

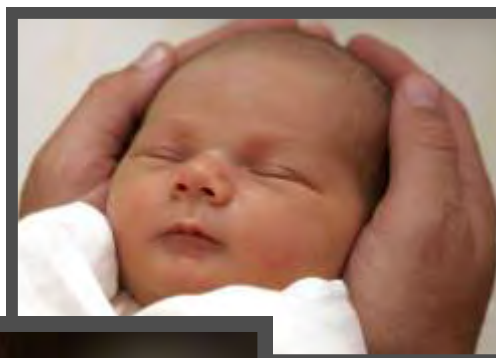


Early health. Lifelong health.  
Début en santé. Longue vie en santé.

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# Perinatal Health Report 2008

*Eastern Ontario Public Health Region*



May 2010



*Dear Colleagues:*

*The Better Outcomes Registry & Network (BORN) Ontario (formerly the Ontario Perinatal Surveillance System – OPSS) is pleased to release this series of reports that provide an overview of the 2008 maternal newborn outcomes for each of seven Public Health Regions in Ontario. These regions were defined according to groupings that have been used historically for planning purposes and do not reflect a formal designation by the Ministry of Health and Long-Term Care or the Ministry of Health Promotion. Where possible, the report compares the indicators for women and babies who live within specific Public Health Unit boundaries. In 2010, a companion series of five reports for hospitals within combined LHIN boundaries will be distributed. The two sets of reports will be pooled to produce an overview of maternal newborn health in Ontario.*

*We hope you find this report informative and useful for guiding public health policy decisions for maternal and newborn issues in your region. Please share this report and use it to guide discussions with colleagues about how to improve programs or learn from others about best practices.*

*Please feel free to provide BORN Ontario with any feedback about how this report could be improved or suggestions for further targeted reports to enhance understanding of particular issues.*



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## Preface

The Better Outcomes Registry & Network (BORN) Ontario (formerly the Ontario Perinatal Surveillance System) is pleased to present this *Perinatal Health Report* for the Eastern Ontario Public Health Region. It provides data from the 2008 calendar year on pregnancy, maternal and newborn health and outcomes of interest to public health care providers. As Public Health has a mandate to enable individuals and families to achieve optimal preconception health, experience a healthy pregnancy, have the healthiest newborn(s) possible, and be prepared for parenthood,<sup>1</sup> BORN Ontario contributes to this mandate by providing data to inform decision making and policy development relevant to maternal health and reproductive outcomes.

The content and presentation of this report by BORN Ontario differs from previous reports of the Ontario Perinatal Surveillance System in a number of ways. For the first time, we are reporting data by public health unit (PHU) regions (defined according to historical groupings, not formal designation). Some data are presented for individual PHUs within the region and others focus on the region itself, particularly when numbers are small. Through input received from PHUs, BORN has added a number of new figures to this report, has included definitions for all the indicators, and has provided background and data interpretation. We greatly appreciate the on-going support of our public health colleagues for their assistance and input into the content of these reports.

The primary focus of public health is the health and well-being of the whole population through the promotion and protection of health and the prevention of illness.<sup>1</sup> Perinatal health care requires public health, community agencies and hospitals to work together to meet the goal of population health. The continuum of care during pregnancy and birth takes women and families from home to offices, clinics, and hospitals, with return for follow-up care to these community settings after the birth. Our hope in providing these data is that they will be used by those providing care in public health, community and acute care settings to stimulate discussions and partnerships to solve common maternal and newborn care issues. We also encourage you to use these data to facilitate program management, benchmarking, quality improvement initiatives, planning, evaluation and research.

Suggestions for future reports can be directed to any member of the BORN team (see **Appendix A** for contact information) or to Ann Sprague, Scientific Manager of BORN Ontario – [asprague@ottawahospital.on.ca](mailto:asprague@ottawahospital.on.ca).

## References

1. Ministry of Health and Long-Term Care, Public Health Division. *Ontario Public Health Standards* [Internet]. Toronto, Ontario: Queen's Printer for Ontario; 2008 [cited 07 Jan 2010]. Available from: [http://www.health.gov.on.ca/english/providers/program/pubhealth/oph\\_standards/ophs/progstds/pdfs/ophs\\_2008.pdf](http://www.health.gov.on.ca/english/providers/program/pubhealth/oph_standards/ophs/progstds/pdfs/ophs_2008.pdf).

## Acknowledgements

BORN Ontario (formerly the Ontario Perinatal Surveillance System) would like to acknowledge the tremendous work of the public health professionals we consulted to develop content for this report. As this is the first year that BORN Ontario has had capacity to explore all public health regions in Ontario, it has been a challenge to find the right mix of data to present. We appreciate the guidance of the Child Health Network (CHN) in Toronto and the collaboration of public health representatives in the Greater Toronto Area, as well as the Perinatal Partnership Program of Eastern and Southeastern Ontario (PPESO) who facilitated contact with the public health groups in their regions to provide advice and direction. For future reports, we will seek further input and direction, especially from Northern public health units and smaller health units to ensure we are reporting indicators that also meet their needs. Further guidance for content of the report was provided by the Scientific Working Group of BORN Ontario and we thank them for their contribution.

We also thank our BORN partners who contributed data for this report – Jennifer Milburn from Newborn Screening Ontario, Tianhua Huang from the Ontario Maternal Multiple Marker Screening Database, Seetha Raja from the Ontario Midwifery Program and Vivian Holmberg on behalf of the Ontario Midwifery Program. Data from the Ministry of Children and Youth Services were provided by Alex Rishea.

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## About the Better Outcomes Registry & Network (BORN Ontario)

BORN Ontario (formerly the Ontario Perinatal Surveillance System) was funded in January of 2009 by the Ontario Ministry of Health and Long-Term Care (MOHLTC). BORN Ontario would like to acknowledge the tremendous vision and support of the Ministry of Health and Long-Term Care in helping us to meet our goals and progress towards our mission of being an authoritative and definitive source of accurate and timely information to monitor, evaluate and plan for the best possible beginnings for life-long health.

BORN operates under the auspices of the Children's Hospital of Eastern Ontario and is recognized (as of November 2009) as a registry of personal health information under the Ontario *Personal Health Information Protection Act* (PHIPA). The focus of BORN Ontario in this first year of business has been to work on:

- Building capacity to enhance data quality, data output, research activities, and reporting.
- Improving data capture to include all hospitals and midwifery practices. As of November 2009, all Ontario hospitals with maternal newborn services are contributing data.
- Developing a new database to collect and store the critical maternal–child data from the five founding partners – Ontario Maternal Multiple Marker Screening Database (prenatal screening), Fetal Alert Network (congenital anomalies), Niday Perinatal Database and NICU/SCN Database, Ontario Midwifery Program Database and the Newborn Screening Ontario Database – as well as to enhance data collection for the future.
- Developing privacy and security policies and procedures for review by the Ontario Information and Privacy Commissioner, required by PHIPA registry status.
- Communicating our mission, vision, and activities to all groups who will work with the organization as we move forward.

For those wishing to access BORN Ontario data for research or quality improvement projects, an outline of the process and guidelines can be found in **Appendix B**.

## Main Messages

- The Eastern Public Health Region (EPHR) had 15 hospital sites providing maternity care in 2008, including two academic health science centers (three sites), four large community hospitals, and eight small community hospitals (with less than 500 births per year).
- For the calendar year 2008, all hospitals in the EPHR providing obstetrical services were contributing data to the BORN Ontario Niday Perinatal Database.
- 16,783 women living in the EPHR gave birth in 2008 – a 1.8% increase from 16,479 in the five-year period since 2004.
- In 2008, a total of 351 women in midwifery care gave birth at home.
- The proportion of teenage women (less than 20 years of age) who gave birth in 2008 was 4.4%, a slight increase from 3.8% in 2004. This proportion was highest in Hastings & Prince Edward counties (8.6%) and lowest in Ottawa Public Health (2.4%).
- One in five women (20.1%) who gave birth in 2008 were 35 years of age or older. This proportion was highest in Ottawa Public Health (26.0%).
- The multiple birth rate has increased by 17%, from 3.0% in 2004 to 3.5% in 2008. The rate of multiple birth was highest for women 30–34 years of age (4.6%) and those 35 years of age and older (4.4%).
- The overall rate of cesarean birth was 29.0% – very similar to the provincial rate (28.5%).
- In 2008, obstetricians were the predominant care providers attending hospital births in the EPHR (82.5%).
- Overall, 91.0% of women who gave birth in the EPHR had at least one prenatal visit with a health care provider during the first trimester.
- The rate of cigarette smoking in pregnancy has increased in the EPHR from 13.9% in 2004 to 16.0% in 2008. There was considerable regional variation in rates of smoking, with the highest rate observed in Hastings & Prince Edward counties (30.0%).
- Rates of smoking during pregnancy decreased with increasing maternal age – close to half of mothers under the age of 20 smoked during pregnancy (47.1%).
- Higher rates of preterm birth, small for gestational age (SGA) and low birth weight (LBW) occurred among women who smoked during pregnancy compared with those who did not smoke.
- Overall, one in five women (20.5%) in the EPHR attended prenatal classes in 2008. Prenatal class attendance was highest among first-time mothers (38.5%).
- The rate of preterm birth (PTB) (<37 weeks gestation) increased from 8.3% in 2004 to 9.3% in 2008.
- The rate of PTB among singleton live births was 7.5%, while more than half of twins or higher-order multiples were born preterm (60.0%).
- The rate of SGA based on the 10<sup>th</sup> percentile showed little variation between 2004 and 2008. Among infants born in the EPHR in 2008, the rate of SGA was 7.3%.
- The rate of SGA was highest among mothers under 20 years of age (12.5%) and lowest in mother 35 years and older (5.9%).
- The proportion of live births with LBW (<2,500 g) was 6.5% in 2008.

