extraction as part of their obstetrical practice;
- 50% reported using forceps (i.e. mid-forceps/rotations or low forceps);
- half (50%) of those whose practice served small-town, rural, or remote/isolated communities said that they used multiple types of assisted delivery, compared with 40% of those who served inner-city, urban, and suburban communities; and
- about two-thirds (67%) of family physicians who used forceps were aged 45 or older.

† Multiple answers were permitted, therefore, percentages do not add to 100 percent.

Similar data are not available for obstetricians, but a 1996 survey of obstetrical residency programs in Canada and the U.S.[70] found that nearly all programs taught assisted deliveries. Three in five programs, however, had assisted delivery rates of 10% or less. In addition, 36% of the programs said that they no longer taught midpelvic-assisted deliveries. The belief that caesarean deliveries were safer alternatives and litigation concerns were the explanations cited most often for this decision. Changes in teaching practices of residency programs have led some to speculate about whether assisted vaginal birthing skills will be a thing of the past for those practicing obstetrical care.[71, 72]

A more recent survey[65] of Canadian obstetrics/gynaecology residents found that almost all who graduated in 2000 intended to use both techniques (97% for vacuum extraction and 93% for forceps). Those surveyed did, however, express concern about using these tools, including:

- not feeling skillfully prepared (48%);
- concern about maternal/neonatal complications (48%);
- worry about the medical-legal implications (44%); and
- concern about maintaining their skills (28%).

To Episiotomy or Not?

Episiotomies, first described around the 1740s, are incisions made to enlarge the vaginal opening in the late stages of labour.[73] They were initially proposed as a means of preventing the painful and sometimes chronic complications associated with vaginal tearing. These problems were thought to include pain, sexual problems, and incontinence.[46, 74] Although it may seem odd to prevent tearing by making a cut, it was thought that a smooth, controlled incision was less painful and easier to repair than an uncontrolled tear.

Did you Know?

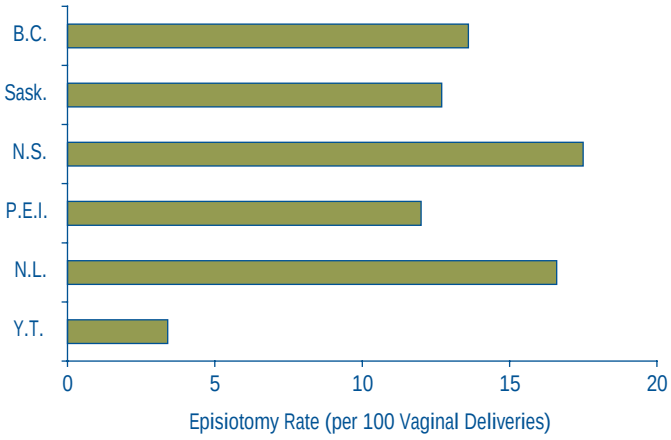
According to CIHI data, about 1 in 20 women who had a vaginal birth between 1999–2000 and 2001–2002 experienced a third- or fourth-degree tear associated with the birth. To avoid tears, many pregnant women are now encouraged to massage their perineum (the skin between the vagina and the anus) in the weeks leading up to birth to enable it to stretch farther during birth.[75] In addition, slow delivery of the head is encouraged.[76]

Until the 1970s, most women having their first delivery had episiotomies.[46, 73] However, the tide has turned over the last 20 years. Studies have shown that episiotomies do not meaningfully protect mothers from severe tears, pain, pelvic muscle injury, or sexual problems—and may actually make some of these problems worse.[74, 77–80]

FIGURE 9

Episiotomy Rates in Selected Jurisdictions

Episiotomy rates varied widely across the country, as the graph below shows.



Note: To maximize comparability, the graph includes only those jurisdictions that reported using the ICD-10-CA/CCI coding standards in 2001–2002.
Source: Discharge Abstract Database, CIHI

Over this period, episiotomy rates in Canada have decreased. According to the *Canadian Perinatal Health Report 2003*, recently published by Health Canada,[21] episiotomies were performed in about half of all vaginal births (49.1%) in 1991–1992. By 2000–2001, the procedure was performed in less than a quarter of all births (23.8%). Rates have also fallen in other countries, such as the U.S.[20, 81]

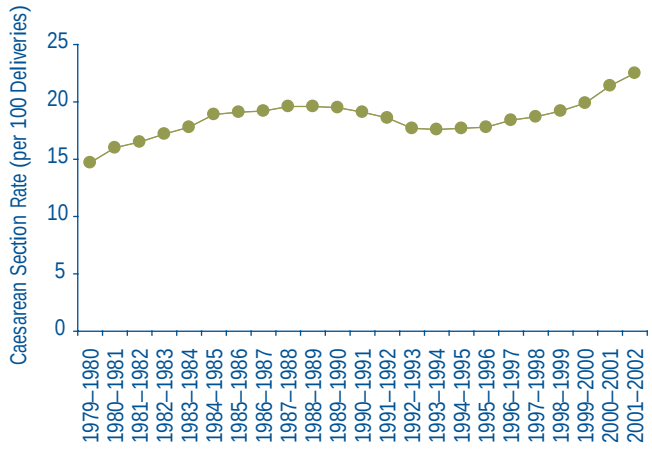
When Nature Needs Even More Help—Caesarean Births in Canada

Today, more than one in five births in Canada are delivered by caesarean section—a rate that has steadily increased since the mid-1990s. More women are having caesarean sections for the first time (primary caesarean section), and fewer women are delivering vaginally following previous caesarean section births.[82]

FIGURE 10

Caesarean Rates in Canada: An All-Time High

The figure below shows how the rate of caesarean sections increased in Canada between 1979–1980 and 2001–2002. It reached an all-time high of 22.5% of in-hospital deliveries in 2001–2002.



Sources: Statistics Canada (1979–1980 to 1993–1994); Hospital Morbidity Database, CIHI (1994–1995 to 2001–2002).

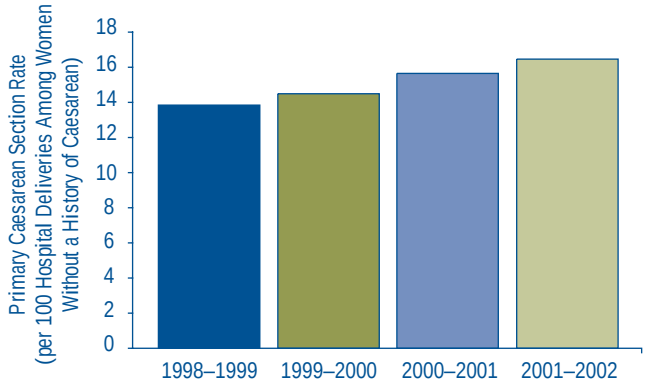
It's My First . . .

Relatively few expectant mothers (10.5% in 2001–2002) have had a caesarean section before. Among those without a history of caesarean sections in Canada in 2001–2002, just over 16% had a caesarean section delivery, up from 14% in 1998–1999. Canada's current primary caesarean section rate is comparable with that of other countries. The U.S., England and Wales, and Northern Ireland, for example, all report rates of 16 to 17%.[82, 83]

FIGURE 11

Primary Caesarean Section Rate on the Rise

In Canada in 2001–2002, just over 16% (16.5%) of babies born to mothers without a history of caesarean section were delivered by primary caesarean section, up almost three percentage points from 1998–1999. Canada's rate is similar to that in England and Wales (16.7%), Northern Ireland (17%), and the U.S. (16.9%).



Source: Hospital Morbidity Database, CIHI

Understanding Primary Caesarean Rates

The primary caesarean section rate was defined as deliveries by caesarean section as a percentage of all deliveries to women who have not had a caesarean delivery previously. Rates and confidence intervals are provided for regions with at least 75,000 people. These rates are unadjusted for factors that may be associated with primary caesareans, such as the mother's age and how many children she has had previously (parity).[61] Further details are provided in the technical notes found at the end of this report.

- These data are from CIHI's Hospital Morbidity Database for the year 2001–2002.
- The results are based on where patients live, not where they were treated.
- Primary caesarean section rates include only women who have not had a caesarean section before. The total number of deliveries (denominator) excludes patients where an abortive procedure was provided.
- The 95% confidence intervals for primary caesarean section rates tend to be wider (i.e. the rate estimate is less precise) for smaller regions. For example, Toronto's rate is estimated to be accurate within ± 0.5%, 19 times out of 20. The rate in Zone 2 (Kentville area) of Nova Scotia is estimated to be accurate within ± 2.7%, 19 times out of 20.

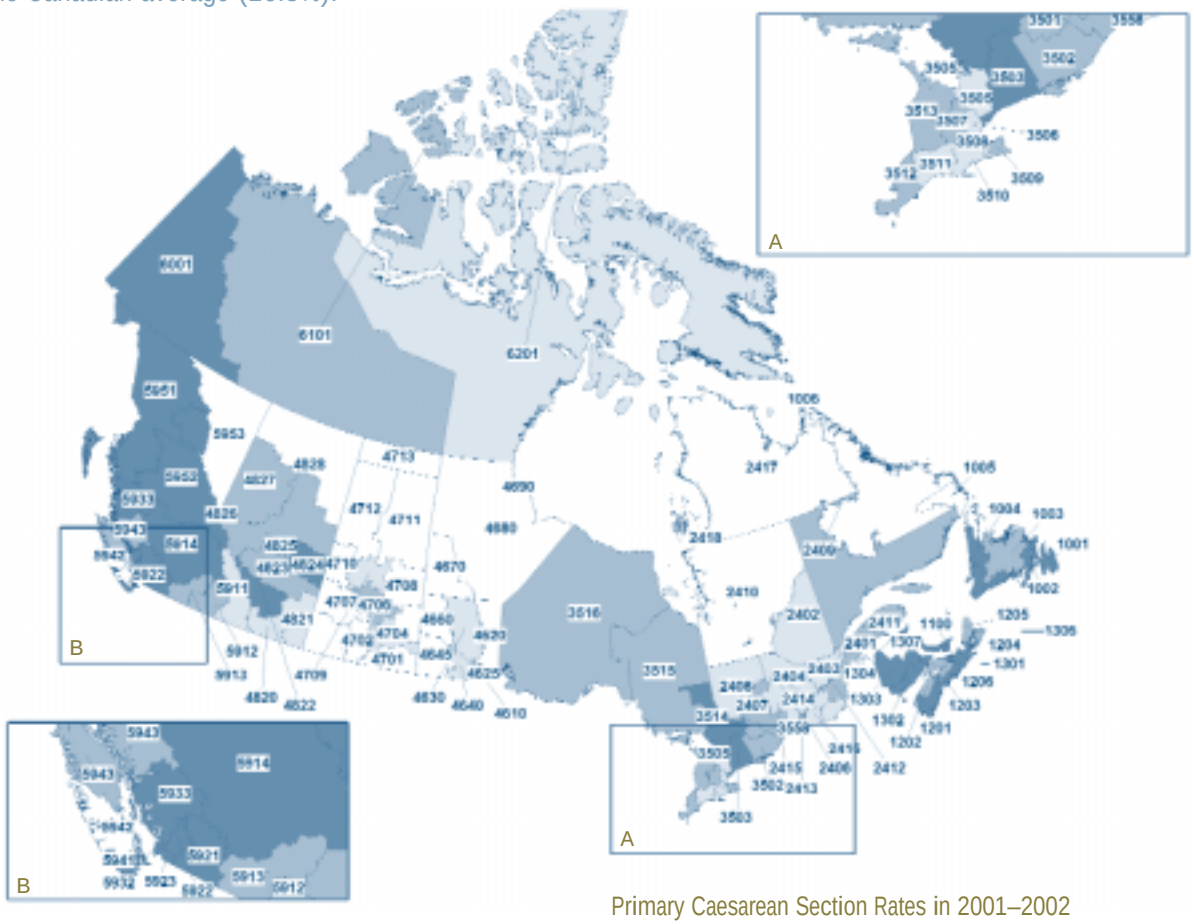
FF Among large health regions in Canada, 2001–2002 primary caesarean section rates varied more than three-fold—from 7.6 in Nunavut to 25.5 in Region 6 (Bathurst area) of New Brunswick. Similarly, among the provinces, rates varied from 12.4 in Manitoba to 21.0 in Prince Edward Island.

Variations in maternal characteristics, obstetrical practices, and other factors at the regional level may contribute to these differences. For example, older maternal age, parity, pre-pregnancy weight, and weight gain during pregnancy have all been shown to be associated with primary caesarean deliveries.[61] Likewise, concerns about perineal damage from vaginal delivery, fetal presentation and number (e.g. breech and multiple births), and how often technologies such as electronic fetal monitoring and labour induction are used (as well as how clinicians respond to them) have been shown to influence the decision to perform a caesarean section.[84–86]

FIGURE 12

First-Time Caesarean Section Rates Vary Across the Country

The map below shows the variation in primary caesarean section rates among Canadian health regions with a population of at least 75,000 or more. Most regions had rates that were significantly different than the Canadian average (16.5%).

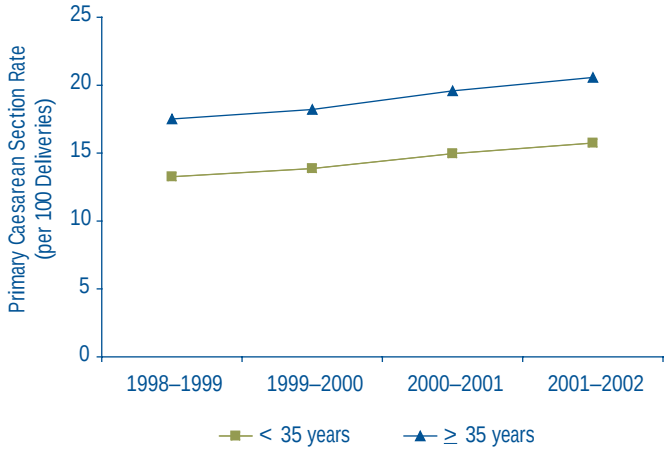


Note: Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

FIGURE 13

Older Mothers More Likely to Have Primary Caesarean Sections

Primary caesarean section rates have been increasing in Canada since at least 1998–1999. Primary caesarean sections have consistently been higher for women aged 35 years and older than for younger women throughout this period.



Source: Hospital Morbidity Database, CIHI

After a Caesarean Section . . .

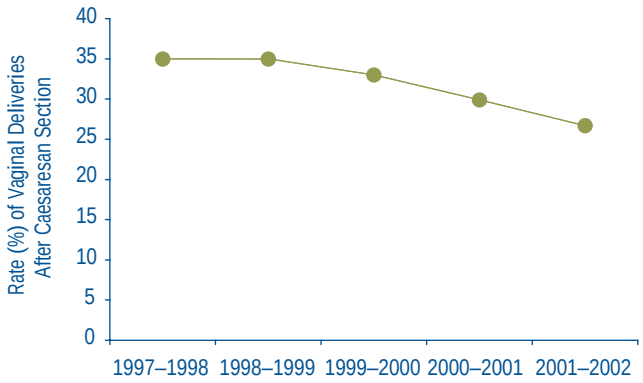
About 10% of women who give birth per year in Canada have had a previous caesarean section. These women face the choice between a repeat caesarean section and a vaginal birth, known as a VBAC (vaginal birth after caesarean). Here too, there is a debate about which type of birth is best in particular situations.[87] The Society of Obstetricians and Gynaecologists of Canada note that most women, even a large proportion of those who have previously had caesarean sections, can safely deliver vaginally. In fact, they suggest that successful vaginal births after caesarean sections typically carry lower health risks for mothers and require shorter hospital stays than having an optional surgical delivery.[87]

FF In 2001–2002, 27% of women with a history of caesarean section delivered a baby vaginally, down from 35% in 1997–1998. Rates varied significantly across the country. Health regions with higher VBAC rates tend to have lower overall caesarean section rates.

FIGURE 14

Vaginal Births After Caesarean Section

Having a vaginal birth after a previous caesarean section (known as a "VBAC") is less common than it used to be. Between 1997–1998 and 2001–2002, the VBAC rate fell from 35% to 27%.



Source: Hospital Morbidity Database, CIHI

Why a Caesarean Section?

Rising caesarean section rates have helped to rekindle the debate over when and under what circumstances caesarean section births should be performed. International studies suggest that common reasons for caesarean section births include:[46, 88]

- Prior caesareans;
- Labour dystocia (slow or abnormal labour);
- Fetal compromise;
- Breech presentation of the baby; and
- Labour induction.

On the one hand, it is clear that caesarean sections are essential, life-saving operations in some situations. For example, when a woman's placenta or the baby is malpositioned (e.g. footling breech), clinicians may determine that a caesarean section birth is necessary.[46] Some studies have also suggested potential long-term benefits for scheduled caesarean section. Examples include protection of the pelvic floor, a reduced risk of urinary incontinence and pelvic-organ prolapse, and reduction in adverse neonatal outcomes, such as stillbirth.[89]

But, like other surgical procedures, caesarean sections are not risk free. As a result, surgery is not always in the best interests of the mother or her baby. Researchers have found that women undergoing caesarean sections are more likely to hemorrhage, to take longer to recover from childbirth, and to experience severe pain and infection

than women who deliver vaginally.[88, 90, 91] In the long term, studies have shown that women who have had a caesarean delivery are at increased risk for certain reproductive problems (e.g. ectopic pregnancies), serious problems pertaining to the placenta (e.g. placenta accreta, placenta previa), or uterine rupture.[89]

Babies born by caesarean section may also be at increased risk. For example, respiratory problems following birth[88, 89] and difficulties initiating breastfeeding[92, 93] have been highlighted as concerns for infants born by caesarean section.

Birthing a Breech Baby

How best to deliver the 3 to 4% of babies who are in a breech position (bottom first) at term has been debated for many years.[94] Although some suggest that avoiding the problem by turning the baby before birth (external cephalic version, or ECV) is preferable, it remains unclear when this maneuver should be performed and how effective it is.[95–97]

In 1997, 121 hospitals in 26 countries participated in a landmark study conducted by researchers at the University of Toronto. The study, the Term Breech Trial, included women with a single baby at term in breech position.[94] Intended to last five years, the study was stopped two years early after researchers discovered that the babies of women who had a planned caesarean section were significantly less likely to die or experience poor outcomes.[94] Likewise, when researchers combined the results of this study with two others in a meta-analysis, they found that the risk of perinatal or neonatal death was reduced for planned caesarean sections (relative risk 0.29), but maternal morbidity was higher (relative risk 1.3).[98]

In direct response to the Term Breech Trial, the Society of Obstetricians and Gynaecologists of Canada recommended that all term breech singletons be delivered by planned caesarean section.[17] These findings have left many practitioners concerned that competency in vaginal breech birth may become a skill of the past.[99]

What's the Right Number?

Not without controversy, the World Health Organization (WHO) has recommended that caesarean sections, including both primary and repeat surgery, should occur in no more than 5 to 15% of all births.[29] Some experts suggest that rates that are less than 5% may indicate inadequate availability and/or access to emergency obstetric care, whereas rates above 15% may suggest overuse of the procedure for non-emergency reasons.[100]

Internationally, however, many countries exceed this rate.[101] For example, Brazil, Hong Kong, and Chile all have caesarean section rates of more than 25%.[101] Other countries have rates just under or just over the WHO target (for example 13.5% in the Netherlands and 17.6% in Denmark).[102] Within Canada, there is a similar range. Some regions have rates below 15%, but others have rates that are more than double this level.

In addition to clinical and demographic factors, birthing practices may be linked to the prevailing philosophy of maternity care. For example, research suggests that people living in countries with low caesarean section rates may be more likely to consider birth as a normal physiological process and maintain low intervention rates in general.[103] Other cultural factors that have been found to contribute to differences in caesarean section rates include:

- How health care is delivered (e.g. caesarean section rates are often higher in private hospitals than in public hospitals);[104]
- Concern for malpractice litigation;[60]
- Socioeconomic and demographic factors;[105]
- Social prestige;[106]
- Fear of pain during vaginal delivery;[107] and
- A belief in astrological fortunes and favourable dates.[108, 109]

Caesareans on Demand—A Growing Trend?

Commentators worldwide have speculated that one of the reasons for rising caesarean section rates is the so-called "too posh to push" phenomenon where women, particularly wealthier women, request surgery even though they do not have recognized medical indications.[110] A few high-profile cases and statistics showing higher caesarean section rates in private hospitals in Australia, Brazil, and other countries have fueled the debate.[104, 111] Researchers in the UK, however, have recently rejected this argument. They found that women in the lowest income group were less likely to have elective caesarean sections, but there was no significant difference between women in the four other income quintiles.[112]

Given the potential risks associated with caesarean sections for non-medical indications, requests may raise clinical and ethical dilemmas for health care professionals. In March 2004, the Society for Obstetricians and Gynaecologists of Canada (SOGC) issued a statement against providing caesarean sections on demand.[113] They argue that a decision to perform surgery should be based on medical indications.

When Baby Arrives

To adapt to life outside their mother's womb, most babies require little more than a clear airway and adequate warmth immediately after birth.[114] To make sure, newborns typically undergo a series of screening tests and assessments.

These procedures help to determine how quickly babies will go home from hospital and whether they need additional care. Twenty years ago, the average length of stay was about five days.[120] Since then, there has been a trend towards shorter hospital stays for maternal/newborn care.[21] Many possible reasons have been cited to explain this trend, including requests from mothers to be discharged early and economic factors.[121–123]

Baby's First Check-Up

Within the first few minutes to days of life, a number of screening tests and assessments are conducted. For example, at one and five minutes after birth, care providers typically assess a newborn's condition using the Apgar test.[46] Developed in 1952, the test assesses a baby's heart rate, respiratory effort, muscle tone, reflex irritability (response to stimuli), and skin colour.[115]

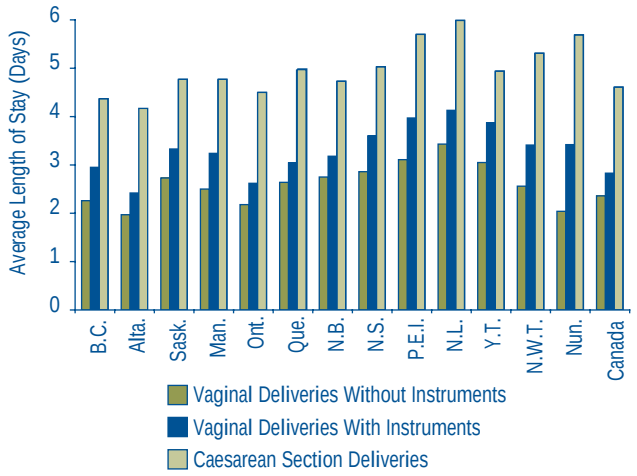
Shortly after birth, newborns are weighed and measured.[116] Typically, they also receive a vitamin K injection to protect against bleeding disorders and an antibiotic ointment to protect against eye infection and blindness.[114]

Between days two and six, the newborn's heel is pricked to obtain a small amount of blood, which is used to screen for two congenital conditions.[117, 118] Phenylketonuria (PKU), an enzyme deficiency, affects approximately one in 12,000 live births.[118, 119] Congenital hypothyroidism, a hormone deficiency affecting normal development, is found in approximately one in 3,500 live births.[117]

FIGURE 15

Maternal Length of Stay by Type of Delivery

Mothers tend to stay longer in the hospital after a caesarean section than a vaginal delivery. In Canada in 2000–2001, the average length of stay after a vaginal delivery with or without the use of instruments (e.g. forceps or vacuum extractor) was 2.8 and 2.4 days respectively, compared to 4.6 days after a caesarean section. Alberta had the lowest average length of stay for all three types of deliveries, while Newfoundland and Labrador had the highest.

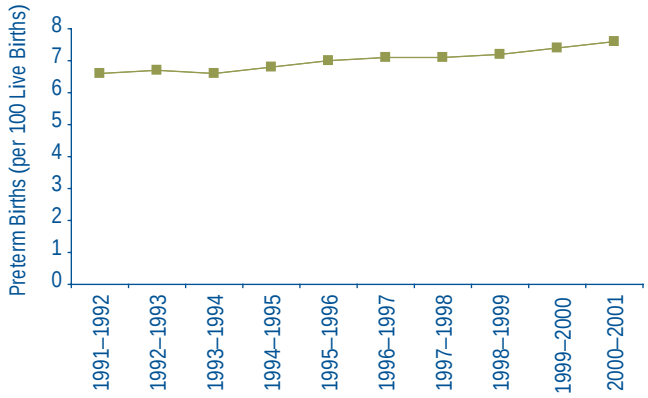


Note: Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

FIGURE 16

Early Babies More Common

Over a 10-year period, the preterm birth rate in Canada increased from 6.6 per hundred live births in 1991–1992 to 7.6 in 2000–2001. Among the provinces and territories, preterm birth rates ranged from 5.8% in Prince Edward Island to 10.4% in Nunavut in 2000–2001. The graph below shows rates of preterm birth (births before 37 weeks' gestation) in Canada.



Notes: 1) Data from Ontario are excluded because of data quality concerns.
2) Live births with unknown gestational age are also excluded.
Source: Health Canada, *Canadian Perinatal Health Report 2003* (Ottawa: Minister of Public Works and Government Services Canada, 2003).

Too Early, Too Small

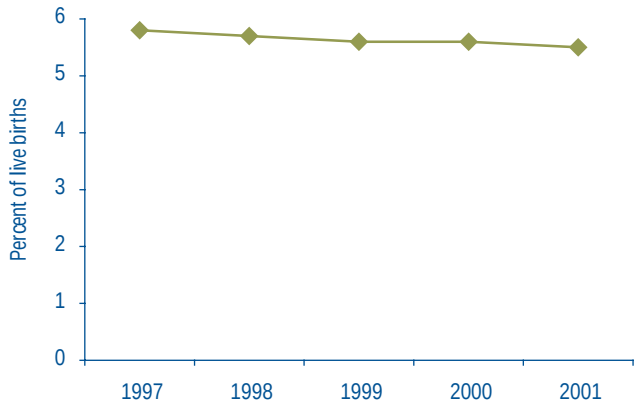
While most newborns are healthy, premature babies are at higher risk of immediate and longer-term health problems because growth and development in the last weeks of pregnancy is critical to an infant's health. Researchers estimate that preterm birth (before 37 completed weeks) contributes to 60 to 80% of deaths among infants without congenital anomalies in industrialized countries.[124] Short-term complications associated with preterm delivery may include respiratory distress syndrome or intraventricular hemorrhage.[124] Premature delivery has also been associated with cerebral palsy and other lifelong health complications.[124, 125]

The rate of premature birth is on the rise, both in Canada and elsewhere. Health Canada estimates that 7.6% of babies were born prematurely in 2000, up from 6.6% in 1991.[21] International comparisons show similar increases. For example, the preterm birth rate in the U.S. was 12.1% in 2002, compared to 10.6% in 1990.[82] Some experts suggest that most of the increase in preterm birth has been due to a greater number of interventions such as pre-term induction and caesarean deliveries at 34 to 36 weeks' gestation.[126]

FIGURE 17

Trends in Low Birth Weight

The figure below shows the Canadian trend in low-birth-weight babies.



Note: Live births with a birth weight less than 2,500 g, expressed as a percentage of all live births with known birth weight.
Source: Canadian Vital Statistics Birth Database, Statistics Canada

Weighing In

Premature babies are often smaller than average. Most babies born in Canada (92% in 2001) weigh between 2,500 and 4,499 g at birth, or five-and-a-half to almost ten pounds. Low birth weight (less than 2,500 g) may result from preterm birth or restricted intrauterine growth and may be associated with perinatal illness, neonatal death, and long-term complications.[127] About 6% of babies were in this category in 2001.

Common reasons for these interventions include maternal and fetal conditions such as hypertension and fetal compromise.

Preventing preterm births remains challenging.[128] A variety of factors, too broad to describe in detail in this report, have been linked to preterm birth. Examples include:

- Previous preterm delivery;[129–131]
- Multiple pregnancy[21, 126] (twins, triplets, and higher order multiple births are often delivered early, but singleton births continue to account for over 80% of preterm births.[21]);
- Maternal demographic characteristics, including age;[82, 130, 132] socioeconomic status;[130] and behavioural risk factors, such as cigarette smoking[128, 133] and alcohol consumption;[134] and
- Reproductive tract infections, such as bacterial vaginosis and sexually transmitted diseases.[132]

Did You Know?

Trends in low birth weight and preterm birth may be affected by changes in birth registration. In particular, it has been suggested that births of infants near the borderline of viability (for example, those below 22 weeks' gestational age and/or near or below 500 g) are more likely to be recorded now than in the past.[128, 135]

Some experts suggest that new technologies, such as early ultrasound dating of gestational age, screening tests for high-risk medical conditions, preterm induction, and preterm caesarean delivery without labour, may also encourage or enable earlier delivery of babies.[126, 134] Yet intervening when a baby is preterm remains a difficult choice, involving balancing early risks (e.g. fetal morbidity or mortality) and benefits with future consequences, such as the potential for longer-term morbidity and mortality.[126]

When Newborns Need Intensive Care

Newborns who need more monitoring or care than regular maternity wards can provide may be admitted to neonatal intensive care units (NICUs). Neonatologists, nurses, and other highly trained specialists who form the neonatal health care team provide care for these fragile babies.[136]

The likelihood of admission to a NICU has risen slightly over the past decade in Canada. In 2001–2002, CIHI data show that 14.4% of newborns spent time in a NICU, up from 12.6% in 1994–1995. The number of admissions per year rose by about 1,500 over this period.

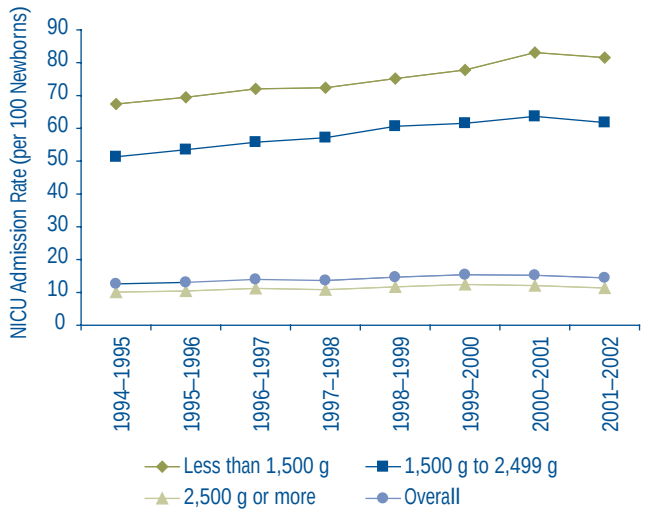
Admission rates were highest for low-birth-weight babies. Almost two-thirds (62%) of babies weighing 1,500 to 2,499 g at birth were admitted to a NICU in 2001–2002. Rates were even higher for the smallest babies: 82% of those weighing less than 1,500 g spent time in a NICU. These findings parallel those from a study of 17 tertiary-level NICUs in Canada, which found that most babies (53%) weighed less than 2,500 g upon admission and that nearly two-thirds (65%) were admitted at less than 38 weeks' gestation.[137] Twenty percent of term infants treated in the NICU (infants born at 37 or more weeks' gestation) were admitted for congenital anomalies.

Low-birth-weight babies also spent more days in the NICU. In 2001–2002 the median length of stay in a NICU was two days. However, very-low-birth-weight and low-birth-weight (1,500 g to 2,500 g) babies spent a median of 23 days and 7 days respectively in this type of unit.

FIGURE 18

How Often Are Babies Admitted to the NICU?

Newborns are now more likely to be admitted to neonatal intensive care units (NICUs) than in the past. The admission rate increased slightly from 12.6% of newborns in 1994–1995 to 14.4% in 2001–2002. Newborns admitted to this type of care tended to have lower birth weights than other babies.