- The proportion of women intending to breastfeed in the EPHR remained consistently high (86.2%–87.8%) over the five year period from 2004 to 2008. Breastfeeding intention was highest in Ottawa Public Health (92.0%) and lowest in Hastings & Prince Edward counties (78.9%).
- Intention to breastfeed was associated with maternal age – the lowest intention to breastfeed was observed in mothers under 20 years of age (73.6%) and the highest in mothers 35 years and older (91.1%).
- Although 60.6% of healthy full-term infants received only breastmilk while in hospital, approximately one in four healthy full-term infants (26.4%) received a combination of formula and breastmilk.
- The rate of exclusive breastfeeding at discharge from hospital among healthy full-term infants appears to be decreasing. Over the past three calendar years, the rate of exclusive breastfeeding in the EPHR decreased from 70.1% to 63.4%.
- 96.7% of infants living the EPHR had a Parkyn screen completed and 84.3% of babies obtained a pass on infant hearing screening while in hospital.



## Future directions/Emerging issues

**Regional variation:** Variation across public health units was observed for several variables. For example, higher rates of teenage pregnancy and smoking during pregnancy, and lower rates of midwifery-attended hospital births, intention to breastfeed and exclusive breastfeeding were observed in Hastings & Prince Edward counties and Eastern Ontario health units. The reasons behind these observations are unknown and warrant further investigation to determine whether they are due to underlying differences in socio-demographic characteristics or availability of programs and services, or due to other reasons.

**Teenage mothers:** Mothers under the age of 20 years had higher rates of smoking during pregnancy and small for gestational age, and lower rates of intention to breastfeed compared with other mothers. These findings may be of particular interest to public health units with respect to delivery of services related to healthy pregnancy and breastfeeding. Future exploration of these data, broken down into smaller age groups (e.g., 12-14 years, 15-16 years and 17-19 years) may be necessary to assist health units target those mothers with the greatest need for services.

**Smoking during pregnancy:** Despite problems with data quality, there appears to be an increasing trend in the rate of cigarette smoking during pregnancy in the EPHR. This finding is concerning and may require action to ensure that pregnant women receive information and support regarding this preventable and harmful prenatal exposure.

**Recent trends in preterm birth:** The recent increase in the rate of preterm birth in the EPHR is also of concern and should be explored further to determine the underlying reasons for this trend.

**Breastfeeding:** Further exploration of the reasons for the decrease in the rate of exclusive breastfeeding should be undertaken. Understanding reasons for supplementation (investigation of care practices, policies and procedures, education for parents and decision making processes used for supplementation in hospitals) is essential to fully understand the triggers that lead to inappropriate supplementation prior to discharge from hospital.

**Information gaps:** There are several areas requiring improved or new perinatal surveillance information. Improved quality of congenital anomaly data for Ontario will be forthcoming with the development of the new BORN Ontario database integrating congenital anomaly information from four existing sources. Other areas warranting consideration for new data collection include prepregnancy body mass index and sociodemographic information, particularly ethno-racial data and income data, which are critical for identifying and addressing social inequalities in maternal and infant health. Finally, there is a recognized need for high-quality infant mortality information in the province. Together with ServiceOntario, BORN Ontario is working on an initiative to explore and understand data quality concerns with infant mortality information in the province.

**Data quality:** There are several variables in the database with a high proportion of missing values that complicate interpretation of results. The variables that could particularly benefit from improvements in data capture include mother's language spoken at home, antenatal care visits in the first trimester, prenatal class attendance, maternal smoking during pregnancy and breastfeeding variables (intention to breastfeed, method of infant feeding in hospital, method of infant feeding on discharge, supplementation rates and reasons for supplementation). These variables are essential for public health unit program planning.

## Introduction

This report is based on data from the 2008 calendar year, primarily from BORN Ontario (formerly the Ontario Perinatal Surveillance System (OPSS)) Niday Perinatal Database, but includes other sources of data, where applicable. Five year trends are available for some variables. The report is divided into five chapters: Regional Profile; Healthy Pregnancy; Preparation for Parenting; Child Health; and Smoking During Pregnancy. The objectives of this report are to:

- Illustrate the utility of the data in supporting indicators that are relevant to reproductive and child health within the Ontario Public Health Standards
- Highlight maternal-newborn issues and trends arising from the analysis
- Present a baseline for future examination of trends by Public Health Region

As of November 2009, all hospitals in Ontario with maternal newborn services are contributing data to the Niday Perinatal Database within BORN. However, for this report of the 2008 calendar year, it is estimated that approximately 95% of the hospital births in the province were captured. As the new BORN Ontario database is developed throughout 2010/2011, all BORN founding partners will be contributing data and we expect to have a more robust system capable of longitudinal analysis of mothers, fetuses and newborns.

This year, for the first time, we are able to provide reports for all areas of the province. For public health units, the unit of analysis is the public health region, based on maternal residence in the region, as opposed to location of birth. In 2010, we will be releasing a series of regional hospital reports, where the unit of analysis will be the LHIN region. In both series of reports (which will be available on the BORN website: [www.bornontario.ca](http://www.bornontario.ca)), you will notice a few changes from previous reports. Each indicator is now accompanied by its definition, as well as clarification of the numerator and denominator used for calculation. For graphs that provide a breakdown by public health unit, comparison at the regional and the provincial level is provided. Where five-year trends are reported, we have added 95% confidence levels to the estimates.

We will continue to improve reports as BORN Ontario grows and develops. Future reporting plans include adding GIS mapping for some indicators, as well as increasing the number of indicators for which we provide confidence intervals. We will be pleased to receive your comments about how reports can change and improve in the future to best meet your needs. If you have specific requests for new indicators, suggestions to change existing indicators, or ideas for specialized reports, we welcome your feedback.

Finally, because BORN Ontario is a web-based system, we are able to add data variables to respond to emerging health issues. The most recent example, particularly important to public health units, is our collection of three variables on H1N1 and other influenza-like illnesses in pregnancy, treatment with antiviral medication and use of influenza vaccine. This process was implemented on November 2, 2009 and data collection will continue for one year. Look for more information regarding this initiative, as well as reporting on these variables on the BORN website in 2010, or contact your BORN Regional Coordinator (see **Appendix A** for contact information).

## Methods

### Data Sources

This report was prepared using data from several of the BORN Ontario (formerly the Ontario Perinatal Surveillance System (OPSS)) databases, but the majority of data presented in this report originate from the BORN-Niday Perinatal Database. The Niday collects information for all births (live births and stillbirths) that occur at  $\geq 20$  weeks of gestational age or have a birth weight of  $\geq 500$  grams. The database does not collect information on pregnancies that end in miscarriage before 20 weeks' gestation or terminations of pregnancy for fetal anomalies at any gestational age. Hospital births that were attended by midwives are included in these analyses. Some information on home births attended by midwives are included in this report, but are presented separately. Births to Ontario residents that occurred in other provinces or countries are not included.

The Niday Perinatal Database is a web-based system into which data on mothers and babies are directly entered either by nurses and midwives providing care, data entry clerks using information from care providers and patient records, or through a system of data upload from electronic health records in some facilities.

The Niday has been operating in Eastern and Southeastern Ontario since 1997, and has undergone tremendous expansion in recent years. In 2008, the principal time period reflected in this report, approximately 95% of all hospital births in Ontario were entered into the database. As of November 2009, all hospitals in the province with a maternal newborn program are now engaged with BORN Ontario and providing data; therefore, future reports will be able to provide a complete, population-based picture of perinatal health in the province of Ontario.

### Indicators

The process for choosing indicators for the public health reports primarily consisted of looking at previous reports by the Child Health Network (CHN) in the Greater Toronto Area (GTA) and the Perinatal Partnership Program of Eastern and Southeastern Ontario (PPESO).<sup>1,2</sup> Both of these groups already had active Niday Perinatal Database subcommittees that advised them on public health needs and data requests. Conference calls and meetings were held with these groups to gain further insight on types of analysis and alignment of indicators with the recently released Ontario Public Health Standards.<sup>3</sup> These consultations took place in the spring and summer of 2009. In addition, on advice of the Scientific Working Group of BORN, national perinatal surveillance reports<sup>4,5</sup> were reviewed to ensure consistency between the work of Ontario and to enhance our ability to contribute to national data initiatives.

### Data Analysis

This report primarily presents data for the calendar year 2008; however, selected indicators are presented for the time period 2004–2008, therefore, a 5-year dataset was extracted from the Niday Perinatal Database in September 2009.

The information in this report is analyzed by mother's place of residence at the time of birth, not by location of birth. At the time of data entry into the Niday, records are automatically assigned to a public health unit (PHU) based on the mother's postal code of residence at the time of birth. For the dataset used to prepare this report, if the postal code was invalid or unknown, a manual process of assigning records to a PHU was carried out. Initially, the latest postal code conversion file from the Ontario Ministry and Health and Long-Term Care (September 2008 version) was used to assign records with new postal codes to the appropriate PHU. Remaining records were assigned using the Forward Sortation Area (first three characters of the postal code) in combination with the name

of the city or town of residence to determine the appropriate PHU of residence. The numbers and statistics in this report may differ somewhat from previous reports using Niday data as a result of updates and modifications to the database or due to a slightly different methodology of assigning postal codes to public health units.

This report presents descriptive statistics, predominantly proportions. No statistical tests have been conducted on these data; therefore, differences in estimates across subgroups, or over time are not necessarily statistically significant and should be subject to cautious interpretation.

In order to quantify the precision of the point estimates (i.e., proportions) for indicators that are presented over a five-year period, 95% confidence intervals were calculated. The 95% confidence interval can be defined as a range that contains the true value of the point estimate 95% of the time.<sup>6</sup> The width of the 95% confidence interval conveys important information about the variability of the point estimate — the narrower the confidence interval, the less variability and the greater the precision of the estimate. To a certain extent, the 95% confidence interval can provide useful information for comparing two rates. A very clear description of this application in the context of perinatal data can be found in Appendix B of the Canadian Perinatal Health Report, 2008 Edition.<sup>4</sup> **Nevertheless, it is important to keep in mind that the BORN-Niday Perinatal Database has been evolving rapidly in recent years, and changes in some point estimates over the 2004–2008 time period may be related to temporal changes in the number of hospitals that contributed birth records to the database or the completeness of data collection over this five-year period.**



Every effort has been made to present data with enough detail to be meaningful, while upholding BORN's responsibility to protect the confidentiality of individual mothers, infants, care providers, and health care facilities. For this report, information is presented in aggregate form. Where aggregate information was based on five or fewer records, the information was either excluded from the report or was aggregated at a higher level.