Note: Manitoba, Quebec, and the territories were excluded from the analysis because comparable data were not available.
Source: Discharge Abstract Database, CIHI

Improved Survival Chances

Advances in knowledge and technology mean that premature babies who would have died during or soon after birth just a few decades ago may now survive, although some may have long-term health problems.[138]

At 5.2 per 1,000 live births in 2001, Canada has achieved one of the lowest infant mortality rates in the world.[139] Today, nearly all (99%) newborns admitted to a Canadian NICU survive until discharge, including even the smallest babies. In 2001–2002, 89% of very-low-birth-weight babies survived until discharge.

A recent study suggests, however, that the survival of babies in NICUs varies between hospitals. In a study of 19,265 newborns admitted to 17 tertiary-level NICUs in Canada, researchers found that the mean risk-adjusted mortality rate was 4%, but there were three-fold differences between institutions. The most common conditions associated with death were preterm births, outborn status (infants not born at the admitting hospital), and congenital anomalies.[140]

Hospital Stays After Birth

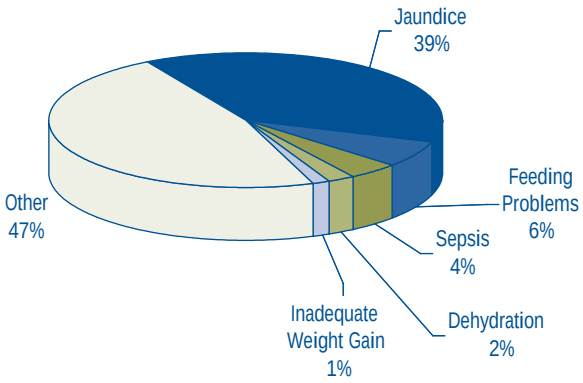
Jaundice, feeding problems, sepsis, and dehydration were just a few of the health problems that caused almost four in 100 babies to be admitted to hospital within 28 days of their birth in 2000–2001. Emergency department visits are even more common. About one in 10 Ontario newborns visited an ED within 28 days of birth in 2002–2003. The most common reasons for ED visits were jaundice and feeding problems.

As with other types of care, there are significant regional variations in post-natal hospital admission rates across the country. For example, the rate was just over 1% of live births in the Région de Québec but over 8% in East Kootenay, British Columbia.

FIGURE 19

Why Are Babies Admitted to Hospital?

Most babies go home shortly after birth, but some need further care. The chart below shows why babies were admitted to hospital within 28 days of birth in Canada in 2000–2001. The leading reason was jaundice (39%).



Notes: 1) Postnatal hospital admissions include any newborn admitted to an acute care hospital within 28 days after birth. Newborns who were transferred to another institution; newborns with an initial length of hospital stay greater than 20 days; newborns with a birth weight of less than 1,000 g; or newborns who were discharged on the same day of birth or were admitted for day surgery were excluded. 2) Manitoba and Quebec were excluded from the analysis because comparable data were not available. 3) "Other" reasons include a variety of conditions such as convulsions, respiratory conditions, fever, esophagitis, etc. 4) Percentages may not add to 100% due to rounding.
Source: Discharge Abstract Database, CIHI

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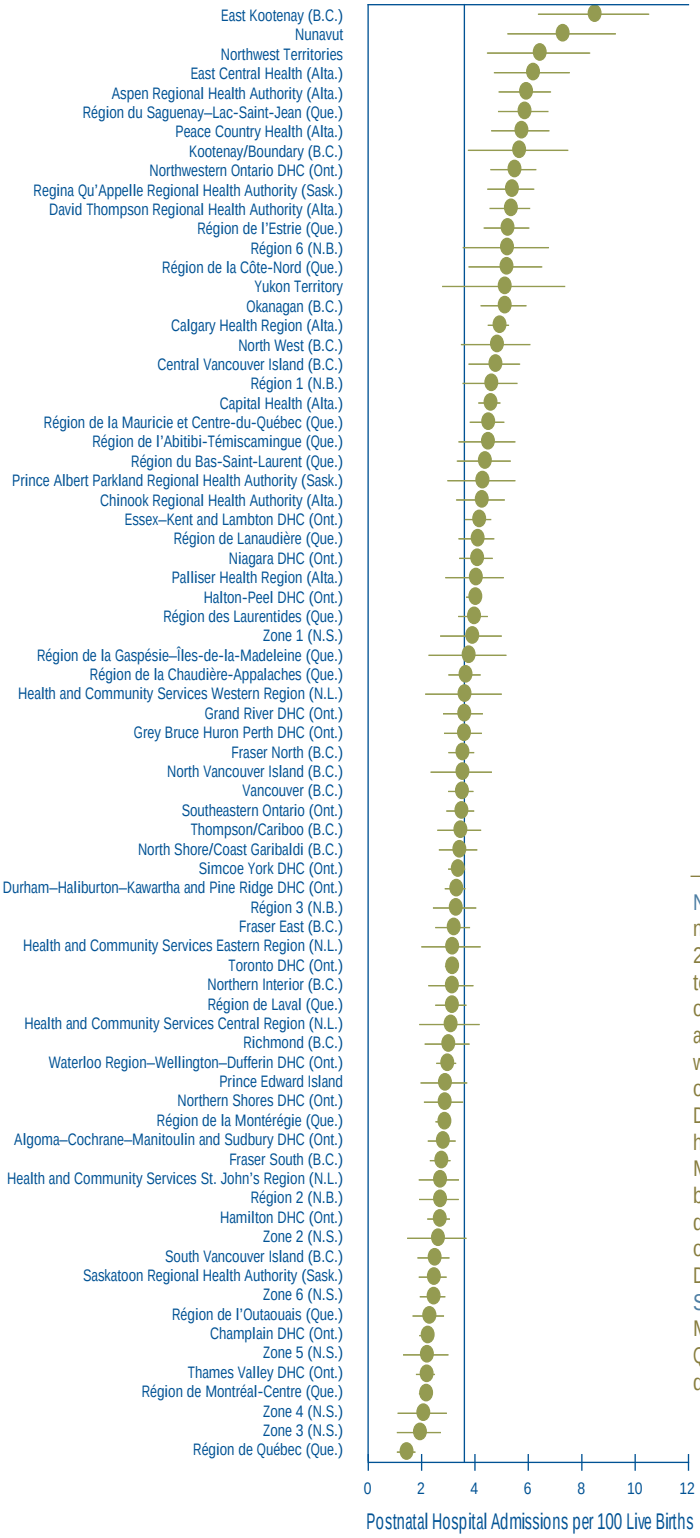
FIGURE 20

Hospital Admissions After Birth

For every 100 live births in Canada, almost four babies were admitted to hospital within 28 days of birth in 2000–2001 (as shown by the solid line). The graph below compares postnatal admission rates among health regions with a population of at least 75,000. Results (shown by the dots) are estimated to be accurate to within the range shown by the horizontal bars, 19 times out of 20.



Notes: Postnatal hospital admissions include any newborn admitted to an acute care hospital within 28 days after birth. Newborns who were transferred to another institution; newborns with an initial length of hospital stay greater than 20 days; newborns with a birth weight of less than 1,000 g; or newborns who were discharged on the same day of birth or were admitted for day surgery were excluded. Data include only jurisdictions that submit comprehensively to the database; therefore, data from Manitoba was excluded from the analysis. Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.

Source: Discharge Abstract Database, CIHI; Ministère de la Santé et des Services sociaux Québec, Banque de données sur les hospitalisations du système Med-Écho.

Calculating Postnatal Hospital Admissions

Calculations for postnatal hospital admission rates are adapted from methods developed by the Canadian Perinatal Surveillance System.[21] Rates and confidence intervals are provided for health regions with at least 75,000 people. Further details are provided in the technical notes found at the end of this report.

- Indicator results are based on data from CIHI's Discharge Abstract Database for 2000–2001.
- The results are based on where patients live, not where they are treated.
- Postnatal hospital admissions include any admission to an acute care hospital within 28 days after birth. Newborns transferred to another institution after birth; having a length of hospital stay greater than 20 days; having a birth weight of less than 1,000 g or a missing weight value; discharged on the day of birth; and having day surgery admissions were excluded.
- The 95% confidence intervals for postnatal hospital admissions tend to be wider (the rate estimate is less precise) for smaller regions. For example, the rate for Calgary Health Region in Alberta is estimated to be accurate within ± 0.38%, 19 times out of 20. The rate in St. John's Newfoundland and Labrador is estimated to be accurate within ± 0.75%, 19 times out of 20.

Possible explanations for these differences in admission rates include:

- **How long mothers and babies typically stay in hospital:** Implications of today's shorter lengths of stay after childbirth have received considerable attention.[123, 141–147] While there is some evidence to suggest that length of stay and neonatal hospital admissions are related,[145–148] other studies,[149, 150] including a systematic review,[151] suggest there is insufficient evidence to link early postpartum discharge and outcomes such as re-hospitalizations.
- **Quality of care before and after discharge:** Babies who have health problems that are not detected during their original hospital stay or that are related to care they did (or did not) receive may be more likely to need further care.[152]
- **Patterns of practice and services available after discharge:** Integration between hospital and community health services once new mothers leave hospital has also been a topic of study.[142, 143] Some communities have designed follow-up protocols and programs that respond to health needs, such as challenges in breastfeeding, in the community rather than in hospital. For example, almost 90% of new mothers who had delivered a baby vaginally without complications in Montréal in 1999 reported receiving a telephone call from a community health centre worker within two weeks of discharge from hospital, although only 9% were contacted within 24 hours following discharge.[143] Most felt that the information they received during the call or home visit was consistent with what they were told in hospital prior to discharge, but 16% disagreed.
- **Other factors:** According to The Ontario Mother and Infant Survey (TOMIS),[153] how mothers rate their infant's health, how much help they anticipate at home following discharge, their concerns about infant care behaviour, and whether newborns are seen by health professionals for a physical check-up after their initial discharge from hospital may also be associated with postnatal hospital admission.
- **Underlying health status:** Differences in the health status of babies at birth may also explain why they return to hospital.[21, 154]

To the extent that these and other factors differ across the country, they may contribute to variations in regional rates of postnatal hospital admission.

Looking Back, Looking Ahead

Childbirth is a central event in cultures around the world. Historically, it was surrounded by a rich and diverse collection of superstitions, customs, and traditions. Some of those traditions reflect practical efforts to aid delivery of the baby and alleviate the mother's pain and discomfort. Comparatively recent developments in medicine, technology, and public health have laid the foundation for the major evolution in birthing practices that we have witnessed in the past century.

FIGURE 21

Regional Variations

There are wide variations in obstetrical care across the country. The chart below shows Canadian rates for eight indicators of care, as well as the range in rates between the regions with a population of 75,000 people or more that have the lowest and highest rates. For details on each of these indicators, see the relevant section in the report.

	Canada (%)	Lowest (%)	Highest (%)
Epidurals*§‡ (2001–2002)	45.4	3.9	74.6
Assisted Delivery* (2000–2001)	16.2	2.5	28.2
Forceps* (2000–2001)	6.1	0.9	15.6
Vacuum Extraction* (2000–2001)	10.6	1.0	21.0
Caesarean Section† (2001–2002)	22.5	9.2	31.5
Primary† (2001–2002)	16.5	7.6	25.5
Repeat† (2001–2002)	73.2	39.3	93.0
Postnatal Hospital Admissions¥‡ (2000–2001)	3.5	1.4	8.4

Notes:
* Among vaginal deliveries only
§ Excludes Chinook, Palliser, and Calgary regions
‡ Excludes Manitoba
† Excludes Central Vancouver Island
¥ Among live-born infants greater than 1,000 g admitted within 28 days of birth
Source: Compiled by CIHI.

This report documents the current state of maternal and infant health care across Canada. The vast majority of today's babies (99%) are born in hospitals. About a fifth are delivered via caesarean section, a higher level than ever before. Yet this overall rate masks significant variations from region to region across the country. Likewise, there are important differences in how often pain management, episiotomies, forceps, vacuum extraction, and other interventions are used in childbirth. In addition, relationships appear to exist between rates of use for certain procedures and delivery methods. For example, where forceps use is low, vacuum extraction tends to be high, and vice versa. Similarly, one reason for higher rates of caesarean births may be fewer vaginal births after caesarean sections.

Watch for More

So far, the "Giving Birth in Canada" series of reports has looked at the providers of maternal and infant care (first report in the series) and at how maternal and infant care varies across the country (this report). The next step is considering how much it costs to provide health care for mothers and their babies. Check our Web site (www.cihi.ca) for news of this report.

These variations are likely due to a complex set of factors, not all of which are well understood. Examples include patient demographics (e.g. age at time of giving birth), maternal and infant health and other characteristics, clinician preferences and training, and the availability of specialized resources. We hope that by providing data on maternal and infant care for health regions across the country, we will spark interest in understanding local rate variations and the extent to which these and many other factors may drive regional variations in the use of interventions.

What We Know

- The rate of perinatal and neonatal mortality in Canada.
- The extent to which labour induction, epidurals, assisted vaginal deliveries, and caesarean sections are performed in Canada at the provincial/territorial and/or regional level.
- The rate at which women have first caesarean section births.
- The trend in preterm birth rates over the past decade.
- The national rate of admissions and mortality among neonatal intensive care units (NICUs).
- Regional rates of postnatal hospital admissions within the first 28 days of life and the major causes of admissions.

What We Don't Know

- To what extent are assisted reproductive technologies (ART) used across Canada? How many live births in Canada were the result of ART? What proportion of those births were multiple births?
- What are the principal causes of variation in birthing practices (e.g. use of forceps/vacuum extraction, epidurals, induction, and caesarean section) across regions? What contribution do factors such as physician preferences and training, patient preferences, and best-practice guidelines make to these rates?
- How many caesarean sections are planned and how many are done on an emergency basis? What is the impact of patient demand on caesarean section rates?
- What is the "right" rate at which these birthing practices should be performed? When does a lower rate suggest better care or poorer access to services? When does a higher rate suggest overuse or better access to care?
- Have shorter lengths of stay for mothers following birth caused an increase in the rates at which infants experience adverse events (e.g. dehydration and jaundice) after birth? (Or are these events now quantifiable but not increasing?)

What's Happening

- ICD-10-CA/CCI coding standards, soon to be adopted across Canada, will provide more detailed information about where, why, and how labour induction is performed across Canada.
- The Ontario Hospital Association has been validating The Maternity Patient Experience Survey, which is designed to capture the mother's experiences before, during, and after delivery. The information derived from the survey will provide a more in-depth picture of maternity care in both free-standing and general hospitals across Canada. The preliminary report of the maternity pilot will be available by mid-September 2004.
- Currently, the Maternal Infant and Reproductive Health Research Unit at the University of Toronto is coordinating a multicentre randomized controlled trial comparing early external cephalic version (ECV) (34 to 36 weeks' gestation) with delayed ECV (≥ 37 weeks' gestation) to see whether beginning ECV at earlier gestational age will decrease the rate of caesarean section births without any increase in the rate of preterm birth or serious fetal complications.
- The Society of Obstetricians and Gynaecologists of Canada met in June 2004 to develop a position paper concerning on-demand caesarean sections.
- In July 2004, the Society of Obstetricians and Gynaecologists of Canada released updated guidelines on vaginal birth after caesarean section.
- In a study currently underway, Canadian Neonatal Network researchers are examining how differences in clinical practices among Canadian NICUs affect outcomes of sick newborn infants, as well as how the resources needed to provide this care may affect quality of care.