Records with missing information for a particular indicator were excluded from analyses of that indicator. As a result, the effective denominator size used for analysis occasionally varied across indicators, even when the definition of the denominator remained the same. Footnotes have been added to the figures to alert the reader when more than 10% of records for a particular estimate had missing information. Those estimates that were based on data where greater than 30% of records had missing information were excluded from the figures due to concern about the validity of the estimate.

## Data Presentation

Most of the data in this report are presented using bar graphs. Line graphs, however, are used when indicators are presented over time. Corresponding data tables for each graph are available on request.

When reviewing each figure, it is important to be cognizant of the scale (i.e., the y-axis) and the denominator, as both of these parameters will vary from graph to graph depending on the indicator being presented. At the bottom of each figure, a definition of the indicator, including information on the numerator and denominator, is provided. Additionally, data tables and data labels have been used in all graphs for clarity.

Throughout the report, many of the indicators have been presented by public health unit. These graphs present the relevant indicator for each public health unit in the region, for the region as a whole, and for the province of Ontario. The following abbreviations are used in the figures to identify each PHU in the Eastern Ontario public health unit region:

HPE	Hastings & Prince Edward Counties Health Unit
KFLA	Kingston, Frontenac and Lennox & Addington Public Health
LGL	Leeds, Grenville and Lanark District Health Unit
OTT	Ottawa Public Health
REN	Renfrew County & District Health Unit
EO	Eastern Ontario Health Unit

## Data Quality

Over the past year, a quality audit of the BORN-Niday Perinatal Database was completed. In this audit, information from the patient record was re-abstracted to help assess concordance (accuracy and completeness) between the data in the Niday Perinatal Database and the maternal and infant charts. An additional component of this audit was to survey database stakeholders to learn more about site-specific data collection and entry processes, report generation capability and overall usefulness of the database.

The auditors were unable to re-abstract several of the variables that may be of particular interest for public health units (e.g., mother's primary language used at home, prenatal class attendance and timing of first antenatal visit), because they exceeded the audit's pre-determined missing data threshold of 10%. However, in the survey of database stakeholders, these variables were flagged by respondents as difficult to capture, partly due to definition issues, and partly due to access to information (poor or missing documentation).

The quality audit did re-abstract smoking variables, and found agreement between the Niday and health records was less than 85%. Survey respondents reported that smoking information documented in the patient record (often just smoker or non-smoker) isn't precise enough for Niday entry where the choice requires a breakdown related to gestational age. This forced some users to select 'unknown' as the only logical option, because a simple 'yes' or 'no' wasn't available. Thus, although smoking wasn't problematic from a missing data perspective, it is likely that smoking rates are underreported across the province.

The results of this audit are now being used to make improvements to the system and help care providers collect and enter data more efficiently. For example, one mechanism used to improve data quality, which was added to the database in January 2009, was an increase in the number of mandatory fields so that a birth record could not be saved unless these fields were complete. Another enhancement was the addition of further logic and verification rules that question conflicts when data are entered. A third mechanism that will occur as part of the process of building the new BORN database is to undertake a data normalization exercise to reduce duplication of data collection among the partners.

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## CHAPTER 1 REGIONAL PROFILE

### Introduction

The Eastern Ontario public health region includes a population of 1,667,032<sup>1</sup> across 14 counties spanning approximately 33,000 square kilometers.<sup>2</sup>

There are 6 public health units in the region:

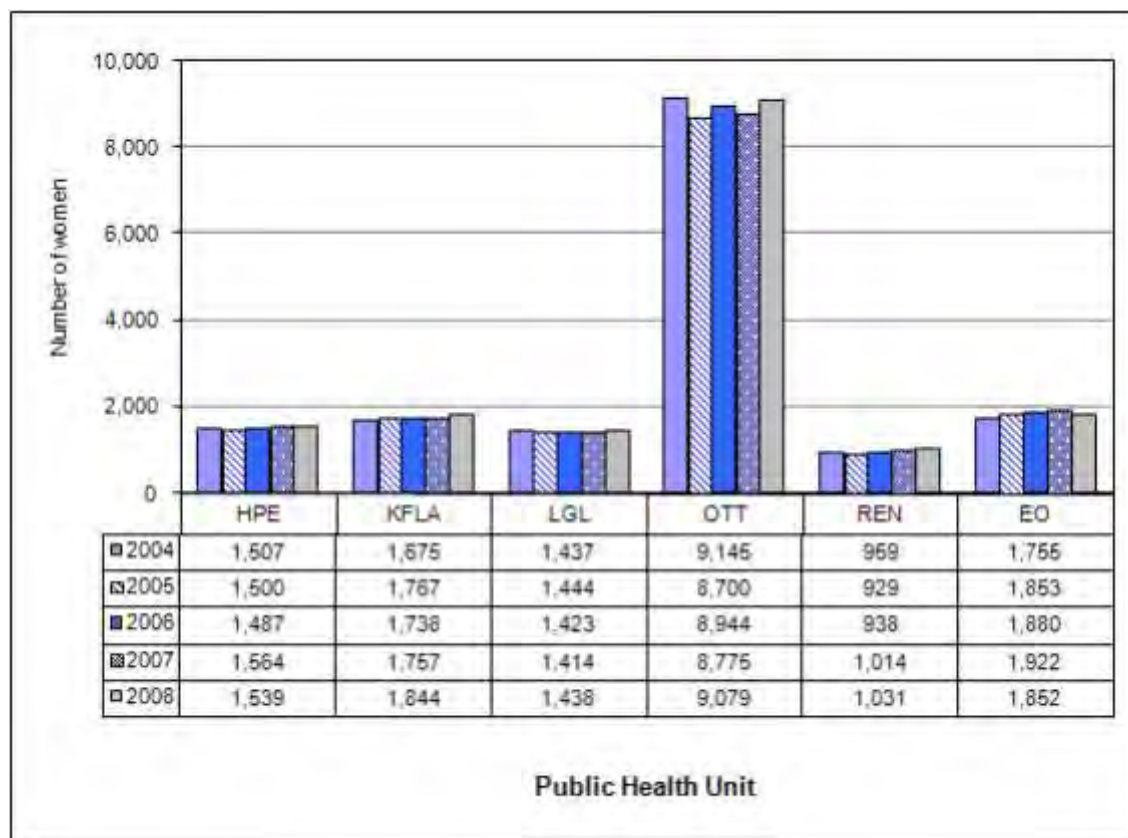
- Hastings & Prince Edward Counties Health Unit
- Kingston, Frontenac and Lennox & Addington Health Unit
- Leeds, Grenville and Lanark District Health Unit
- Ottawa Public Health
- Renfrew County & District Health Unit
- Eastern Ontario Health Unit

Information on health unit demographic profiles<sup>1</sup> and on programs and services provided by the health units<sup>3</sup> in the Eastern Ontario region is available elsewhere.

In the fiscal year 2007/08, the region had 15 hospital sites providing obstetric care and delivery services including two academic health science centers (three sites), four large community hospitals, and eight small community hospitals (with less than 500 births per year). There were three hospitals providing high risk neonatal care for babies born at those sites and a children's hospital providing high-risk neonatal care for babies born at other sites and transferred after birth.<sup>2</sup>

This report presents data for women who were residents of the Eastern Ontario public health region at the time of birth, regardless of where the birth took place. While most women in the region gave birth at one of the 15 hospitals, some women gave birth at home and these births are presented separately within this report.

**Figure 1.1** Number of women who gave birth, by public health unit  
*Eastern Region, 2004–2008*

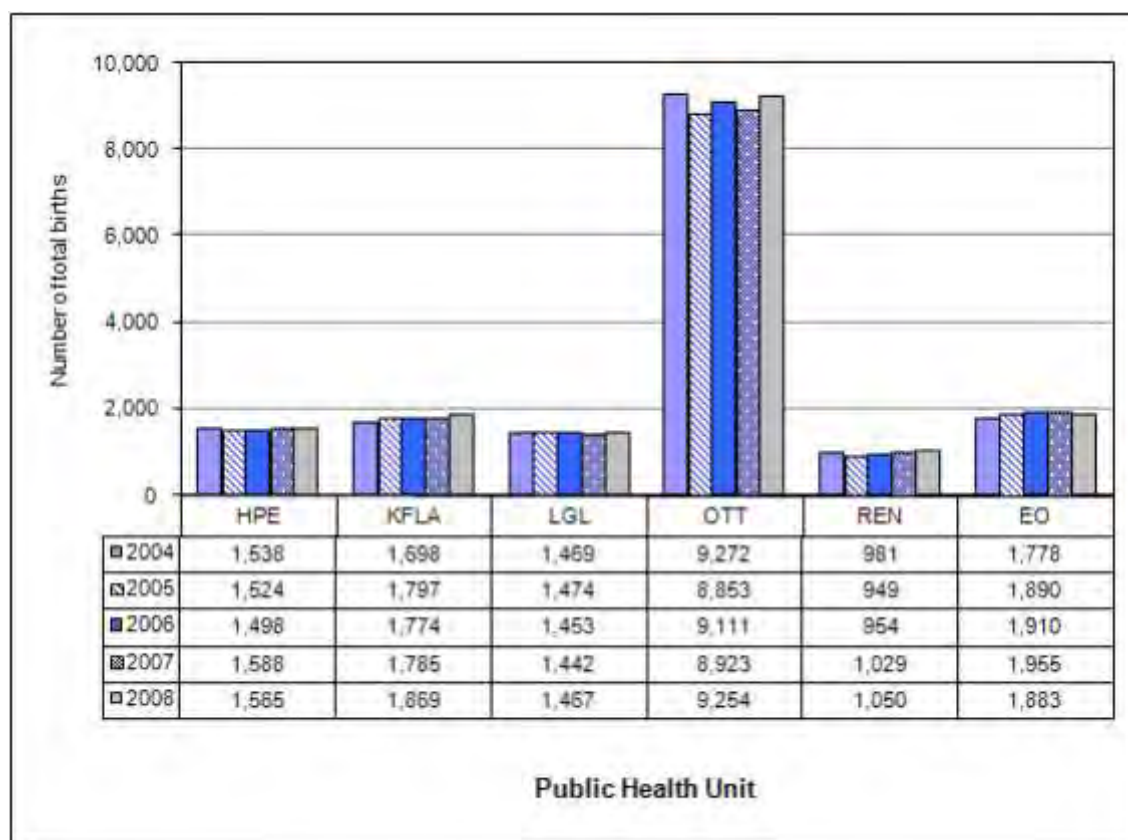


*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of women residing in the Eastern Ontario public health region who gave birth in hospital in 2004–2008.

- The number of women who resided in the Eastern Public Health Region who gave birth in hospital in 2008 was 16,783. This represents 12.3% of the total number of Ontario residents who gave birth in Ontario in 2008 (136,138). The PHU with the highest number of women who gave birth in the Eastern Public Health Region in 2008 was Ottawa Public Health (9,079). All other health units in the region had fewer than 2,000 women who gave birth in 2008.
- The total number of women recorded in the database for this region who gave birth in hospital increased by 1.8%, from 16,479 in 2004 to 16,783 in 2008.

**Figure 1.2** Number of total births, by public health unit  
Eastern Region, 2004–2008

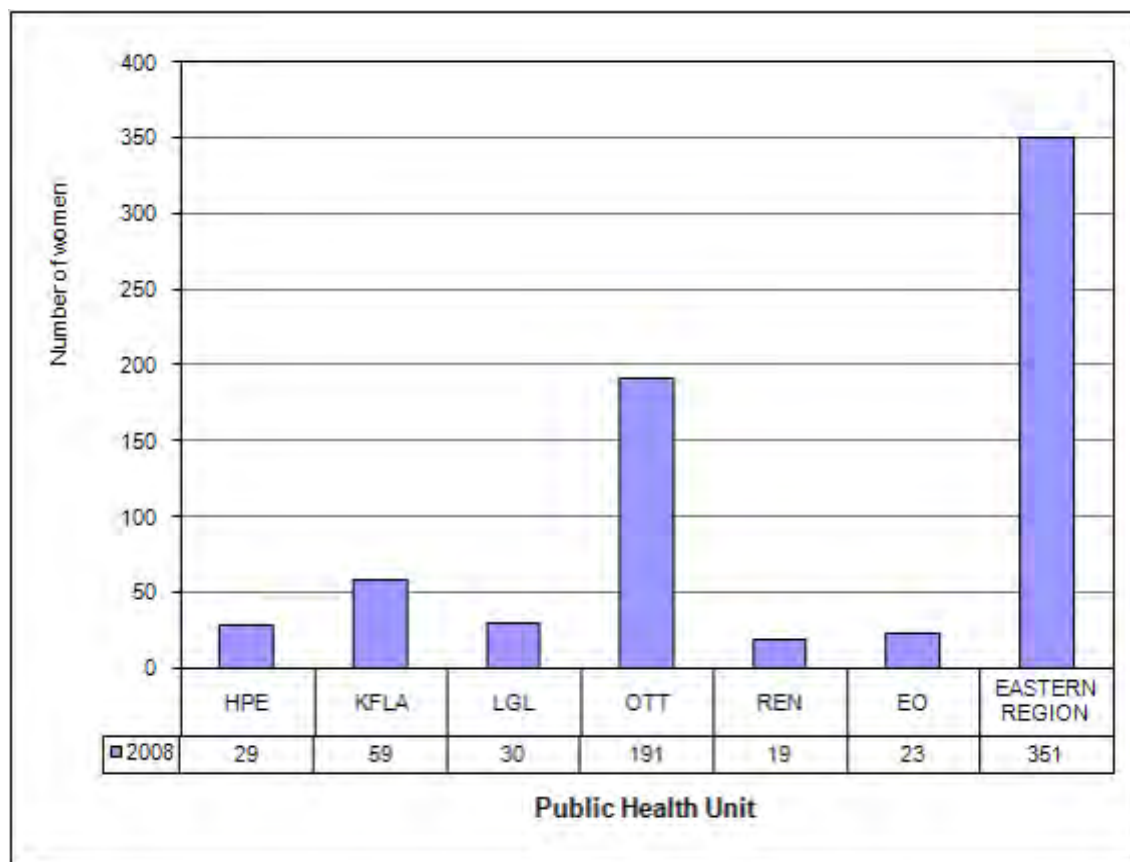


Data source BORN Ontario (Niday Perinatal Database), 2004–2008

Definition of indicator The number of total hospital births (live births and stillbirths) in the Eastern Ontario public health region in 2004–2008.

- The number of total hospital births (live births and stillbirths) to women who resided in the Eastern Region in 2008 was 17,088. Over half of the births (9,254) occurred within the Ottawa Public Health region. All other units in the region had fewer than 2,000 births.
- The number of total hospital births recorded in the database for this region increased by 2.1%, from 16,736 in 2004 to 17,088 in 2008.

**Figure 1.3** Number of women in midwifery care who gave birth at home, by public health unit  
 Eastern Region, 2008



*Data source* Ontario Midwifery Program Maternal-Newborn Health Reporting System (Ontario Ministry of Health and Long-Term Care), 2008

*Definition of indicator* The number of women residing in the Eastern Ontario public health region who gave birth at home in 2008 under the care of a midwife.

- The number of women who resided in the Eastern Public Health Region who gave birth at home under the care of a midwife in 2008 was 351. This represents 14.8% of the total number of home births in Ontario in 2008 (2,360).

## Teen Pregnancy and Birth

Although the proportion of live births to teenage mothers decreased in Canada from 1995–2004,<sup>4</sup> Canada's teenage birth rate is six times higher than that of Japan and Switzerland and more than twice that of Sweden and Finland.<sup>5</sup> In 2004, the proportion of live births to mothers 10-19 years of age was 4.8% in Canada (excluding Ontario) and 3.3% in Ontario.<sup>6</sup>

Inadequate prenatal care, physical and sexual abuse, increased likelihood of social deprivation, drug use and smoking,<sup>7</sup> poor nutrition resulting in poor maternal weight gain and anemia<sup>7,8</sup> and premature termination of education<sup>8,9</sup> are all factors that place teen mothers and their infants at greater risk for preterm and/or low birth weight,<sup>7,8</sup> and increased perinatal mortality.<sup>8,10–12</sup> Teen mothers, particularly those with limited social support, are more likely to experience postpartum depression,<sup>13</sup> and they are less likely to breastfeed.<sup>12</sup>

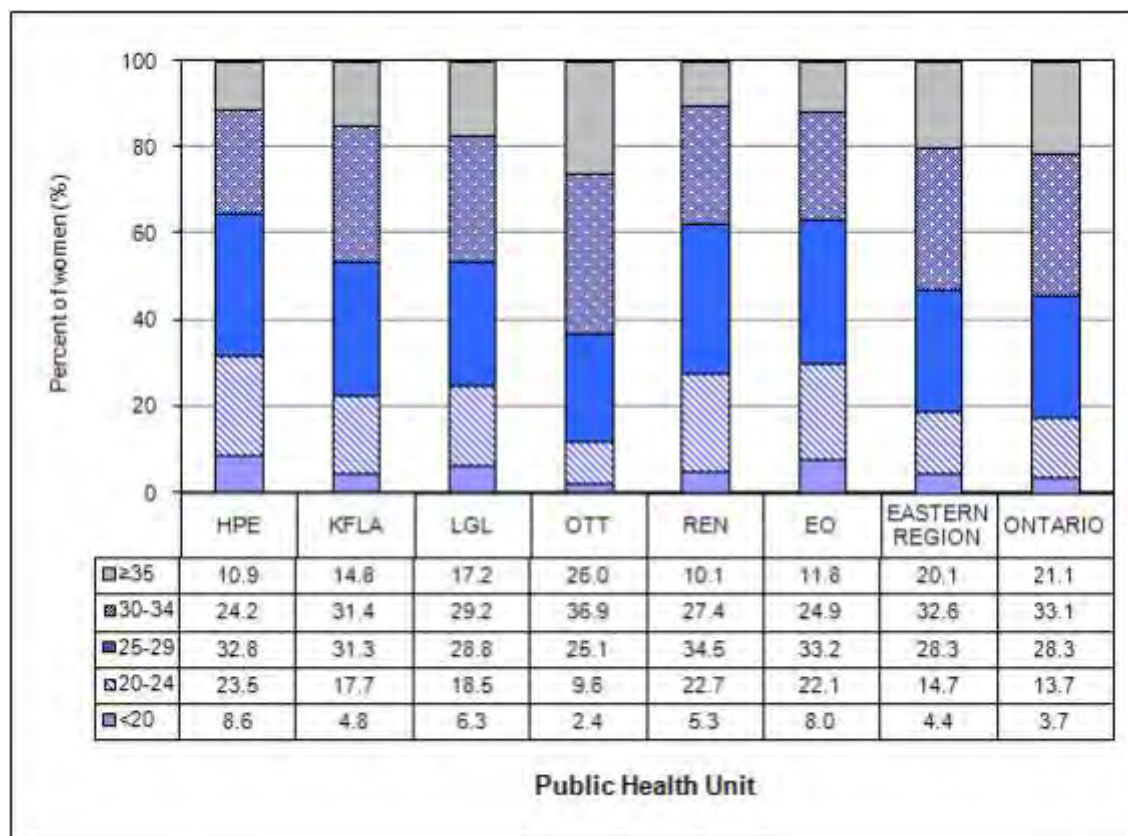
Teenage pregnancy and birth is an important public health issue. Ontario's public health units provide a variety of comprehensive services intended to support young mothers to have optimal health outcomes for themselves and their babies. These services include: healthy sexuality education and counseling, provision of low cost birth control supplies, confidential and free sexual health clinic services, and building community partnerships with schools, hospitals, and community-based organizations to deliver healthy sexuality and reproductive health programs and services.<sup>1</sup>