Appendix A

FF Fast Facts—List of Data Tables and Figures

Epidural Rate for All Deliveries and Vaginal Deliveries by Health Region, Canada, 2001–2002

Map Code	Region	Epidural Use (2001–2002) Rate/100 Deliveries	95% CI	Epidural Use (2001–2002) Rate/100 Vaginal Deliveries	95% CI
N.L.		**35.6**	**(34.2–37.0)**	**34.4**	**(32.8–36.1)**
1001	Health and Community Services St. John's Region	50.5	(48.1–52.8)	50.5	(47.8–53.2)
1002	Health and Community Services Eastern Region	30.5	(27.2–33.7)	30.5	(26.6–34.4)
1003	Health and Community Services Central Region	8.3	(6.3–10.3)	8.0	(5.8–10.3)
1004	Health and Community Services Western Region	44.6	(40.9–48.4)	39.4	(35.1–43.8)
P.E.I.	**Prince Edward Island**	**19.7**	**(17.5–21.8)**	**17.2**	**(14.8–19.6)**
N.S.		**43.4**	**(42.4–44.5)**	**44.1**	**(42.9–45.3)**
1201	Zone 1	22.1	(19.6–24.7)	18.7	(16.0–21.5)
1202	Zone 2	17.0	(14.2–19.7)	3.9	(2.3–5.5)
1203	Zone 3	23.4	(20.8–26.1)	22.3	(19.4–25.3)
1204	Zone 4	23.9	(21.0–26.8)	26.0	(22.5–29.4)
1205	Zone 5	30.5	(27.8–33.2)	31.8	(28.6–34.9)
1206	Zone 6	66.6	(65.1–68.0)	71.3	(69.7–73.0)
N.B.		**34.3**	**(33.2–35.4)**	**34.6**	**(33.3–35.9)**
1301	Region 1	19.5	(17.6–21.4)	14.7	(12.8–16.6)
1302	Region 2	68.5	(66.3–70.7)	74.6	(72.3–77.0)
1303	Region 3	23.4	(21.4–25.4)	22.6	(20.3–24.9)
1306	Region 6	28.6	(25.1–32.0)	29.3	(25.1–33.4)
Que.		**56.7**	**(56.3–57.0)**	**60.2**	**(59.8–60.6)**
2401	Région du Bas-Saint-Laurent	22.1	(20.0–24.1)	18.6	(16.4–20.7)
2402	Région du Saguenay—Lac-Saint-Jean	54.5	(52.6–56.4)	57.3	(55.2–59.4)
2403	Région de Québec	67.0	(65.7–68.2)	74.4	(73.1–75.7)
2404	Région de la Mauricie et Centre-du-Québec	45.7	(44.1–47.2)	50.3	(48.6–52.0)
2405	Région de l'Estrie	63.4	(61.6–65.2)	69.1	(67.2–71.0)
2406	Région de Montréal-Centre	63.7	(63.1–64.4)	67.7	(67.0–68.5)
2407	Région de l'Outaouais	55.9	(54.2–57.7)	60.7	(58.7–62.6)
2408	Région de l'Abitibi-Témiscamingue	39.8	(37.4–42.3)	38.0	(35.3–40.6)
2409	Région de la Côte-Nord	23.8	(21.2–26.5)	21.8	(18.9–24.7)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	34.4	(30.8–38.0)	36.1	(32.0–40.2)
2412	Région de la Chaudière-Appalaches	66.2	(64.7–67.7)	72.5	(70.9–74.2)
2413	Région de Laval	60.0	(58.3–61.6)	65.0	(63.2–66.7)
2414	Région de Lanaudière	63.1	(61.5–64.7)	67.7	(66.0–69.4)
2415	Région des Laurentides	46.2	(44.8–47.6)	47.9	(46.4–49.4)
2416	Région de la Montérégie	54.6	(53.7–55.4)	57.1	(56.1–58.1)
Ont.		**44.6**	**(44.3–44.9)**	**47.0**	**(46.7–47.3)**
3501	Champlain DHC	56.1	(55.2–57.0)	60.7	(59.7–61.7)
3502	Southeastern Ontario DHC	38.0	(36.6–39.4)	41.2	(39.6–42.9)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	33.2	(32.2–34.2)	36.5	(35.3–37.7)
3504	Toronto DHC	45.8	(45.2–46.3)	47.8	(47.2–48.5)
3505	Simcoe York DHC	48.9	(48.0–49.8)	52.7	(51.7–53.7)
3506	Halton-Peel DHC	50.6	(49.9–51.4)	52.7	(51.8–53.5)
3507	Waterloo Region-Wellington-Dufferin DHC	42.8	(41.7–43.9)	44.0	(42.8–45.3)
3508	Hamilton DHC	64.8	(63.5–66.1)	70.7	(69.3–72.0)
3509	Niagara DHC	35.7	(34.2–37.1)	36.6	(35.0–38.3)
3510	Grand River DHC	31.5	(29.6–33.3)	31.7	(29.6–33.8)
3511	Thames Valley DHC	55.1	(53.9–56.3)	58.1	(56.8–59.5)
3512	Essex Kent and Lambton DHC	44.9	(43.7–46.1)	44.1	(42.7–45.4)
3513	Grey Bruce Huron Perth DHC	19.1	(17.6–20.6)	18.2	(16.6–19.8)
3514	Northern Shores DHC	11.0	(9.6–12.3)	10.8	(9.2–12.4)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	23.1	(21.8–24.5)	23.5	(21.9–25.1)
3516	Northwestern Ontario DHC	10.6	(9.5–11.8)	9.4	(8.2–10.6)
Sask.		**39.8**	**(39.0–40.7)**	**43.0**	**(42.1–44.0)**
4704	Regina Qu'Appelle Regional Health Authority	59.1	(57.2–60.9)	63.2	(61.3–65.2)
4706	Saskatoon Regional Health Authority	61.3	(59.6–63.0)	67.2	(65.4–69.0)
4709	Prince Albert Parkland Regional Health Authority	26.7	(23.9–29.4)	27.1	(24.2–30.1)
Alta.		**33.0**	**(32.4–33.6)**	**34.9**	**(34.2–35.6)**
4820	Chinook Regional Health Authority	*			
4821	Palliser Health Region	*			
4822	Calgary Health Region	*			
4823	David Thompson Regional Health Authority	9.2	(8.3–10.2)	6.7	(5.8–7.7)
4824	East Central Health	23.3	(20.8–25.8)	24.6	(21.6–27.6)
4825	Capital Health	50.1	(49.2–51.1)	54.7	(53.6–55.8)
4826	Aspen Regional Health Authority	21.0	(19.3–22.7)	20.7	(18.8–22.6)
4827	Peace Country Health	4.7	(3.7–5.6)	4.9	(3.8–6.0)
B.C.		**24.6**	**(24.2–25.1)**	**23.3**	**(22.8–23.7)**
5911	East Kootenay	13.4	(10.7–16.0)	12.5	(9.6–15.4)
5912	Kootenay/Boundary	15.4	(12.4–18.3)	16.2	(12.8–19.7)
5913	Okanagan	25.7	(24.0–27.4)	26.3	(24.3–28.3)
5914	Thompson/Cariboo	12.8	(11.3–14.4)	12.0	(10.2–13.8)
5921	Fraser East	18.0	(16.6–19.4)	17.3	(15.7–18.9)
5922	Fraser North	23.7	(22.5–24.8)	21.7	(20.5–23.0)
5923	Fraser South	29.1	(28.0–30.2)	27.6	(26.4–28.8)
5931	Richmond	29.7	(27.4–32.0)	28.0	(25.4–30.7)
5932	Vancouver	36.3	(35.0–37.5)	35.7	(34.2–37.1)
5933	North Shore/Coast Garibaldi	18.2	(16.6–19.8)	15.7	(13.9–17.5)
5941	South Vancouver Island	25.3	(23.7–27.0)	23.4	(21.4–25.3)
5942	Central Vancouver Island	23.8	(21.9–25.7)	22.2	(20.1–24.4)
5943	North Vancouver Island	11.4	(9.4–13.3)	9.0	(6.9–11.0)
5951	Northwest	20.3	(17.8–22.8)	19.9	(17.1–22.8)
5952	Northern Interior	19.9	(18.0–21.9)	16.6	(14.4–18.8)
Y.T.	**Yukon Territory**	**17.3**	**(13.2–21.4)**	**14.9**	**(10.4–19.4)**
N.W.T.	**Northwest Territories**	**5.6**	**(3.8–7.4)**	**4.0**	**(2.2–5.7)**
†Nun.	**Nunavut**	**4.5**	**(2.8–6.2)**	**4.2**	**(2.5–5.9)**
Canada		**43.1**	**(43.0–43.3)**	**45.4**	**(45.2–45.6)**

Notes: Not all provinces and regions across Canada submit comprehensively to the Discharge Abstract Database. For this reason, the province of Manitoba was excluded from the analysis.
*Calgary health region (Alberta), Chinook regional health authority (Alberta) and Palliser health region (Alberta) were excluded due to underreporting. Consequently, the national rate excludes these jurisdictions. The provincial rate for Alberta excluded Calgary health region, Chinook regional health authority and Palliser health region.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Discharge Abstract Database, CIHI; Hospital Morbidity Database, CIHI

Assisted Delivery Rate (Overall) by Health Region, Canada, 2000–2001

Map Code	Region	Overall Assisted Delivery (2000–2001) Rate/100 Vaginal Deliveries	95% CI
N.L.		**18.6**	**(17.4–19.9)**
1001	Health and Community Services St. John's Region	19.0	(16.9–21.2)
1002	Health and Community Services Eastern Region	28.2	(24.8–31.7)
1003	Health and Community Services Central Region	14.8	(12.1–17.4)
1004	Health and Community Services Western Region	17.1	(13.8–20.3)
P.E.I.	**Prince Edward Island**	**10.0**	**(8.2–11.9)**
N.S.		**13.0**	**(12.2–13.8)**
1201	Zone 1	14.9	(12.4–17.3)
1202	Zone 2	12.2	(9.7–14.8)
1203	Zone 3	7.6	(5.7–9.5)
1204	Zone 4	20.4	(17.3–23.5)
1205	Zone 5	14.8	(12.4–17.1)
1206	Zone 6	11.9	(10.7–13.1)
N.B.		**16.8**	**(15.8–17.8)**
1301	Region 1	14.2	(12.2–16.1)
1302	Region 2	12.6	(10.8–14.4)
1303	Region 3	22.2	(20.0–24.4)
1306	Region 6	11.5	(8.8–14.2)
Que.		**15.9**	**(15.6–16.2)**
2401	Région du Bas-Saint-Laurent	22.2	(19.9–24.4)
2402	Région du Saguenay—Lac-Saint-Jean	18.4	(16.7–20.0)
2403	Région de Québec	21.7	(20.4–22.9)
2404	Région de la Mauricie et Centre-du-Québec	20.3	(19.0–21.7)
2405	Région de l'Estrie	18.1	(16.5–19.7)
2406	Région de Montréal-Centre	12.3	(11.7–12.8)
2407	Région de l'Outaouais	16.8	(15.3–18.3)
2408	Région de l'Abitibi-Témiscamingue	14.5	(12.6–16.4)
2409	Région de la Côte-Nord	14.8	(12.3–17.3)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	15.1	(12.2–18.0)
2412	Région de la Chaudière-Appalaches	18.5	(17.1–19.9)
2413	Région de Laval	20.0	(18.5–21.5)
2414	Région de Lanaudière	11.4	(10.2–12.5)
2415	Région des Laurentides	17.9	(16.7–19.1)
2416	Région de la Montérégie	15.2	(14.5–15.9)
Ont.		**16.7**	**(16.5–16.9)**
3501	Champlain DHC	17.3	(16.5–18.0)
3502	Southeastern Ontario DHC	16.0	(14.8–17.1)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	14.5	(13.6–15.4)
3504	Toronto DHC	18.4	(17.9–18.9)
3505	Simcoe York DHC	16.3	(15.6–17.1)
3506	Halton-Peel DHC	17.9	(17.3–18.6)
3507	Waterloo Region-Wellington-Dufferin DHC	17.0	(16.1–17.9)
3508	Hamilton DHC	12.3	(11.3–13.2)
3509	Niagara DHC	15.4	(14.2–16.7)
3510	Grand River DHC	10.4	(9.0–11.8)
3511	Thames Valley DHC	14.9	(13.9–15.8)
3512	Essex Kent and Lambton DHC	22.7	(21.5–23.8)
3513	Grey Bruce Huron Perth DHC	9.7	(8.5–11.0)
3514	Northern Shores DHC	20.8	(18.6–22.9)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	10.9	(9.7–12.0)
3516	Northwestern Ontario DHC	13.2	(11.7–14.6)
Man.		**9.9**	**(9.3–10.4)**
4610	Winnipeg Regional Health Authority	10.9	(10.1–11.7)
4630	Interlake Regional Health Authority	5.9	(4.1–7.7)
4640	Central Regional Health Authority	5.9	(4.5–7.3)
Sask.		**16.7**	**(16.0–17.5)**
4704	Regina Qu'Appelle Regional Health Authority	15.6	(14.1–17.1)
4706	Saskatoon Regional Health Authority	20.7	(19.2–22.3)
4709	Prince Albert Parkland Regional Health Authority	13.3	(11.1–15.6)
Alta.		**18.4**	**(18.0–18.8)**
4820	Chinook Regional Health Authority	13.5	(11.8–15.2)
4821	Palliser Health Region	11.8	(9.8–13.7)
4822	Calgary Health Region	22.3	(21.4–23.1)
4823	David Thompson Regional Health Authority	9.3	(8.2–10.4)
4824	East Central Health	21.2	(18.5–23.9)
4825	Capital Health	19.5	(18.7–20.4)
4826	Aspen Regional Health Authority	17.4	(15.6–19.1)
4827	Peace Country Health	10.7	(9.1–12.3)
B.C.		**16.0**	**(15.5–16.4)**
5911	East Kootenay	11.3	(8.7–14.0)
5912	Kootenay/Boundary	10.6	(7.8–13.4)
5913	Okanagan	11.2	(9.8–12.6)
5914	Thompson/Cariboo	11.6	(9.9–13.3)
5921	Fraser East	17.2	(15.6–18.8)
5922	Fraser North	16.8	(15.7–17.9)
5923	Fraser South	18.9	(17.8–20.0)
5931	Richmond	24.9	(22.4–27.4)
5932	Vancouver	21.2	(19.9–22.4)
5933	North Shore/Coast Garibaldi	16.2	(14.4–17.9)
5941	South Vancouver Island	10.5	(9.2–11.9)
5942	Central Vancouver Island	12.0	(10.3–13.7)
5943	North Vancouver Island	11.6	(9.3–13.9)
5951	Northwest	12.7	(10.4–15.0)
5952	Northern Interior	9.2	(7.6–10.8)
Y.T.	**Yukon Territory**	**13.5**	**(9.5–17.5)**
N.W.T.	**Northwest Territories**	**9.6**	**(7.1–12.1)**
†Nun.	**Nunavut**	**2.5**	**(1.1–3.9)**
Canada		**16.2**	**(16.0–16.3)**

Note: †Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Assisted Delivery Rate (Forceps) by Health Region, Canada, 2000–2001