## Advanced Maternal Age

Increasingly, women are delaying childbearing – in Canada, the proportion of live births to older mothers ( $\geq 35$  years of age) steadily increased from 1995–2004.<sup>14</sup> In 2004, the proportion of live births to mothers 35-49 years of age was 15.4% in Canada (excluding Ontario) and 19.9% in Ontario.<sup>6</sup> This trend has become an important public health issue because of its association with increases in maternal morbidity (including gestational hypertension and diabetes), cesarean delivery, multiple gestation pregnancy and adverse pregnancy outcomes (including chromosomal abnormalities, miscarriage, low birth weight, small for gestational age, preterm birth, stillbirth, perinatal mortality and serious neonatal morbidity).<sup>14–18</sup> Health care providers and public education campaigns should emphasize to all women of child-bearing age the risks of advanced maternal age as a means to support informed decisions about the timing of child bearing.<sup>19</sup>

Older first-time mothers, often have a higher level of education and socioeconomic status.<sup>20</sup> These women usually seek prenatal care earlier and receive good quality maternity care.<sup>20</sup> Since higher socioeconomic status is associated with a lower prevalence of risk factors such as pre-pregnancy obesity and smoking during pregnancy,<sup>21</sup> older women, especially those who have no chronic conditions, generally have healthy pregnancies and healthy babies.<sup>22</sup>

**Figure 1.4** Distribution of maternal age, by public health unit  
Eastern Region, 2008

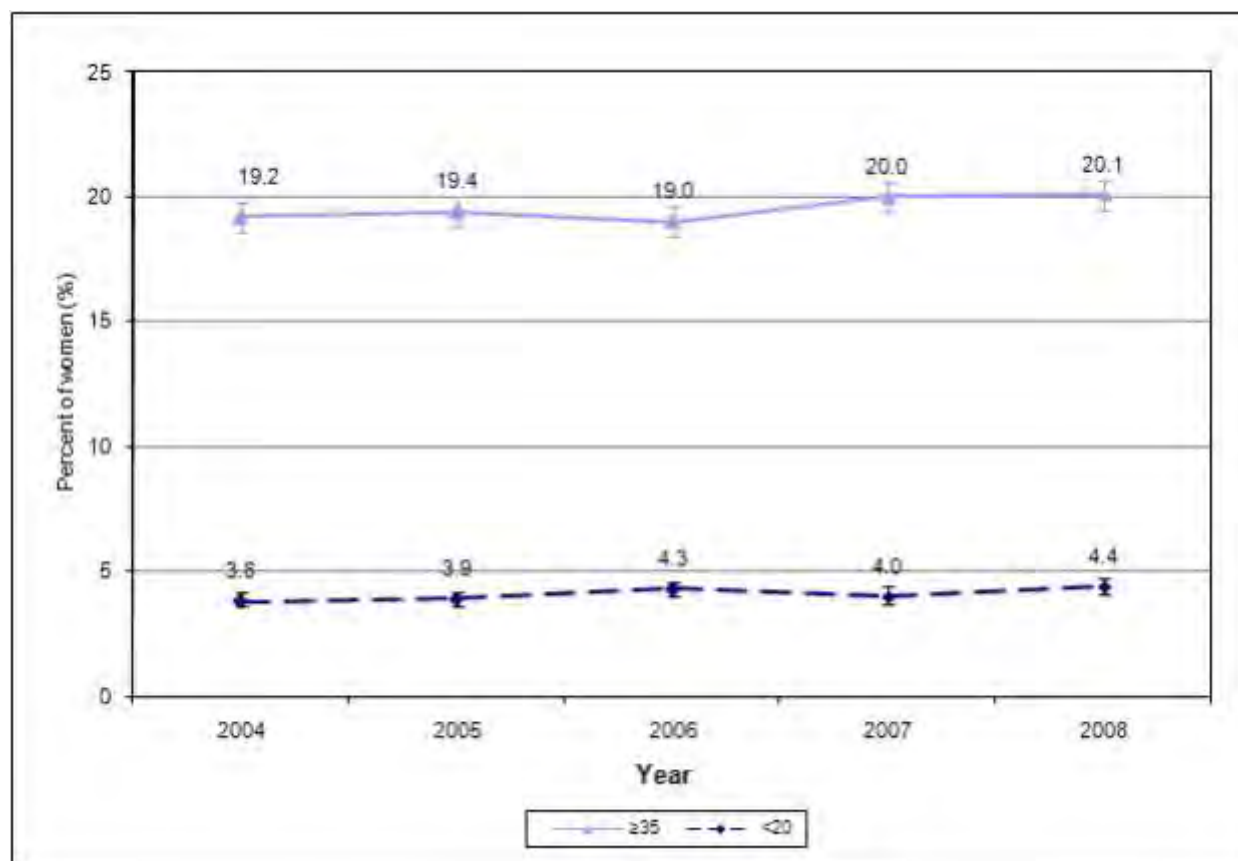


Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The distribution of categories of maternal age in years at the time of birth, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- Approximately 61% of women who resided in the Eastern Public Health Region and gave birth in 2008 were between the ages of 25 and 34 years.
- The proportion of teenage women (less than 20 years of age) who gave birth in 2008 was 4.4%. The public health units with the highest proportion of teenage women giving birth in 2008 were Hastings & Prince Edward counties (8.6%) and Eastern Ontario health units (8.0%).
- One in five women were 35 years of age or older. The PHU with the highest proportion of women ≥35 years of age giving birth in 2008 was Ottawa Public Health (26.0%).

**Figure 1.5 Proportion of women who were <20 years or  $\geq 35$  years at delivery**  
*Eastern Region, 2004–2008*

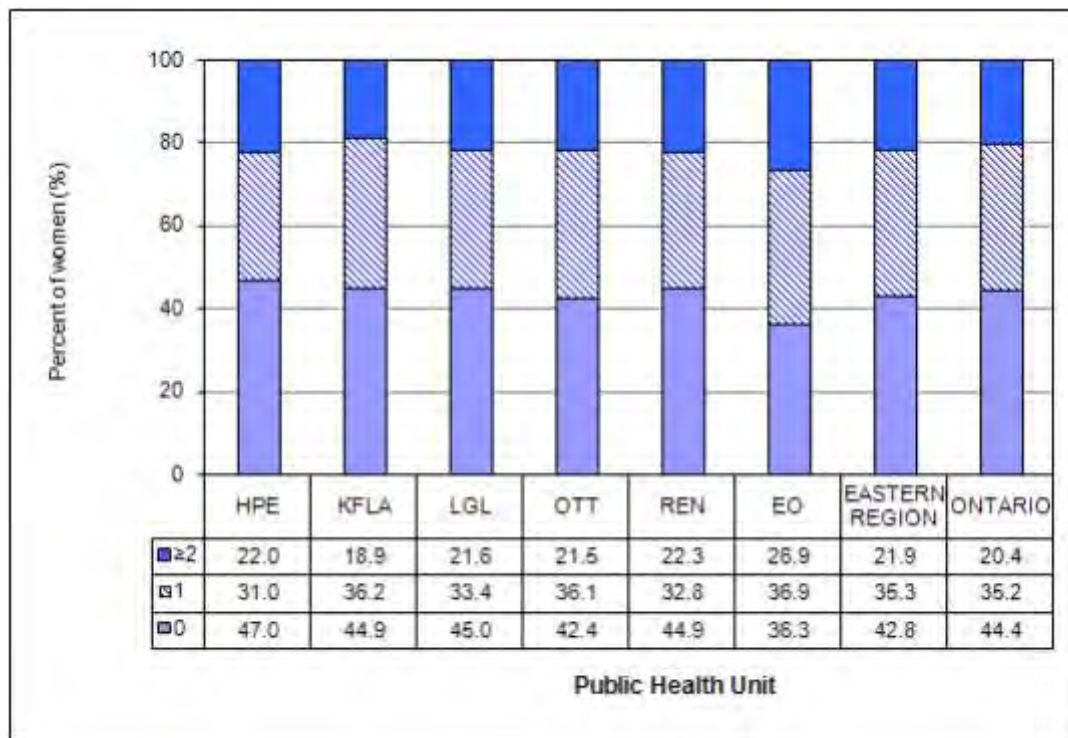


*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of women <20 years of age or  $\geq 35$  years of age who gave birth, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- The proportion of women who gave birth who were <20 years of age increased slightly from 3.8% (95% CI: 3.6%-4.2%) in 2004 to 4.4% (95% CI: 4.1%-4.7%) in 2008.
- Between 2004 and 2008, the proportion of women who gave birth who were  $\geq 35$  years of age remained relatively constant, fluctuating from a low of 19.0% (95% CI: 18.4%-19.6%) to a high of 20.1% (95% CI: 19.5%-20.7%).

**Figure 1.6 Distribution of parity, by public health unit**  
*Eastern Region, 2008*

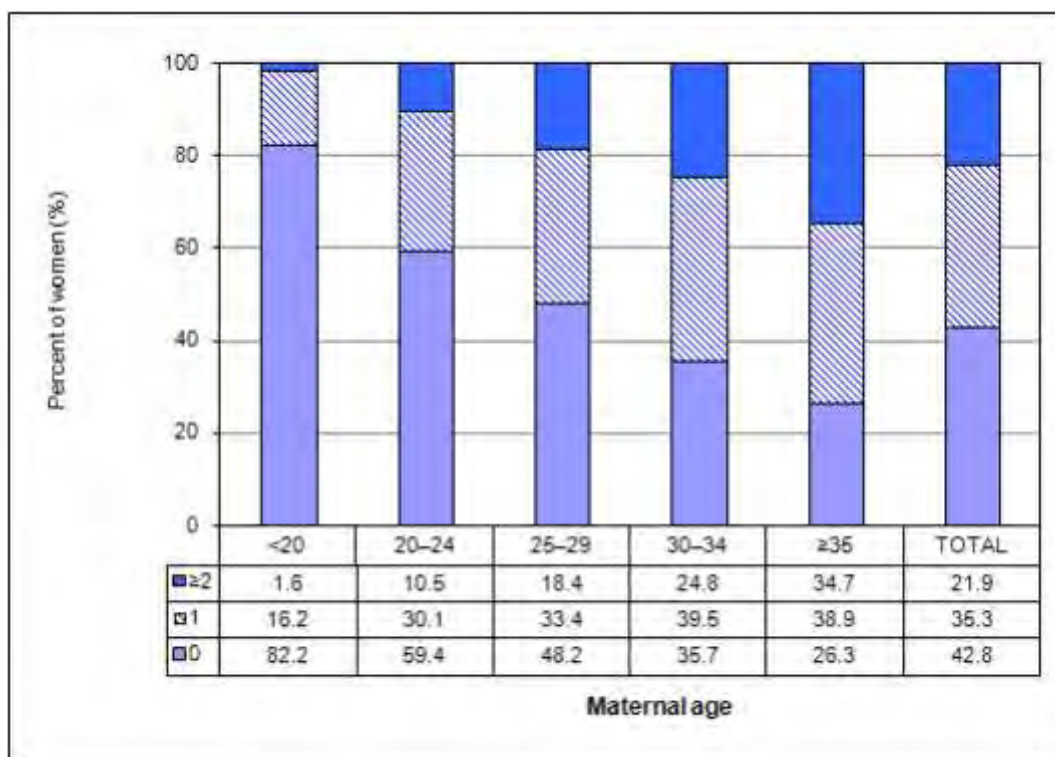


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of parity, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time). For this report, parity is defined as the number of previous live births or stillbirths (0, 1, ≥2), not including the current pregnancy.

- Over 40% (42.8%) of the women who resided in the Eastern Public Health Region and gave birth in 2008 were first-time mothers (i.e., parity = 0). The public health unit with the highest proportion of first-time mothers was Hastings & Prince Edward counties (47.0%).

**Figure 1.7 Distribution of parity, by maternal age**  
*Eastern Region, 2008*

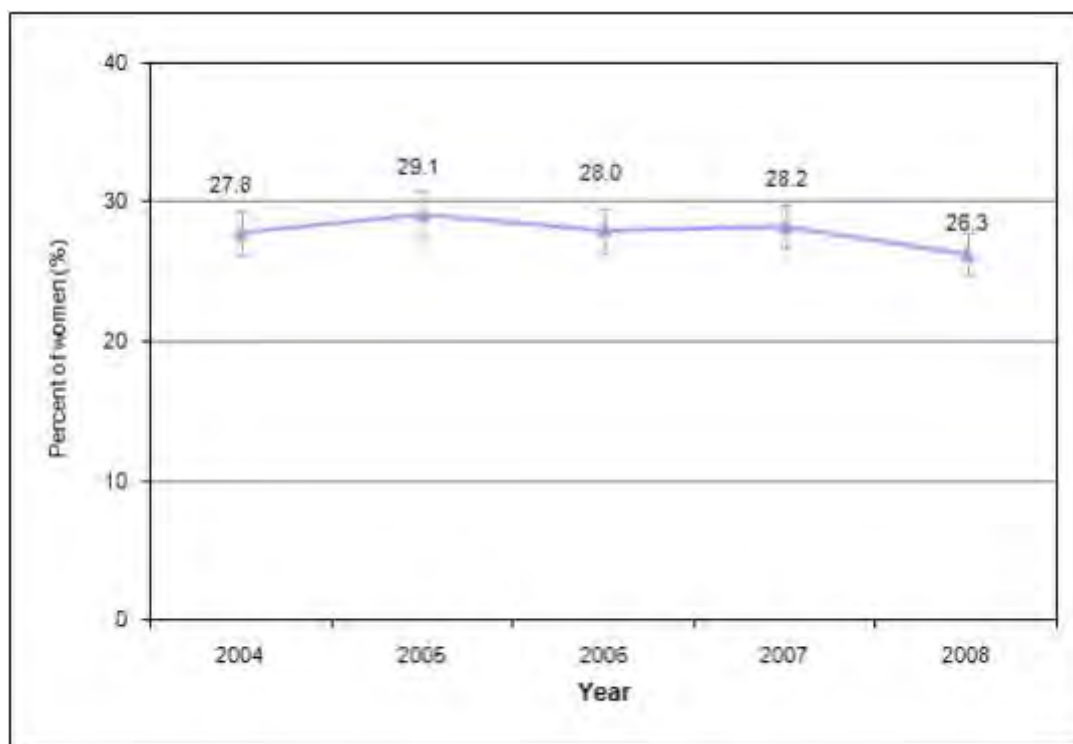


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of parity, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time). For this report, parity is defined as the number of previous live births or stillbirths (0, 1, ≥2), not including the current pregnancy.

- The distribution of parity showed considerable variation by maternal age. Over 80% of women less than 20 years of age (82.2%) were giving birth for the first time (i.e., parity = 0) versus 26.3% for women ≥35 years of age. Conversely, only 1.6% of women under 20 years of age had already given birth two or more times prior to the current pregnancy (i.e., parity ≥2), compared with 34.7% of women ≥35 years.

**Figure 1.8** Proportion of women who were  $\geq 35$  years and nulliparous at delivery  
Eastern Region, 2004–2008

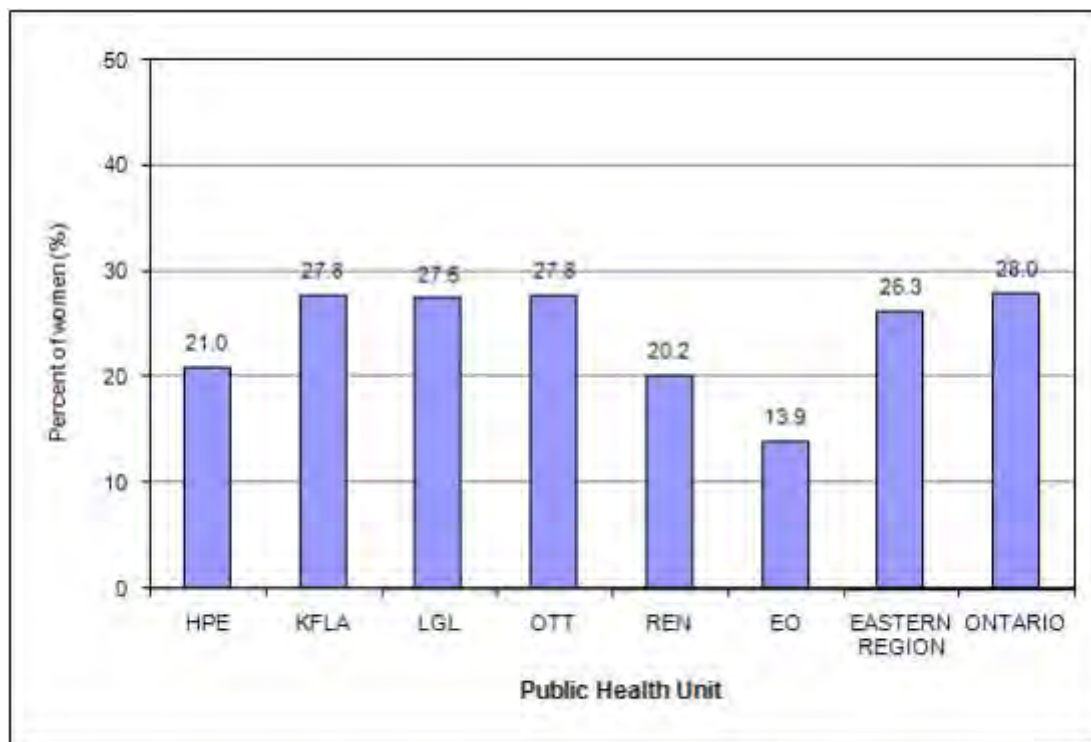


*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of deliveries to women who were  $\geq 35$  years of age and nulliparous (parity=0), expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- Between 2004 and 2008, the proportion of women who were 35 years of age or older and nulliparous (i.e., parity = 0) remained fairly constant.

**Figure 1.9** Proportion of women who were  $\geq 35$  years and nulliparous at delivery, by public health unit  
Eastern Region, 2008



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of deliveries to women who were  $\geq 35$  years of age and nulliparous (parity=0), expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- In 2008, about 26% of women in the Eastern Public Health Region were 35 years of age or older and nulliparous (i.e., parity = 0), marginally lower than the provincial proportion of 28.0%. Among the public health units in the region, this proportion was highest in Kingston, Frontenac and Lennox & Addington and Ottawa Public Health (27.8%), and lowest among residents in the Eastern Ontario Health Unit area (13.9%).