Map Code	Region	Forceps-Assisted Delivery (2000–2001) Rate/100 Vaginal Deliveries	95% CI
N.L.		**8.8**	**(7.8–9.7)**
1001	Health and Community Services St. John's Region	8.7	(7.2–10.3)
1002	Health and Community Services Eastern Region	11.7	(9.3–14.2)
1003	Health and Community Services Central Region	9.4	(7.2–11.6)
1004	Health and Community Services Western Region	8.1	(5.8–10.5)
P.E.I.	**Prince Edward Island**	**6.1**	**(4.7–7.6)**
N.S.		**7.4**	**(6.8–8.1)**
1201	Zone 1	9.8	(7.8–11.9)
1202	Zone 2	10.3	(8.0–12.7)
1203	Zone 3	4.4	(2.9–5.8)
1204	Zone 4	3.9	(2.4–5.3)
1205	Zone 5	3.8	(2.5–5.0)
1206	Zone 6	8.9	(7.9–9.9)
N.B.		**7.3**	**(6.6–8.0)**
1301	Region 1	2.7	(1.8–3.6)
1302	Region 2	8.0	(6.6–9.5)
1303	Region 3	13.2	(11.4–15.0)
1306	Region 6	5.1	(3.2–6.9)
Que.		**5.0**	**(4.8–5.1)**
2401	Région du Bas-Saint-Laurent	3.6	(2.6–4.6)
2402	Région du Saguenay—Lac-Saint-Jean	3.0	(2.2–3.7)
2403	Région de Québec	4.6	(4.0–5.2)
2404	Région de la Mauricie et Centre-du-Québec	4.0	(3.4–4.7)
2405	Région de l'Estrie	10.6	(9.3–11.8)
2406	Région de Montréal-Centre	6.5	(6.1–6.9)
2407	Région de l'Outaouais	4.6	(3.8–5.5)
2408	Région de l'Abitibi-Témiscamingue	6.0	(4.7–7.3)
2409	Région de la Côte-Nord	3.6	(2.3–4.9)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	3.0	(1.6–4.4)
2412	Région de la Chaudière-Appalaches	2.9	(2.3–3.6)
2413	Région de Laval	4.5	(3.7–5.3)
2414	Région de Lanaudière	3.7	(3.0–4.4)
2415	Région des Laurentides	3.5	(2.9–4.1)
2416	Région de la Montérégie	4.4	(4.0–4.8)
Ont.		**6.6**	**(6.4–6.7)**
3501	Champlain DHC	3.8	(3.4–4.2)
3502	Southeastern Ontario DHC	4.3	(3.6–5.0)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	4.8	(4.3–5.4)
3504	Toronto DHC	6.2	(5.9–6.5)
3505	Simcoe York DHC	5.4	(5.0–5.9)
3506	Halton-Peel DHC	5.2	(4.8–5.5)
3507	Waterloo Region-Wellington-Dufferin DHC	12.8	(11.9–13.6)
3508	Hamilton DHC	3.1	(2.6–3.6)
3509	Niagara DHC	4.5	(3.8–5.3)
3510	Grand River DHC	3.1	(2.3–3.9)
3511	Thames Valley DHC	13.9	(13.0–14.8)
3512	Essex Kent and Lambton DHC	15.6	(14.6–16.6)
3513	Grey Bruce Huron Perth DHC	6.2	(5.1–7.2)
3514	Northern Shores DHC	5.6	(4.4–6.8)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	3.0	(2.4–3.6)
3516	Northwestern Ontario DHC	6.2	(5.2–7.3)
Man.		**4.9**	**(4.5–5.3)**
4610	Winnipeg Regional Health Authority	5.7	(5.1–6.3)
4630	Interlake Regional Health Authority	2.7	(1.5–3.9)
4640	Central Regional Health Authority	1.5	(0.8–2.2)
Sask.		**4.2**	**(3.8–4.6)**
4704	Regina Qu'Appelle Regional Health Authority	6.9	(5.9–8.0)
4706	Saskatoon Regional Health Authority	4.3	(3.5–5.0)
4709	Prince Albert Parkland Regional Health Authority	2.2	(1.2–3.2)
Alta.		**6.3**	**(6.0–6.6)**
4820	Chinook Regional Health Authority	3.0	(2.2–3.9)
4821	Palliser Health Region	1.5	(0.8–2.3)
4822	Calgary Health Region	7.0	(6.5–7.5)
4823	David Thompson Regional Health Authority	4.7	(4.0–5.5)
4824	East Central Health	4.0	(2.7–5.3)
4825	Capital Health	8.5	(7.9–9.1)
4826	Aspen Regional Health Authority	5.1	(4.1–6.1)
4827	Peace Country Health	1.1	(0.6–1.7)
B.C.		**6.5**	**(6.2–6.7)**
5911	East Kootenay	0.9	(0.1–1.7)
5912	Kootenay/Boundary	3.0	(1.5–4.6)
5913	Okanagan	4.8	(3.9–5.8)
5914	Thompson/Cariboo	4.0	(3.0–5.1)
5921	Fraser East	8.5	(7.3–9.7)
5922	Fraser North	7.0	(6.3–7.8)
5923	Fraser South	5.7	(5.0–6.3)
5931	Richmond	8.1	(6.5–9.7)
5932	Vancouver	11.4	(10.5–12.4)
5933	North Shore/Coast Garibaldi	5.3	(4.3–6.3)
5941	South Vancouver Island	5.9	(4.8–6.9)
5942	Central Vancouver Island	6.5	(5.3–7.8)
5943	North Vancouver Island	3.7	(2.3–5.0)
5951	Northwest	0.9	(0.2–1.5)
5952	Northern Interior	3.4	(2.4–4.4)
Y.T.	**Yukon Territory**	*	
N.W.T.	**Northwest Territories**	**2.1**	**(0.9–3.3)**
†Nun.	**Nunavut**	*	
Canada		**6.1**	**(6.0–6.1)**

Note: Yukon Territory and Nunavut data were excluded due to small numbers.
† Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Assisted Delivery Rate (Vacuum Extraction) by Health Region, Canada, 2000–2001

Map Code	Region	Vacuum-Assisted Delivery (2000–2001) Rate/100 Vaginal Deliveries	95% CI
N.L.		**10.0**	**(9.1–11.0)**
1001	Health and Community Services St. John's Region	10.5	(9.0–12.2)
1002	Health and Community Services Eastern Region	16.8	(13.9–19.7)
1003	Health and Community Services Central Region	5.6	(3.8–7.3)
1004	Health and Community Services Western Region	8.9	(6.5–11.4)
P.E.I.	**Prince Edward Island**	**4.8**	**(3.5–6.1)**
N.S.		**5.7**	**(5.1–6.2)**
1201	Zone 1	5.3	(3.8–6.8)
1202	Zone 2	2.2	(1.1–3.3)
1203	Zone 3	3.4	(2.1–4.6)
1204	Zone 4	16.7	(13.8–19.5)
1205	Zone 5	11.1	(9.0–13.2)
1206	Zone 6	3.1	(2.5–3.7)
N.B.		**10.0**	**(9.2–10.8)**
1301	Region 1	11.9	(10.1–13.7)
1302	Region 2	4.7	(3.5–5.8)
1303	Region 3	9.4	(7.9–11.0)
1306	Region 6	7.5	(5.3–9.8)
Que.		**11.5**	**(11.2–11.8)**
2401	Région du Bas-Saint-Laurent	21.0	(18.8–23.2)
2402	Région du Saguenay—Lac-Saint-Jean	16.5	(14.9–18.2)
2403	Région de Québec	17.5	(16.3–18.6)
2404	Région de la Mauricie et Centre-du-Québec	17.2	(16.0–18.5)
2405	Région de l'Estrie	7.6	(6.6–8.7)
2406	Région de Montréal-Centre	6.1	(5.7–6.4)
2407	Région de l'Outaouais	13.0	(11.6–14.3)
2408	Région de l'Abitibi-Témiscamingue	8.9	(7.3–10.4)
2409	Région de la Côte-Nord	12.3	(10.0–14.7)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	12.1	(9.4–14.8)
2412	Région de la Chaudière-Appalaches	15.8	(14.5–17.1)
2413	Région de Laval	16.5	(15.1–17.9)
2414	Région de Lanaudière	8.2	(7.2–9.2)
2415	Région des Laurentides	15.4	(14.3–16.5)
2416	Région de la Montérégie	11.1	(10.5–11.8)
Ont.		**10.5**	**(10.4–10.7)**
3501	Champlain DHC	14.4	(13.7–15.2)
3502	Southeastern Ontario DHC	12.1	(11.1–13.2)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	9.9	(9.1–10.7)
3504	Toronto DHC	12.6	(12.2–13.1)
3505	Simcoe York DHC	11.4	(10.7–12.0)
3506	Halton-Peel DHC	13.4	(12.8–14.0)
3507	Waterloo Region-Wellington-Dufferin DHC	4.8	(4.3–5.3)
3508	Hamilton DHC	9.5	(8.6–10.3)
3509	Niagara DHC	11.5	(10.4–12.7)
3510	Grand River DHC	7.6	(6.4–8.8)
3511	Thames Valley DHC	1.0	(0.8–1.3)
3512	Essex Kent and Lambton DHC	7.3	(6.6–8.0)
3513	Grey Bruce Huron Perth DHC	3.8	(2.9–4.6)
3514	Northern Shores DHC	15.4	(13.6–17.3)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	8.3	(7.2–9.3)
3516	Northwestern Ontario DHC	7.2	(6.1–8.3)
Man.		**5.6**	**(5.1–6.0)**
4610	Winnipeg Regional Health Authority	5.8	(5.2–6.4)
4630	Interlake Regional Health Authority	3.9	(2.4–5.3)
4640	Central Regional Health Authority	4.6	(3.4–5.9)
Sask.		**13.3**	**(12.7–14.0)**
4704	Regina Qu'Appelle Regional Health Authority	9.0	(7.8–10.2)
4706	Saskatoon Regional Health Authority	18.5	(17.0–20.0)
4709	Prince Albert Parkland Regional Health Authority	11.8	(9.7–14.0)
Alta.		**12.8**	**(12.4–13.2)**
4820	Chinook Regional Health Authority	10.7	(9.1–12.2)
4821	Palliser Health Region	10.3	(8.5–12.2)
4822	Calgary Health Region	15.5	(14.8–16.2)
4823	David Thompson Regional Health Authority	5.0	(4.2–5.8)
4824	East Central Health	17.5	(15.0–20.0)
4825	Capital Health	12.6	(11.9–13.3)
4826	Aspen Regional Health Authority	13.7	(12.1–15.3)
4827	Peace Country Health	9.8	(8.3–11.4)
B.C.		**10.0**	**(9.6–10.3)**
5911	East Kootenay	10.4	(7.9–13.0)
5912	Kootenay/Boundary	8.7	(6.1–11.3)
5913	Okanagan	7.1	(6.0–8.2)
5914	Thompson/Cariboo	8.4	(7.0–9.9)
5921	Fraser East	9.9	(8.6–11.2)
5922	Fraser North	10.0	(9.1–10.9)
5923	Fraser South	13.4	(12.5–14.4)
5931	Richmond	17.1	(14.9–19.3)
5932	Vancouver	10.2	(9.3–11.1)
5933	North Shore/Coast Garibaldi	11.4	(9.9–12.9)
5941	South Vancouver Island	4.8	(3.8–5.7)
5942	Central Vancouver Island	6.4	(5.1–7.6)
5943	North Vancouver Island	8.5	(6.5–10.5)
5951	Northwest	12.0	(9.7–14.2)
5952	Northern Interior	6.6	(5.2–8.0)
Y.T.	**Yukon Territory**	**12.4**	**(8.6–16.3)**
N.W.T.	**Northwest Territories**	**7.7**	**(5.4–10.0)**
†Nun.	**Nunavut**	**1.9**	**(0.7–3.1)**
Canada		**10.6**	**(10.5–10.8)**

Note: †Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Caesarean Section Rate by Health Region, Canada, 2001–2002

Map Code	Region	Caesarean Section (2001–2002) %	95% CI
N.L.		**26.6**	**(25.3–27.9)**
1001	Health and Community Services St. John's Region	26.2	(24.2–28.3)
1002	Health and Community Services Eastern Region	31.5	(28.2–34.8)
1003	Health and Community Services Central Region	24.8	(21.8–27.9)
1004	Health and Community Services Western Region	26.6	(23.2–29.9)
P.E.I.	**Prince Edward Island**	**27.9**	**(25.5–30.3)**
N.S.		**25.3**	**(24.4–26.2)**
1201	Zone 1	25.3	(22.6–27.9)
1202	Zone 2	20.8	(17.9–23.8)
1203	Zone 3	24.9	(22.2–27.5)
1204	Zone 4	28.1	(25.1–31.1)
1205	Zone 5	24.1	(21.6–26.6)
1206	Zone 6	26.1	(24.7–27.4)
N.B.		**26.6**	**(25.6–27.6)**
1301	Region 1	25.1	(23.1–27.2)
1302	Region 2	25.1	(23.1–27.1)
1303	Region 3	27.2	(25.1–29.3)
1306	Region 6	29.8	(26.3–33.2)
Que.		**19.5**	**(19.2–19.8)**
2401	Région du Bas-Saint-Laurent	19.8	(17.8–21.7)
2402	Région du Saguenay—Lac-Saint-Jean	16.8	(15.3–18.2)
2403	Région de Québec	19.7	(18.6–20.7)
2404	Région de la Mauricie et Centre-du-Québec	19.5	(18.2–20.7)
2405	Région de l'Estrie	15.0	(13.7–16.3)
2406	Région de Montréal-Centre	21.0	(20.4–21.6)
2407	Région de l'Outaouais	20.6	(19.1–22.0)
2408	Région de l'Abitibi-Témiscamingue	17.2	(15.3–19.1)
2409	Région de la Côte-Nord	20.4	(17.9–22.9)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	22.5	(19.4–25.6)
2412	Région de la Chaudière-Appalaches	22.1	(20.7–23.4)
2413	Région de Laval	20.3	(19.0–21.6)
2414	Région de Lanaudière	19.1	(17.8–20.4)
2415	Région des Laurentides	16.9	(15.9–18.0)
2416	Région de la Montérégie	19.1	(18.4–19.7)
Ont.		**22.9**	**(22.7–23.1)**
3501	Champlain DHC	22.5	(21.7–23.2)
3502	Southeastern Ontario DHC	24.2	(23.0–25.4)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	25.8	(24.8–26.7)
3504	Toronto DHC	24.0	(23.5–24.5)
3505	Simcoe York DHC	23.0	(22.3–23.7)
3506	Halton-Peel DHC	22.5	(21.9–23.1)
3507	Waterloo Region-Wellington-Dufferin DHC	21.7	(20.8–22.6)
3508	Hamilton DHC	21.6	(20.5–22.7)
3509	Niagara DHC	22.8	(21.5–24.0)
3510	Grand River DHC	19.2	(17.6–20.8)
3511	Thames Valley DHC	18.9	(18.0–19.9)
3512	Essex Kent and Lambton DHC	22.4	(21.4–23.4)
3513	Grey Bruce Huron Perth DHC	20.1	(18.6–21.6)
3514	Northern Shores DHC	28.7	(26.7–30.7)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	24.0	(22.6–25.3)
3516	Northwestern Ontario DHC	21.9	(20.3–23.4)
Man.		**18.2**	**(17.6–18.9)**
4610	Winnipeg Regional Health Authority	18.3	(17.4–19.2)
4630	Interlake Regional Health Authority	17.1	(14.6–19.6)
4640	Central Regional Health Authority	20.2	(18.0–22.3)
Sask.		**18.4**	**(17.7–19.1)**
4704	Regina Qu'Appelle Regional Health Authority	15.2	(13.9–16.6)
4706	Saskatoon Regional Health Authority	20.2	(18.9–21.6)
4709	Prince Albert Parkland Regional Health Authority	14.2	(12.1–16.4)
Alta.		**22.5**	**(22.1–23.0)**
4820	Chinook Regional Health Authority	20.9	(19.1–22.8)
4821	Palliser Health Region	18.5	(16.3–20.7)
4822	Calgary Health Region	23.6	(22.8–24.3)
4823	David Thompson Regional Health Authority	22.9	(21.5–24.2)
4824	East Central Health	27.6	(24.9–30.2)
4825	Capital Health	21.9	(21.1–22.7)
4826	Aspen Regional Health Authority	20.8	(19.1–22.4)
4827	Peace Country Health	22.1	(20.3–24.0)
B.C.		**27.1**	**(26.7–27.6)**
5911	East Kootenay	18.9	(15.8–22.0)
5912	Kootenay/Boundary	24.7	(21.2–28.3)
5913	Okanagan	24.3	(22.7–26.0)
5914	Thompson/Cariboo	30.4	(28.3–32.5)
5921	Fraser East	24.8	(23.2–26.4)
5922	Fraser North	27.5	(26.3–28.6)
5923	Fraser South	27.4	(26.4–28.5)
5931	Richmond	30.5	(28.2–32.8)
5932	Vancouver	27.4	(26.3–28.6)
5933	North Shore/Coast Garibaldi	27.9	(26.0–29.8)
5941	South Vancouver Island	29.4	(27.7–31.2)
5942	Central Vancouver Island	27.2	(25.2–29.1)
5943	North Vancouver Island	25.4	(22.7–28.1)
5951	Northwest	25.8	(23.1–28.6)
5952	Northern Interior	28.6	(26.4–30.9)
Y.T.	**Yukon Territory**	**25.9**	**(21.2–30.7)**
N.W.T.	**Northwest Territories**	**23.3**	**(20.0–26.6)**
†Nun.	**Nunavut**	**9.2**	**(6.8–11.5)**
Canada		**22.5**	**(22.3–22.6)**