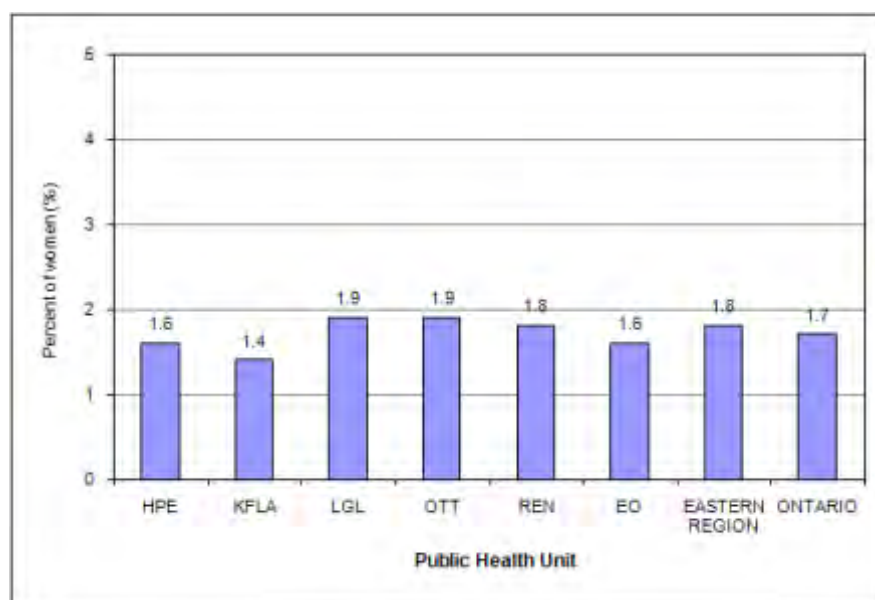
## Multiple Birth

Multiple gestation pregnancies are accompanied by an increased risk of problems in mother and baby. For instance, women pregnant with multiples have more obstetrical complications such as anemia, pre-eclampsia, preterm labour and cesarean delivery; while the fetuses/infants are at higher risk of having low birth weight, poor fetal growth, preterm birth, perinatal death,<sup>23,24</sup> cerebral palsy and other neurodevelopmental disabilities.<sup>25</sup>

The multiple birth rate in Canada (excluding Ontario) increased steadily between 1995 and 2004, from 2.2% to 3.0%.<sup>26</sup> In Ontario, the rates have similarly increased from 2.4% to 3.2%.<sup>6</sup> This ongoing trend is likely related to increased use of assisted reproductive technology to treat infertility (which is more common in older women) as well as increases in maternal age.<sup>27,28</sup> Techniques that limit the number of fetuses in multiple gestation pregnancies (through limitations on the number of embryos transferred during assisted reproductive technology or multifetal pregnancy reduction) may lead to improved outcomes.<sup>29,30</sup>

The rising number of multiple births has financial consequences to families and society. These costs include provision of additional antenatal and intrapartum care, health care and other services to preterm babies born from a multiple pregnancy, and lifetime medical costs related to prematurity.<sup>31,32</sup>

**Figure 1.10** Proportion of women with a multiple gestation pregnancy, by public health unit  
Eastern Region, 2008

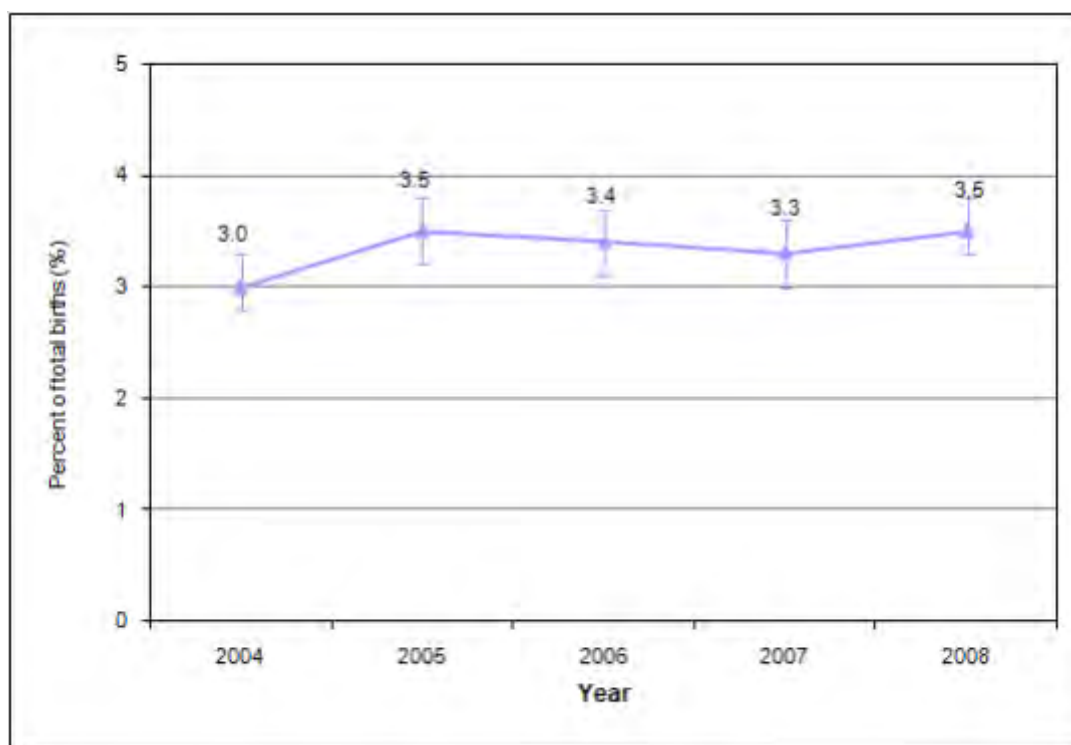


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who had a multiple gestation pregnancy, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- In 2008, the proportion of women with a multiple gestation pregnancy was 1.8%. Across the region, the proportion was highest in the Ottawa and Leeds, Grenville, and Lanark District Health Unit areas (1.9%), and lowest in Kingston, Frontenac and Lennox & Addington (1.4%).

**Figure 1.11**      **Rate of multiple birth**  
*Eastern Region, 2004–2008*

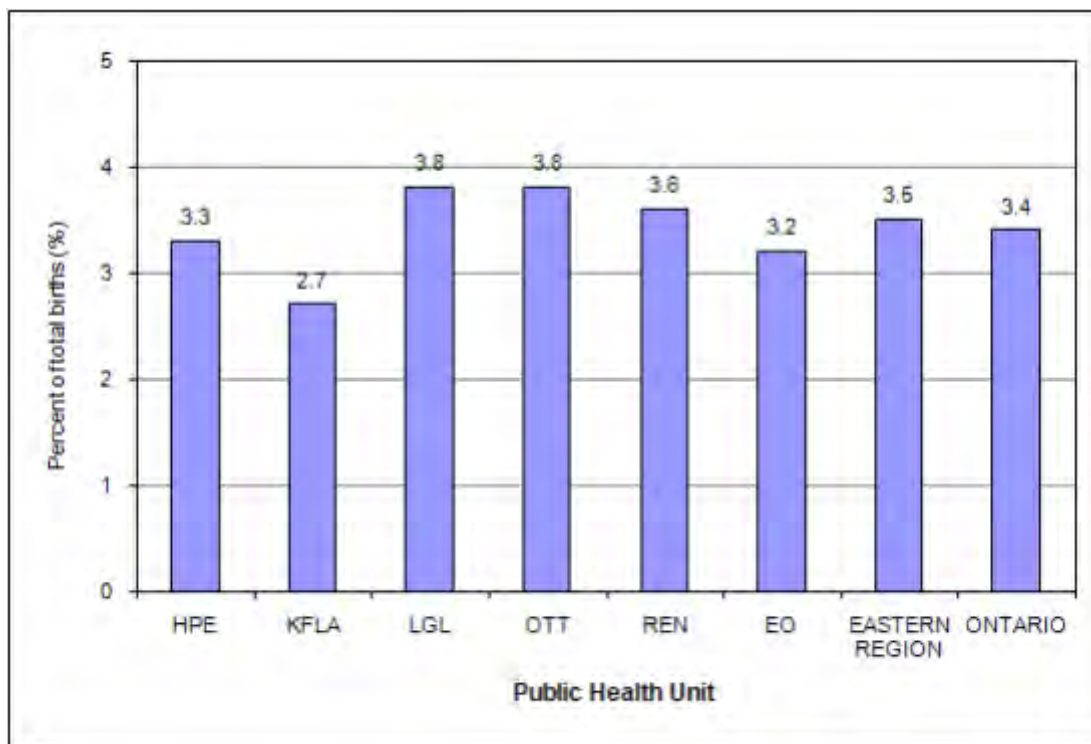


*Data source*            BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator*    The number of live births and stillbirths following a multiple gestation pregnancy, expressed as a percentage of the total number of live births and stillbirths (in a given place and time).

- The multiple birth rate in the Eastern Public Health Region increased from 3.0% (95% CI: 2.8%-3.3%) in 2004 to 3.5% (95% CI: 3.3%-3.8%) in 2008, a relative increase of 17%.
- The corresponding number of babies born in the region following a multiple gestation pregnancy also increased from 509 babies in 2004 to 605 babies in 2008.

**Figure 1.12 Rate of multiple birth, by public health unit**  
*Eastern Region, 2008*

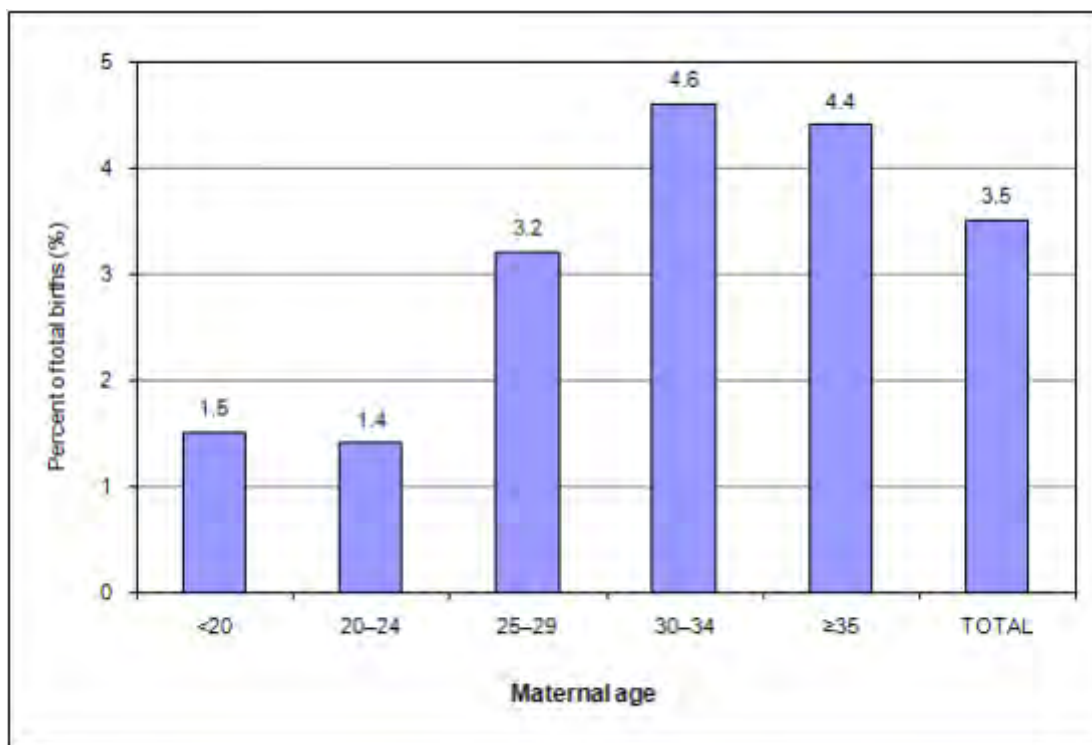


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births and stillbirths following a multiple gestation pregnancy, expressed as a percentage of the total number of live births and stillbirths (in a given place and time).