Notes: Stillbirths were excluded from the denominator.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Primary and Repeat Caesarean Section Rate by Health Region, Canada, 2001–2002

Map Code	Region	Primary Caesarean Section (2001–2002) Rate/100 Hospital Deliveries	95% CI	Repeat Caesarean Section (2001–2002) Rate/100 Hospital Deliveries	95% CI
N.L.		**19.4**	**(18.2–20.7)**	**87.5**	**(84.5–90.5)**
1001	Health and Community Services St. John's Region	18.7	(16.7–20.6)	85.6	(80.8–90.5)
1002	Health and Community Services Eastern Region	23.7	(20.5–26.9)	86.5	(79.6–93.3)
1003	Health and Community Services Central Region	16.2	(13.4–19.0)	93.0	(87.6–98.4)
1004	Health and Community Services Western Region	20.9	(17.7–24.1)	87.7	(79.2–96.2)
P.E.I.	**Prince Edward Island**	**21.0**	**(18.7–23.4)**	**75.4**	**(68.9–82.0)**
N.S.		**18.9**	**(18.0–19.8)**	**76.0**	**(73.3–78.7)**
1201	Zone 1	19.3	(16.8–21.9)	77.1	(69.1–85.2)
1202	Zone 2	14.8	(12.1–17.6)	75.0	(65.0–85.0)
1203	Zone 3	17.5	(15.0–20.0)	77.6	(70.3–84.9)
1204	Zone 4	20.1	(17.3–23.0)	90.3	(84.3–96.3)
1205	Zone 5	18.2	(15.8–20.7)	67.9	(60.0–75.9)
1206	Zone 6	19.8	(18.5–21.1)	74.7	(70.7–78.7)
N.B.		**19.4**	**(18.4–20.4)**	**85.7**	**(83.2–88.2)**
1301	Region 1	18.6	(16.7–20.6)	87.7	(82.6–92.7)
1302	Region 2	18.9	(16.9–20.8)	74.7	(68.6–80.9)
1303	Region 3	18.5	(16.6–20.5)	90.0	(85.9–94.1)
1306	Region 6	25.5	(22.1–29.0)	80.4	(69.5–91.3)
Que.		**14.6**	**(14.3–14.9)**	**69.4**	**(68.2–70.5)**
2401	Région du Bas-Saint-Laurent	15.5	(13.7–17.4)	73.1	(65.1–81.1)
2402	Région du Saguenay—Lac-Saint-Jean	12.0	(10.7–13.3)	63.0	(56.8–69.2)
2403	Région de Québec	14.8	(13.8–15.8)	70.8	(66.7–74.9)
2404	Région de la Mauricie et Centre-du-Québec	14.3	(13.2–15.4)	80.2	(75.8–84.6)
2405	Région de l'Estrie	12.5	(11.2–13.8)	52.3	(44.9–59.8)
2406	Région de Montréal-Centre	15.4	(14.9–16.0)	70.7	(68.7–72.8)
2407	Région de l'Outaouais	15.8	(14.5–17.2)	72.6	(67.2–78.0)
2408	Région de l'Abitibi-Témiscamingue	14.5	(12.6–16.3)	50.0	(41.0–59.0)
2409	Région de la Côte-Nord	15.8	(13.5–18.2)	72.5	(62.7–82.3)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	17.3	(14.3–20.3)	70.1	(59.2–81.1)
2412	Région de la Chaudière-Appalaches	16.6	(15.3–17.8)	73.6	(69.1–78.2)
2413	Région de Laval	14.1	(12.9–15.4)	78.2	(73.8–82.6)
2414	Région de Lanaudière	14.9	(13.7–16.2)	60.7	(55.4–66.0)
2415	Région des Laurentides	12.7	(11.7–13.7)	69.3	(64.6–74.0)
2416	Région de la Montérégie	14.1	(13.5–14.7)	67.4	(64.8–70.1)
Ont.		**16.5**	**(16.3–16.7)**	**75.1**	**(74.4–75.8)**
3501	Champlain DHC	16.6	(15.9–17.4)	73.8	(71.3–76.3)
3502	Southeastern Ontario DHC	17.5	(16.4–18.7)	79.0	(75.5–82.5)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	18.2	(17.4–19.1)	77.6	(75.1–80.1)
3504	Toronto DHC	17.8	(17.4–18.3)	76.6	(75.2–78.1)
3505	Simcoe York DHC	15.8	(15.1–16.4)	79.4	(77.3–81.4)
3506	Halton-Peel DHC	15.6	(15.1–16.2)	77.3	(75.5–79.1)
3507	Waterloo Region-Wellington-Dufferin DHC	15.8	(14.9–16.6)	70.6	(67.6–73.6)
3508	Hamilton DHC	15.3	(14.3–16.3)	71.4	(67.8–75.0)
3509	Niagara DHC	15.8	(14.6–17.0)	80.0	(76.3–83.8)
3510	Grand River DHC	13.5	(12.1–14.9)	67.5	(61.7–73.2)
3511	Thames Valley DHC	14.2	(13.3–15.1)	61.9	(58.2–65.6)
3512	Essex Kent and Lambton DHC	17.0	(16.1–17.9)	66.9	(63.5–70.3)
3513	Grey Bruce Huron Perth DHC	15.4	(14.0–16.9)	70.4	(64.5–76.3)
3514	Northern Shores DHC	19.5	(17.6–21.4)	84.9	(80.7–89.2)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	17.2	(15.9–18.5)	85.3	(81.7–88.9)
3516	Northwestern Ontario DHC	15.3	(13.9–16.8)	65.6	(60.7–70.6)
Man.		**12.4**	**(11.8–13.0)**	**67.7**	**(65.3–70.1)**
4610	Winnipeg Regional Health Authority	12.7	(11.9–13.6)	67.3	(63.9–70.7)
4630	Interlake Regional Health Authority	11.4	(9.2–13.6)	66.7	(56.9–76.4)
4640	Central Regional Health Authority	13.1	(11.1–15.0)	69.5	(62.5–76.6)
Sask.		**13.1**	**(12.4–13.7)**	**64.2**	**(61.6–66.9)**
4704	Regina Qu'Appelle Regional Health Authority	10.2	(9.0–11.4)	66.4	(60.4–72.4)
4706	Saskatoon Regional Health Authority	15.7	(14.4–17.0)	59.8	(54.6–65.0)
4709	Prince Albert Parkland Regional Health Authority	11.4	(9.3–13.5)	42.4	(32.3–52.5)
Alta.		**16.6**	**(16.2–17.0)**	**69.8**	**(68.4–71.2)**
4820	Chinook Regional Health Authority	14.5	(12.8–16.2)	67.9	(61.7–74.0)
4821	Palliser Health Region	12.5	(10.5–14.5)	70.5	(62.4–78.6)
4822	Calgary Health Region	18.0	(17.3–18.7)	68.4	(66.0–70.8)
4823	David Thompson Regional Health Authority	16.5	(15.2–17.8)	72.8	(68.5–77.2)
4824	East Central Health	19.4	(16.9–21.9)	78.4	(71.9–84.9)
4825	Capital Health	16.2	(15.5–17.0)	68.0	(65.4–70.7)
4826	Aspen Regional Health Authority	15.1	(13.6–16.6)	67.7	(61.9–73.5)
4827	Peace Country Health	14.8	(13.2–16.5)	82.6	(77.4–87.8)
B.C.		**20.8**	**(20.4–21.3)**	**76.1**	**(74.8–77.3)**
5911	East Kootenay	13.2	(10.4–16.0)	68.8	(57.4–80.1)
5912	Kootenay/Boundary	17.0	(13.7–20.3)	80.9	(71.5–90.2)
5913	Okanagan	17.7	(16.1–19.3)	72.5	(67.5–77.5)
5914	Thompson/Cariboo	22.1	(20.1–24.2)	77.5	(72.5–82.5)
5921	Fraser East	18.2	(16.7–19.7)	72.6	(67.8–77.3)
5922	Fraser North	21.3	(20.2–22.5)	79.8	(76.5–83.0)
5923	Fraser South	21.1	(20.0–22.1)	75.0	(72.0–78.0)
5931	Richmond	24.6	(22.3–26.9)	72.6	(66.3–79.0)
5932	Vancouver	22.2	(21.0–23.3)	75.0	(71.4–78.6)
5933	North Shore/Coast Garibaldi	21.1	(19.2–22.9)	83.7	(79.0–88.4)
5941	South Vancouver Island	23.1	(21.3–24.8)	74.1	(69.3–78.8)
5942	Central Vancouver Island	*			
5943	North Vancouver Island	18.4	(15.8–20.9)	78.3	(70.7–85.8)
5951	Northwest	20.0	(17.3–22.6)	76.2	(68.0–84.3)
5952	Northern Interior	22.3	(20.2–24.5)	80.3	(74.4–86.3)
Y.T.	**Yukon Territory**	**21.9**	**(17.2–26.6)**	**66.7**	**(48.9–84.4)**
N.W.T.	**Northwest Territories**	**16.4**	**(13.4–19.5)**	**80.3**	**(70.7–89.9)**
†Nun.	**Nunavut**	**7.6**	**(5.4–9.9)**	**39.3**	**(21.2–57.4)**
Canada		**16.5**	**(16.3–16.6)**	**73.2**	**(72.8–73.7)**

Notes: *Central Vancouver Island (Vancouver) was excluded from this analysis due to underreporting of uterine scar.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Primary Caesarean Section Rate by Age Group (< 35 years, ≥ 35 years) by Health Region, Canada, 2001–2002

Map Code	Region	Primary Caesarean (2001–2002): Women < 35 years Rate/100 Deliveries	95% CI	Primary Caesarean (2001–2002): Women ≥ 35 years Rate/100 Deliveries	95% CI
N.L.		**18.9**	**(17.6–20.1)**	**24.3**	**(20.2–28.4)**
1001	Health and Community Services St. John's Region	18.1	(16.0–20.1)	22.3	(16.9–27.7)
1002	Health and Community Services Eastern Region	22.1	(18.8–25.3)	39.7	(27.6–51.8)
1003	Health and Community Services Central Region	16.7	(13.7–19.6)	11.7	(3.5–19.8)
1004	Health and Community Services Western Region	20.4	(17.1–23.7)	26.7	(13.7–39.6)
P.E.I.	**Prince Edward Island**	**20.1**	**(17.6–22.6)**	**28.5**	**(20.5–36.4)**
N.S.		**18.3**	**(17.4–19.3)**	**22.7**	**(20.1–25.4)**
1201	Zone 1	18.5	(15.8–21.1)	27.9	(18.4–37.4)
1202	Zone 2	14.3	(11.5–17.2)	18.8	(9.6–28.1)
1203	Zone 3	17.1	(14.5–19.7)	20.9	(12.5–29.2)
1204	Zone 4	19.9	(16.9–22.9)	22.4	(13.0–31.7)
1205	Zone 5	16.9	(14.4–19.4)	27.4	(19.6–35.3)
1206	Zone 6	19.6	(18.1–21.0)	21.4	(17.9–24.9)
N.B.		**19.3**	**(18.3–20.3)**	**20.6**	**(17.4–23.8)**
1301	Region 1	19.0	(16.9–21.1)	15.6	(10.2–21.0)
1302	Region 2	18.7	(16.6–20.7)	20.5	(14.2–26.8)
1303	Region 3	18.5	(16.5–20.6)	18.6	(12.5–24.7)
1306	Region 6	24.5	(21.0–28.1)	37.5	(23.8–51.2)
Que.		**14.2**	**(13.9–14.5)**	**17.4**	**(16.6–18.2)**
2401	Région du Bas-Saint-Laurent	15.1	(13.2–17.0)	19.8	(13.0–26.7)
2402	Région du Saguenay—Lac-Saint-Jean	11.8	(10.4–13.2)	14.9	(9.5–20.3)
2403	Région de Québec	14.6	(13.6–15.7)	16.1	(13.3–19.0)
2404	Région de la Mauricie et Centre-du-Québec	14.1	(12.9–15.2)	16.9	(12.8–20.9)
2405	Région de l'Estrie	12.0	(10.7–13.3)	18.1	(13.0–23.2)
2406	Région de Montréal-Centre	14.7	(14.1–15.3)	18.8	(17.4–20.2)
2407	Région de l'Outaouais	15.6	(14.2–17.0)	17.2	(13.4–21.0)
2408	Région de l'Abitibi-Témiscamingue	14.0	(12.2–15.9)	20.4	(12.4–28.4)
2409	Région de la Côte-Nord	15.9	(13.4–18.4)	15.3	(7.6–22.9)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	17.3	(14.1–20.4)	17.6	(8.9–26.2)
2412	Région de la Chaudière-Appalaches	16.6	(15.3–17.9)	16.4	(12.2–20.5)
2413	Région de Laval	13.5	(12.2–14.8)	17.8	(14.4–21.1)
2414	Région de Lanaudière	14.5	(13.3–15.8)	18.3	(14.2–22.5)
2415	Région des Laurentides	12.5	(11.5–13.5)	14.0	(10.9–17.1)
2416	Région de la Montérégie	13.9	(13.2–14.5)	15.8	(13.9–17.7)
Ont.		**15.7**	**(15.5–16.0)**	**20.3**	**(19.7–20.8)**
3501	Champlain DHC	15.6	(14.9–16.4)	20.9	(19.1–22.7)
3502	Southeastern Ontario DHC	17.1	(15.8–18.3)	20.6	(17.2–24.0)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	17.6	(16.7–18.6)	21.5	(19.1–23.8)
3504	Toronto DHC	16.4	(16.0–16.9)	22.7	(21.7–23.8)
3505	Simcoe York DHC	15.5	(14.8–16.3)	16.7	(15.2–18.2)
3506	Halton-Peel DHC	15.0	(14.4–15.6)	18.5	(17.1–19.8)
3507	Waterloo Region-Wellington-Dufferin DHC	15.5	(14.6–16.4)	17.7	(15.3–20.1)
3508	Hamilton DHC	14.6	(13.5–15.7)	18.9	(16.1–21.7)
3509	Niagara DHC	15.4	(14.1–16.7)	17.8	(14.6–21.0)
3510	Grand River DHC	13.2	(11.7–14.7)	16.0	(11.5–20.4)
3511	Thames Valley DHC	13.6	(12.7–14.6)	17.6	(15.0–20.2)
3512	Essex Kent and Lambton DHC	16.2	(15.2–17.2)	23.5	(20.3–26.6)
3513	Grey Bruce Huron Perth DHC	14.9	(13.4–16.4)	19.9	(15.2–24.6)
3514	Northern Shores DHC	17.9	(16.0–19.9)	31.0	(24.5–37.4)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	16.5	(15.2–17.8)	23.9	(19.2–28.7)
3516	Northwestern Ontario DHC	15.0	(13.5–16.5)	18.1	(13.4–22.8)
Man.		**11.7**	**(11.1–12.3)**	**18.0**	**(16.0–20.0)**
4610	Winnipeg Regional Health Authority	11.6	(10.8–12.4)	19.7	(17.1–22.3)
4630	Interlake Regional Health Authority	10.5	(8.2–12.8)	18.3	(10.4–26.1)
4640	Central Regional Health Authority	13.1	(11.1–15.2)	12.8	(6.6–19.1)
Sask.		**12.6**	**(11.9–13.2)**	**17.9**	**(15.5–20.2)**
4704	Regina Qu'Appelle Regional Health Authority	9.6	(8.4–10.8)	15.2	(11.1–19.4)
4706	Saskatoon Regional Health Authority	15.2	(13.8–16.5)	20.0	(15.7–24.3)
4709	Prince Albert Parkland Regional Health Authority	11.3	(9.2–13.5)	12.5	(4.4–20.6)
Alta.		**15.9**	**(15.5–16.3)**	**21.4**	**(20.2–22.7)**
4820	Chinook Regional Health Authority	13.7	(11.9–15.5)	21.6	(15.3–27.9)
4821	Palliser Health Region	12.5	(10.5–14.6)	12.2	(5.5–19.0)
4822	Calgary Health Region	17.0	(16.3–17.8)	23.0	(21.1–24.9)
4823	David Thompson Regional Health Authority	16.0	(14.7–17.4)	21.3	(16.6–26.1)
4824	East Central Health	19.6	(16.9–22.3)	17.8	(10.5–25.0)
4825	Capital Health	15.4	(14.6–16.2)	21.5	(19.3–23.7)
4826	Aspen Regional Health Authority	15.0	(13.4–16.6)	16.2	(10.8–21.6)
4827	Peace Country Health	14.3	(12.6–16.1)	20.9	(13.9–28.0)
B.C.		**19.8**	**(19.3–20.2)**	**25.5**	**(24.4–26.6)**
5911	East Kootenay	12.6	(9.6–15.5)	17.6	(8.9–26.2)
5912	Kootenay/Boundary	16.5	(13.0–20.0)	20.0	(10.9–29.1)
5913	Okanagan	16.8	(15.1–18.5)	23.2	(18.6–27.7)
5914	Thompson/Cariboo	21.5	(19.3–23.6)	26.9	(20.7–33.1)
5921	Fraser East	17.9	(16.3–19.5)	21.0	(16.3–25.7)
5922	Fraser North	20.0	(18.8–21.3)	26.0	(23.4–28.7)
5923	Fraser South	20.3	(19.2–21.4)	25.3	(22.6–28.0)
5931	Richmond	22.9	(20.3–25.5)	29.7	(24.9–34.6)
5932	Vancouver	20.7	(19.4–22.0)	26.3	(24.0–28.7)
5933	North Shore/Coast Garibaldi	19.8	(17.7–21.9)	24.2	(20.7–27.8)
5941	South Vancouver Island	21.7	(19.8–23.6)	28.8	(24.5–33.0)
5942	Central Vancouver Island	*			
5943	North Vancouver Island	17.1	(14.4–19.8)	26.0	(18.3–33.8)
5951	Northwest	19.9	(17.1–22.6)	20.6	(12.7–28.4)
5952	Northern Interior	22.0	(19.7–24.2)	25.9	(18.7–33.1)
Y.T.	**Yukon Territory**	**17.7**	**(12.9–22.4)**	**43.8**	**(29.7–57.8)**
N.W.T.	**Northwest Territories**	**15.5**	**(12.3–18.7)**	**22.9**	**(13.0–32.7)**
†Nun.	**Nunavut**	**7.6**	**(5.3–9.9)**	**	
Canada		**15.7**	**(15.6–15.9)**	**20.6**	**(20.2–21.0)**

Notes: Central Vancouver Island (Vancouver) was excluded from this analysis due to underreporting of uterine scar.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database. Data for women over 35 suppressed due to small numbers.
Source: Hospital Morbidity Database, CIHI

Vaginal Birth After Caesarean (VBAC) Rate by Health Region, Canada, 2001–2002

Map Code	Region	Vaginal Birth After Caesarean (2001–2002) %	95% CI
N.L.		**12.5**	**(9.5–15.5)**
1001	Health and Community Services St. John's Region	14.4	(9.5–19.2)
1002	Health and Community Services Eastern Region	13.5	(6.7–20.4)
1003	Health and Community Services Central Region	7.0	(1.6–12.4)
1004	Health and Community Services Western Region	12.3	(3.8–20.8)
P.E.I.	**Prince Edward Island**	**24.6**	**(18.0–31.1)**
N.S.		**24.0**	**(21.3–26.7)**
1201	Zone 1	22.9	(14.8–30.9)
1202	Zone 2	25.0	(15.0–35.0)
1203	Zone 3	22.4	(15.1–29.7)
1204	Zone 4	9.7	(3.7–15.7)
1205	Zone 5	32.1	(24.1–40.1)
1206	Zone 6	25.3	(21.3–29.3)
N.B.		**14.3**	**(11.8–16.8)**
1301	Region 1	12.3	(7.3–17.4)
1302	Region 2	25.3	(19.1–31.4)
1303	Region 3	10.0	(5.9–14.1)
1306	Region 6	19.6	(8.7–30.5)
Que.		**30.6**	**(29.5–31.8)**
2401	Région du Bas-Saint-Laurent	26.9	(18.9–34.9)
2402	Région du Saguenay—Lac-Saint-Jean	37.0	(30.8–43.2)
2403	Région de Québec	29.2	(25.1–33.3)
2404	Région de la Mauricie et Centre-du-Québec	19.8	(15.4–24.2)
2405	Région de l'Estrie	47.7	(40.2–55.1)
2406	Région de Montréal-Centre	29.3	(27.2–31.3)
2407	Région de l'Outaouais	27.4	(22.0–32.8)
2408	Région de l'Abitibi-Témiscamingue	50.0	(41.0–59.0)
2409	Région de la Côte-Nord	27.5	(17.7–37.3)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	29.9	(18.9–40.8)
2412	Région de la Chaudière-Appalaches	26.4	(21.8–30.9)
2413	Région de Laval	21.8	(17.4–26.2)
2414	Région de Lanaudière	39.3	(34.0–44.6)
2415	Région des Laurentides	30.7	(26.0–35.4)
2416	Région de la Montérégie	32.6	(29.9–35.2)
Ont.		**24.9**	**(24.2–25.6)**
3501	Champlain DHC	26.2	(23.7–28.7)
3502	Southeastern Ontario DHC	21.0	(17.5–24.5)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	22.4	(19.9–24.9)
3504	Toronto DHC	23.4	(21.9–24.8)
3505	Simcoe York DHC	20.6	(18.6–22.7)
3506	Halton-Peel DHC	22.7	(20.9–24.5)
3507	Waterloo Region-Wellington-Dufferin DHC	29.4	(26.4–32.4)
3508	Hamilton DHC	28.6	(25.0–32.2)
3509	Niagara DHC	20.0	(16.2–23.7)
3510	Grand River DHC	32.5	(26.8–38.3)
3511	Thames Valley DHC	38.1	(34.4–41.8)
3512	Essex Kent and Lambton DHC	33.1	(29.7–36.5)
3513	Grey Bruce Huron Perth DHC	29.6	(23.7–35.5)
3514	Northern Shores DHC	15.1	(10.8–19.3)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	14.7	(11.1–18.3)
3516	Northwestern Ontario DHC	34.4	(29.4–39.3)
Man.		**32.3**	**(29.9–34.7)**
4610	Winnipeg Regional Health Authority	32.7	(29.3–36.1)
4630	Interlake Regional Health Authority	33.3	(23.6–43.1)
4640	Central Regional Health Authority	30.5	(23.4–37.5)
Sask.		**35.8**	**(33.1–38.4)**
4704	Regina Qu'Appelle Regional Health Authority	33.6	(27.6–39.6)
4706	Saskatoon Regional Health Authority	40.2	(35.0–45.4)
4709	Prince Albert Parkland Regional Health Authority	57.6	(47.5–67.7)
Alta.		**30.2**	**(28.8–31.6)**
4820	Chinook Regional Health Authority	32.1	(26.0–38.3)
4821	Palliser Health Region	29.5	(21.4–37.6)
4822	Calgary Health Region	31.6	(29.2–34.0)
4823	David Thompson Regional Health Authority	27.2	(22.8–31.5)
4824	East Central Health	21.6	(15.1–28.1)
4825	Capital Health	32.0	(29.3–34.6)
4826	Aspen Regional Health Authority	32.3	(26.5–38.1)
4827	Peace Country Health	17.4	(12.2–22.6)
B.C.		**23.6**	**(22.3–24.8)**
5911	East Kootenay	31.3	(19.9–42.6)
5912	Kootenay/Boundary	19.1	(9.8–28.5)
5913	Okanagan	27.5	(22.4–32.5)
5914	Thompson/Cariboo	22.5	(17.5–27.5)
5921	Fraser East	27.4	(22.7–32.2)
5922	Fraser North	20.2	(17.0–23.5)
5923	Fraser South	25.0	(22.0–28.0)
5931	Richmond	27.4	(21.0–33.7)
5932	Vancouver	25.0	(21.4–28.6)
5933	North Shore/Coast Garibaldi	16.3	(11.6–21.0)
5941	South Vancouver Island	25.9	(21.2–30.7)
5942	Central Vancouver Island	*	
5943	North Vancouver Island	21.7	(14.2–29.3)
5951	Northwest	23.8	(15.7–32.0)
5952	Northern Interior	19.7	(13.7–25.6)
Y.T.	**Yukon Territory**	**33.3**	**(15.6–51.1)**
N.W.T.	**Northwest Territories**	**19.7**	**(10.1–29.3)**
†Nun.	**Nunavut**	**60.7**	**(42.6–78.8)**
Canada		**26.7**	**(26.2–27.2)**

Notes: *Central Vancouver Island (Vancouver) was excluded from this analysis due to underreporting of uterine scar.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Source: Hospital Morbidity Database, CIHI

Postnatal Hospital Admissions by Health Region, Canada, 2000–2001

Map Code	Region	Postnatal Hospital Admissions (2000–2001) Rate/100 Live Births	95% CI
N.L.		**3.0**	**(2.5–3.5)**
1001	Health and Community Services St. John's Region	2.6	(1.9–3.4)
1002	Health and Community Services Eastern Region	3.1	(2.0–4.2)
1003	Health and Community Services Central Region	3.0	(1.9–4.2)
1004	Health and Community Services Western Region	3.6	(2.1–5.0)
P.E.I.	**Prince Edward Island**	**2.8**	**(1.9–3.7)**
N.S.		**2.5**	**(2.1–2.8)**
1201	Zone 1	3.8	(2.7–5.0)
1202	Zone 2	2.6	(1.5–3.7)
1203	Zone 3	1.9	(1.1–2.7)
1204	Zone 4	2.0	(1.1–2.9)
1205	Zone 5	2.2	(1.3–3.0)
1206	Zone 6	2.4	(1.9–2.9)
N.B.		**3.9**	**(3.4–4.3)**
1301	Region 1	4.6	(3.6–5.6)
1302	Region 2	2.6	(1.9–3.4)
1303	Region 3	3.2	(2.4–4.0)
1306	Region 6	5.2	(3.6–6.8)
Que.		**3.1**	**(3.0–3.2)**
2401	Région du Bas-Saint-Laurent	4.3	(3.3–5.3)
2402	Région du Saguenay—Lac-Saint-Jean	5.8	(4.9–6.7)
2403	Région de Québec	1.4	(1.1–1.7)
2404	Région de la Mauricie et Centre-du-Québec	4.5	(3.8–5.1)
2405	Région de l'Estrie	5.2	(4.3–6.0)
2406	Région de Montréal-Centre	2.1	(1.9–2.3)
2407	Région de l'Outaouais	2.2	(1.7–2.8)
2408	Région de l'Abitibi-Témiscamingue	4.4	(3.4–5.5)
2409	Région de la Côte-Nord	5.1	(3.8–6.5)
2411	Région de la Gaspésie—Îles-de-la-Madeleine	3.7	(2.3–5.2)
2412	Région de la Chaudière-Appalaches	3.6	(3.0–4.2)
2413	Région de Laval	3.1	(2.5–3.7)
2414	Région de Lanaudière	4.1	(3.4–4.7)
2415	Région des Laurentides	3.9	(3.4–4.5)
2416	Région de la Montérégie	2.8	(2.5–3.1)
Ont.		**3.2**	**(3.1–3.3)**
3501	Champlain DHC	2.2	(1.9–2.5)
3502	Southeastern Ontario DHC	3.4	(2.9–4.0)
3503	Durham, Haliburton, Kawartha and Pine Ridge DHC	3.3	(2.9–3.6)
3504	Toronto DHC	3.1	(2.9–3.3)
3505	Simcoe York DHC	3.3	(3.0–3.6)
3506	Halton-Peel DHC	4.0	(3.7–4.3)
3507	Waterloo Region-Wellington-Dufferin DHC	2.9	(2.5–3.3)
3508	Hamilton DHC	2.6	(2.2–3.1)
3509	Niagara DHC	4.0	(3.4–4.6)
3510	Grand River DHC	3.6	(2.8–4.3)
3511	Thames Valley DHC	2.1	(1.8–2.5)
3512	Essex Kent and Lambton DHC	4.1	(3.6–4.6)
3513	Grey Bruce Huron Perth DHC	3.5	(2.8–4.3)
3514	Northern Shores DHC	2.8	(2.1–3.5)
3515	Algoma, Cochrane, Manitoulin and Sudbury DHC	2.8	(2.2–3.3)
3516	Northwestern Ontario DHC	5.4	(4.6–6.3)
Sask.		**4.9**	**(4.5–5.3)**
4704	Regina Qu'Appelle Regional Health Authority	5.3	(4.5–6.2)
4706	Saskatoon Regional Health Authority	2.4	(1.9–2.9)
4709	Prince Albert Parkland Regional Health Authority	4.2	(3.0–5.5)
Alta.		**5.0**	**(4.7–5.2)**
4820	Chinook Regional Health Authority	4.2	(3.3–5.1)
4821	Palliser Health Region	4.0	(2.9–5.1)
4822	Calgary Health Region	4.9	(4.5–5.2)
4823	David Thompson Regional Health Authority	5.3	(4.6–6.0)
4824	East Central Health	6.1	(4.7–7.5)
4825	Capital Health	4.5	(4.1–4.9)
4826	Aspen Regional Health Authority	5.9	(4.9–6.8)
4827	Peace Country Health	5.7	(4.6–6.8)
B.C.		**3.5**	**(3.3–3.7)**
5911	East Kootenay	8.4	(6.4–10.5)
5912	Kootenay/Boundary	5.6	(3.8–7.5)
5913	Okanagan	5.1	(4.2–5.9)
5914	Thompson/Cariboo	3.4	(2.6–4.2)
5921	Fraser East	3.2	(2.5–3.8)
5922	Fraser North	3.5	(3.0–4.0)
5923	Fraser South	2.7	(2.3–3.1)
5931	Richmond	3.0	(2.1–3.8)
5932	Vancouver	3.5	(3.0–3.9)
5933	North Shore/Coast Garibaldi	3.4	(2.6–4.1)
5941	South Vancouver Island	2.4	(1.8–3.0)
5942	Central Vancouver Island	4.7	(3.8–5.7)
5943	North Vancouver Island	3.5	(2.3–4.6)
5951	Northwest	4.8	(3.5–6.1)
5952	Northern Interior	3.1	(2.2–3.9)
Y.T.	**Yukon Territory**	**5.0**	**(2.8–7.3)**
N.W.T.	**Northwest Territories**	**6.4**	**(4.5–8.3)**
†Nun.	**Nunavut**	**7.2**	**(5.2–9.3)**
Canada		**3.5**	**(3.5–3.6)**

Notes: Includes only jurisdictions that submit comprehensively to the database, therefore data from Manitoba is excluded from the analysis.
†Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
Sources: Discharge Abstract Database, CIHI
Banque de données sur les hospitalisations du système Med-Écho, Ministère de la Santé et des Services sociaux (Med-Écho hospitalization database, Québec Ministry of Health and Social Services)

Appendix B

Technical Notes for Maternal and Infant Health Care Indicators

General Notes

The methodology used for these indicators was designed to maximize inter-regional, inter-provincial, and inter-territorial comparability. For this reason, and because the indicators are based on the latest updates available at the time of publication, there may be differences with definitions and data sources used in other reports.

Health regions are defined by provincial governments as the areas of responsibility for regional health boards (that is, legislated) or as regions of interest to health care authorities. In order to provide for more stable rate estimation, as well as less suppression due to privacy and confidentiality issues, only data from regions with a population of at least 75,000 are reported. Boundaries are those that were in effect as of June 2003.

Data are based on a patient's region of residence, which may not be the same as the region of hospitalization.

Hospitalizations include discharges and deaths for inpatients in acute care hospitals for the reference period. Same day surgery (outpatient) cases and patients admitted to non–acute care hospitals (e.g. chronic care, psychiatric, or rehabilitation facilities) are generally not included in the totals.

ICD-10-CA and the Canadian Classification of Health Interventions (CCI) systems of coding diagnoses and procedures came into effect April 1, 2001, and were adopted by Newfoundland (now Newfoundland and Labrador), Prince Edward Island, Nova Scotia, parts of Saskatchewan, British Columbia and the Yukon Territory. Ontario, the remainder of Saskatchewan, Alberta, the Northwest Territories and Nunavut implemented ICD-10/CCI on April 1, 2002. Most of the indicators are based on data up to and including March 31, 2002.

Indicator cases that were originally coded in ICD-10 or CCI were extracted on the relevant codes and not the ICD-9 or CCP translations.

- Nunavut birth counts may differ from the territory's published data due to the incomplete capture of some births occurring among Nunavut women in CIHI's Discharge Abstract Database.
- Methods for selected indicators (assisted delivery, primary caesarean section and postnatal hospital admissions) were chosen to be as consistent as possible with those used by Health Canada's *Canadian Perinatal Health Report 2003*.

Rate of Epidural Anaesthesia for Vaginal Deliveries

Definition

Number of acute hospital vaginal deliveries where epidural anaesthetic was used, expressed as a proportion of all vaginal deliveries.

Method of Calculation

(Number of vaginal deliveries where epidural anaesthetic was used/number of vaginal deliveries) * 100

Denominator: Number of Vaginal Deliveries

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of "1" or "2"; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position
ICD-9-CM	Any one diagnosis code of 640-676 and with a fifth digit of "1" or "2"; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position
ICD-10	Any one diagnosis code of O1, O2, O4, O6, O7, O8, O9, O30-O35, O37, O36.0, O36.1, O36.2, O36.3, O36.5, O36.6, O36.7, O36.8, or O36.9 and with a sixth digit of "1" or "2" in any position; Z37.0, Z37.2, Z37.3, Z37.5, or Z37.6 in the first position

Denominator Exclusions

1. Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
ICD-9-CM	Any one procedure code of 74.3, 74.91, 75.0, 69.51, or 69.01
CCI	Any one procedure code of 5.CA.93.EM, 5.CA.93.EQ, 5.MD.60.KF, 5.MD.60.RE, 5.MD.60.RF, 5.CA.88, 5.CA.89

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and "abandoned after onset" cases were excluded.

2. Deliveries via caesarean section:

CCP	Any one procedure of 86.0-86.2, 86.8, or 86.9
ICD-9-CM	Any one procedure code of 74.0, 74.1, 74.2, 74.4, 74.99
CCI	5.MD.60

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and "abandoned after onset" cases were excluded.

Numerator: Number of Vaginal Deliveries Where Epidural Anaesthetic Was Used

Since this number is a subset of the denominator, the same exclusion criteria used in the calculation of the denominator were applied. Either of the following codes was used to identify cases of epidural anaesthesia:

Anaesthetic technique code

Anaesthetic technique code equal to "3" or procedure code of

CCP	16.91
ICD-9-CM	03.91
CCI	5.LD.20.HA-P1

Data Sources

Discharge Abstract Database, CIHI
Hospital Morbidity Database, CIHI

Availability

April 1, 2001 to March 31, 2002

Comprehensiveness

Not all provinces and regions across Canada submit comprehensively to the Discharge Abstract Database. For this reason, the province of Manitoba was excluded from the analysis. Three Alberta health regions: Chinook (4820), Calgary (4822) and Palliser (4821) were excluded from the analysis due to underreporting of epidural anaesthetic use. Consequently, the national rate and the provincial rate for Alberta exclude those jurisdictions.

References

1 Truman C, Jin Y. (2002). *Use of epidural analgesia for labor and delivery in Alberta*. CRRM; 7(4):265–70.

2 Truman C, Jin Y, Johnson D. (2002).*Use of Epidural Analgesia for Labour and Delivery in Alberta*. Technical Report. Alberta Centre for Health Services Utilization Research, September.

3 Perinatal Partnership Program of Eastern and Southeastern Ontario. (2003). *PPPESO Annual Perinatal Statistical Report 2002*, May.

4 Rourke JTB. (1998). *Trends in small hospital obstetric services in Ontario*. Can Fam Physician; 44:2117–2124.

5 Oyston J. (1995). Obstetrical anaesthesia in Ontario. Can J Anaesth; 42(12):1117–1125.

6 *Alberta Reproductive Health: Pregnancy Outcomes*. Alberta Health and Wellness 2001. www.asac.ab.ca/Pubs/reproductiveHealthStudy2001.pdf.

7 Canadian Anesthesiologists' Society. www.cas.ca/public/anesthesia_and_you/default.asp?load=anesthesia - 6.

Rate of Epidural Anaesthesia for All Deliveries

Definition

Number of acute hospital deliveries where epidural anaesthetic was used, expressed as a proportion of all deliveries

Method of Calculation

(Number of deliveries where epidural anaesthetic was used/number of all deliveries) * 100

Denominator: Number of All Deliveries

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position
ICD-9-CM	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position
ICD-10	Any one diagnosis code of O1, O2, O4, O6, O7, O8, O9, O30-O35, O37, O36.0, O36.1, O36.2, O36.3, O36.5, O36.6, O36.7, O36.8, or O36.9 and with a sixth digit of “1” or “2” in any position; Z37.0, Z37.2, Z37.3, Z37.5, or Z37.6 in the first position

Denominator Exclusions

Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
ICD-9-CM	Any one procedure code of 74.3, 74.91, 75.0, 69.51, or 69.01
CCI	Any one procedure code of 5.CA.93.EM, 5.CA.93.EQ, 5.MD.60.KF, 5.MD.60.RE, 5.MD.60.RF, 5.CA.88, 5.CA.89

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and “abandoned after onset” cases were excluded.

Numerator: Number of Deliveries Where Epidural Anaesthetic Was Used

Since this number is a subset of the denominator, the same exclusion criteria used in the calculation of the denominator were applied. Either of the following codes was used to identify cases of epidural anaesthesia:

Anaesthetic technique code

Anaesthetic technique code equal to "3" or procedure code of

CCP	16.91
ICD-9-CM	03.91
CCI	5.LD.20.HA-P1

Data Sources

Discharge Abstract Database, CIHI
Hospital Morbidity Database, CIHI

Availability

April 1, 2001 to March 31, 2002

Comprehensiveness

Not all provinces and regions across Canada submit comprehensively to the Discharge Abstract Database. For this reason, the province of Manitoba was excluded from the analysis. Three Alberta health regions: Chinook (4820), Calgary (4822) and Palliser (4821) were excluded from the analysis due to underreporting of epidural anaesthetic use. Consequently, the national rate and the provincial rate for Alberta exclude those jurisdictions.

References

1 Truman C, Jin Y. (2002). *Use of epidural analgesia for labor and delivery in Alberta*. CRRM; 7(4):265–70.

2 Truman C, Jin Y, Johnson D. (2002).*Use of Epidural Analgesia for Labour and Delivery in Alberta*. Technical Report. Alberta Centre for Health Services Utilization Research, September.

3 Perinatal Partnership Program of Eastern and Southeastern Ontario. (2003). *PPPESO Annual Perinatal Statistical Report 2002*, May.

4 Rourke JTB. (1998). *Trends in small hospital obstetric services in Ontario*. Can Fam Physician; 44:2117–2124.

5 Oyston J. (1995). Obstetrical anaesthesia in Ontario. Can J Anaesth; 42(12):1117–1125.

6 *Alberta Reproductive Health: Pregnancy Outcomes*. Alberta Health and Wellness 2001. www.asac.ab.ca/Pubs/reproductiveHealthStudy2001.pdf.

7 Canadian Anesthesiologists' Society. www.cas.ca/public/anesthesia_and_you/default.asp?load=anesthesia - 6.

Assisted Deliveries (Overall)

Definition

The number of acute hospital vaginal births assisted by means of forceps or vacuum extraction, expressed as a proportion of all vaginal births.

Method of Calculation

(Number of vaginal deliveries by forceps or vacuum extraction/number of vaginal deliveries) * 100

Denominator: Number of Vaginal Deliveries

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of "1" or "2"; 650; V27.0, V27.2, V27.3, V27.5, or V27.6 in any position.
ICD-9-CM	Any one diagnosis code of 640-676 and with a fifth digit of "1" or "2"; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position

Denominator Exclusions

1. Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
ICD-9-CM	Any one procedure code of 74.3, 74.91, 75.0, 69.51, or 69.01

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

2. Deliveries via caesarean section:

CCP	Any one procedure of 86.0-86.2, 86.8 or 86.9
ICD-9-CM	Any one procedure code of 74.0, 74.1, 74.2, 74.4, 74.99

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

Numerator: Number of Vaginal Deliveries by Forceps or Vacuum Extraction

Since this number is a subset of the denominator, the same exclusion criteria used in the calculation of the denominator were applied. The following codes were used to identify forceps or vacuum extraction:

CCP	Any one procedure of 84.0, 84.1, 84.2, 84.3 or 84.7
ICD-9-CM	Any one procedure of 72.0, 72.1, 72.2, 72.3, 72.7

Code may be recorded in any position. Cancelled, previous, out-of-hospital cases were excluded.

Additional Numerator Exclusions

Minor uses of forceps were excluded. The CCP codes and ICD-9-CM codes for these procedures are:

CCP	84.4, 84.61, 84.62 and 84.69
ICD-9-CM	72.4, 72.51, 72.53, 72.6

Data Source

Hospital Morbidity Database, CIHI

Availability

April 1, 2000 to March 31, 2001

Comprehensiveness

Available for all provinces and territories

References

1 Health Canada. (2003). *Canadian Perinatal Health Report, 2003*. Ottawa: Minister of Public Works and Government Services Canada.

Assisted Deliveries (Forceps)

Definition

The number of acute hospital vaginal births assisted by means of forceps, expressed as a proportion of all vaginal births.

Method of Calculation

(Number of vaginal deliveries by forceps/number of vaginal deliveries) * 100

Denominator: Number of Vaginal Deliveries

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6 in any position.
ICD-9-CM	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position

Denominator Exclusions

1. Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
ICD-9-CM	Any one procedure code of 74.3, 74.91, 75.0, 69.51, or 69.01

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

2. Deliveries via caesarean section:

CCP	Any one procedure of 86.0-86.2, 86.8 or 86.9
ICD-9-CM	Any one procedure code of 74.0, 74.1, 74.2, 74.4, 74.99

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

Numerator: Number of Vaginal Deliveries by Forceps

Since this number is a subset of the denominator, the same exclusions criteria used in the calculation of the denominator were applied. The following codes were used to identify forceps procedure:

CCP	Any one procedure of 84.0, 84.1, 84.2, 84.3
ICD-9-CM	Any one procedure of 72.0, 72.1, 72.2, 72.3

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and "abandoned after onset" cases were excluded.

Additional Numerator Exclusions

Minor uses of forceps were excluded. The CCP codes and ICD-9-CM codes for these procedures are:

CCP	84.4, 84.61, 84.62 and 84.69
ICD-9-CM	72.4, 72.51, 72.53, 72.6

Data Source

Hospital Morbidity Database, CIHI

Availability

April 1, 2000 to March 31, 2001

Comprehensiveness

Available for all provinces and territories

References

1 Health Canada. (2003). *Canadian Perinatal Health Report, 2003*. Ottawa: Minister of Public Works and Government Services Canada.

Assisted Deliveries (Vacuum Extraction)

Definition

The number of acute hospital vaginal births by vacuum, extraction expressed as a proportion of all vaginal births.

Method of Calculation

(Number of deliveries by vacuum extraction/number of vaginal deliveries) * 100

Denominator: Number of Vaginal Deliveries

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6 in any position.
ICD-9-CM	Any one diagnosis code of 640-676 and with a fifth digit of “1” or “2”; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position

Denominator Exclusions

1. Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
ICD-9-CM	Any one procedure code of 74.3, 74.91, 75.0, 69.51, or 69.01

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

2. Deliveries via caesarean section:

CCP	Any one procedure of 86.0-86.2, 86.8 or 86.9
ICD-9-CM	Any one procedure code of 74.0, 74.1, 74.2, 74.4, 74.99

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

Numerator: Number of Vaginal Deliveries by Vacuum Extraction

Since this number is a subset of the denominator, the same exclusions criteria used in the calculation of the denominator were applied. The following codes were used to identify vacuum extraction:

CCP	84.7
ICD-9-CM	72.7

Code may be recorded in any position. Cancelled, previous, and out-of-hospital cases were excluded.

Data Source

Hospital Morbidity Database, CIHI

Availability

April 1, 2000 to March 31, 2001

Comprehensiveness

Available for all provinces and territories

References

1 Health Canada. (2003). *Canadian Perinatal Health Report, 2003*. Ottawa: Minister of Public Works and Government Services Canada.

Rate of Primary Caesarean Deliveries

Definition

Proportion of women delivering babies in acute care hospitals by caesarean section among women who have not previously had a caesarean delivery.

Method of Calculation

(Number of caesarean sections among women who have not previously had a caesarean delivery/number of deliveries excluding women who have previously had a caesarean delivery) * 100

Denominator: Deliveries Among Women Who Have Not Previously Had a Caesarean Delivery

A delivery was identified using the following diagnostic codes:

ICD-9	Any one diagnosis code of 640-676 and with a fifth digit of "1" or "2"; 650; V27.0, V27.2, V27.3, V27.5, or V27.6, in any position
ICD-10	Any one diagnosis code of O1, O2, O4, O6, O7, O8, O9, O30-O35, O37, O36.0, O36.1, O36.2, O36.3, O36.5, O36.6, O36.7, O36.8, or O36.9 and with a sixth digit of "1" or "2" in any position; Z37.0, Z37.2, Z37.3, Z37.5, or Z37.6 in any position

Denominator Exclusions

1. Deliveries in which an abortive procedure was provided:

CCP	Any one procedure code of 86.3, 86.4, 87.0, 87.1, or 87.2
CCI	Any one procedure code of 5.CA.93.EM, 5.CA.93.EQ, 5.MD.60.KF, 5.MD.60.RE, 5.MD.60.RF, 5.CA.88, 5.CA.89

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and "abandoned after onset" cases were excluded.

2. Women with a history of uterine scar:

ICD-9	Diagnosis code 6542 in any position
ICD-10	Any one diagnosis code of O34201, O75701 in any position

Numerator: Primary Caesarean Sections

Since the numerator is a subset of the denominator, the same exclusion criteria used in the calculation of the denominator were applied. The following codes were used to identify caesarean section:

CCP	Any one procedure of 86.0-86.2, 86.8, or 86.9
CCI	5.MD.60

Code may be recorded in any position. Cancelled, previous, out-of-hospital, and "abandoned after onset" cases were excluded.

Standards/Benchmarks

Guidelines defining the appropriate indications for caesarean section are available.

Data Source

Hospital Morbidity Database, CIHI

Availability

April 1, 2001 to March 31, 2002

Comprehensiveness

Central Vancouver Island (health region 5942) was excluded from the analysis due to underreporting of uterine scar within the region, and (primary caesarean section rates could not be reliably calculated). Consequently, the national rate and the provincial rate for British Columbia were calculated excluding this region.

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Postnatal Hospital Admissions

Definition

Number of infants who were readmitted to an acute care hospital within 28 days of birth, per 100 live births.

Method of Calculation

(Number of infants who were readmitted to an acute care hospital within 28 days of birth/number of acute care hospital live births) * 100.

Denominator: Live Births

The number of hospital live births was identified using CIHI's abstract entry flag for newborns coded as "N."

Denominator Exclusions

Newborns with a birth weight of less than 1,000 g or a missing weight value were excluded.

Numerator: Postnatal Hospital Admissions

Any admission to an acute care hospital within 28 days after birth.

Numerator Exclusions

Newborns who were transferred to another institution after birth; newborns with initial length of hospital stay greater than 20 days; newborns with a birth weight of less than 1,000 g or a missing weight value; newborns discharged on the same day of birth; and day surgery admissions.

Data Sources

Discharge Abstract Database, CIHI
Banque de donneés sur les hospitalisations du système Med-Écho, Ministère de la Santé et des Services sociaux (Québec)

Availability

April 1, 2000 to March 31, 2001

Comprehensiveness

Includes only jurisdictions that submit comprehensively to the database, therefore data from Manitoba are excluded from the analysis.

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