- The multiple birth rate in the Eastern Public Health Region in 2008 was 3.5%. Based on the health units in this region, the highest observed rate was 3.8% and the lowest rate was 2.7%.

**Figure 1.13 Rate of multiple birth, by maternal age**  
*Eastern Region, 2008*

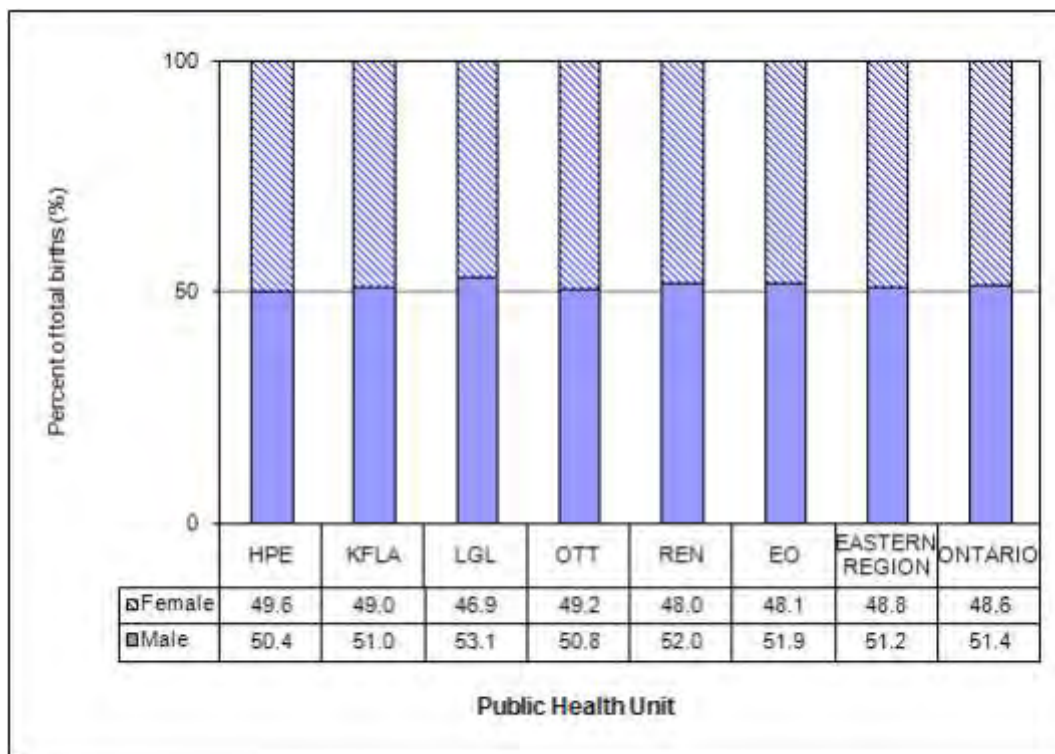


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births and stillbirths following a multiple gestation pregnancy, expressed as a percentage of the total number of live births and stillbirths (in a given place and time).

- The multiple birth rate in the Eastern Public Health Region showed substantial variation by maternal age. The rate of multiple birth was highest for women 30 years of age and over (4.6% among women 30–34 years of age and 4.4% for women  $\geq 35$  years of age).

**Figure 1.14 Distribution of infant sex, by public health unit**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of infant sex, expressed as a percentage of the total number of live births and stillbirths (in a given place and time).

- The distribution of infant sex across the Eastern Region in 2008 showed little variation and was consistent with the provincial distribution. There were slightly more male babies (51.2%) born in 2008 than female babies (48.8%).
- This distribution showed little variation over the 5-year period from 2004 to 2008 in the Eastern Region – the highest observed proportion of male babies was 51.5% in 2005 and the lowest was 50.7% in 2007 (data not shown).

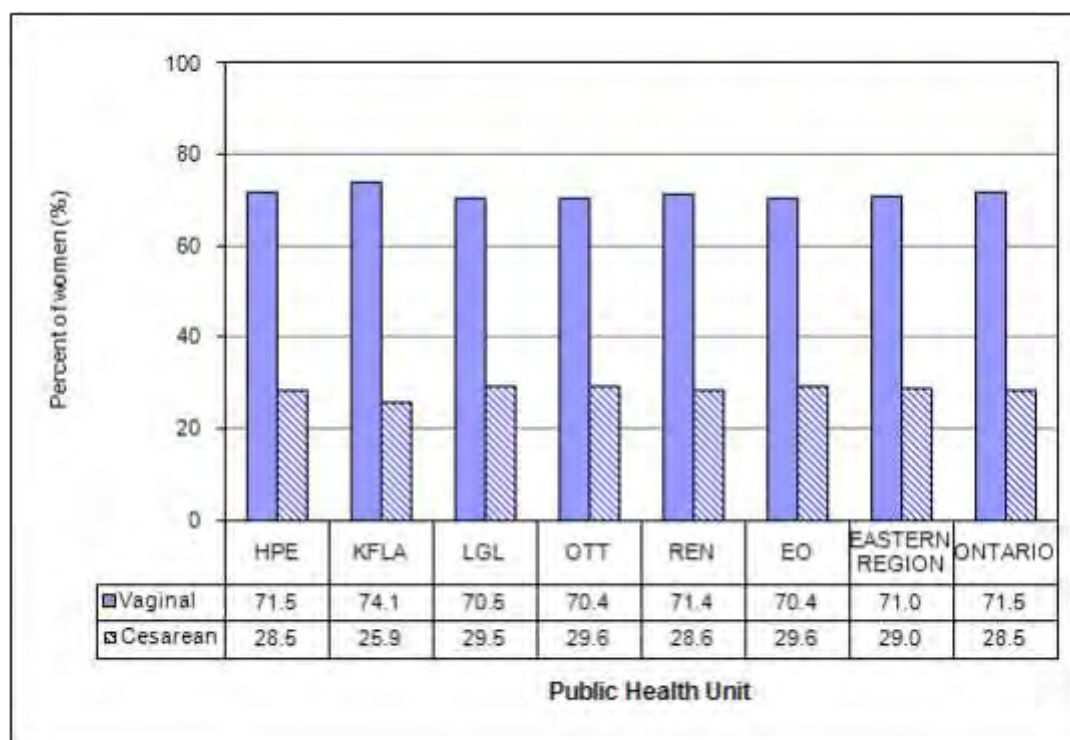
## Delivery Type

In Canada, overall cesarean birth rates increased by 45% in the last decade, from 17.6% in 1995–1996 to 25.6% in 2004–2005, with increases observed for repeat cesarean delivery as well as primary cesarean delivery.<sup>33</sup> Explanations for the increase in primary cesarean delivery include changes in maternal characteristics (increases in maternal age and pre-pregnancy body mass index, and reductions in parity), as well as changes in obstetrical practice (increasing use of electronic fetal monitoring, cesarean delivery for breech presentation, labour induction and epidural anesthesia, and reduced use of midpelvic forceps).<sup>34</sup>

The World Health Organization recommends an upper limit of 15% for the cesarean birth rate.<sup>35</sup> In Canada, over one-third (35.4%) of women who have a cesarean delivery are having a repeat cesarean.<sup>33</sup> Therefore, one of the best strategies for preventing rising cesarean rates is to prevent the primary cesarean delivery, where possible. It is not known how women's birth preferences affect the rising rates of cesarean delivery. It is estimated that about 2.5% of all births in the United States<sup>36</sup> and 1-2% of all Canadian births<sup>37</sup> are cesarean on maternal request.

Cesarean delivery is not without risks – it has been associated with both immediate (e.g., anesthetic complications, cardiac arrest, venous thromboembolism)<sup>38</sup> and later (e.g., postpartum hospital readmission, pelvic injury/wounds, major puerperal infection)<sup>39</sup> risk of complications. Therefore, the rising rate of cesarean birth is concerning. Through prenatal education classes, public health units can play a role in informing pregnant women about their options for labour and birth, including information on normal labour and birth, cesarean delivery, strategies for pain management and role of support person during labour.<sup>40</sup>

**Figure 1.15** Distribution of type of delivery, by public health unit  
Eastern Region, 2008



Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The distribution of type of delivery (vaginal or cesarean), expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

- The overall rate of cesarean birth for women who resided in the Eastern Public Health Region and gave birth in 2008 was 29.0% which was very similar to the provincial rate (28.5%). The health unit with the lowest cesarean birth rate was Kingston, Frontenac and Lennox & Addington (25.9%), while the rates for all other units in the region were quite similar, ranging from 29.6% to 28.5%.

## Type of Care Provider at Delivery – Human Resource Issues

Pregnant women in Ontario have options when choosing a care provider for birth. These include obstetricians, family practitioners and midwives. The vast majority of births, however, are attended by obstetricians.<sup>41</sup>

It has been estimated that up to 60% of pregnant women could be eligible for normal birth practices. This would include women who do not have health problems prior to pregnancy, have no obstetrical/medical complications during pregnancy, are carrying a singleton baby at term in a vertex presentation, go into labour spontaneously and give birth spontaneously.<sup>42</sup> Midwifery services are specifically designed for women with low-risk pregnancies; however, in 2006–2007, midwives were the primary care provider at the time of birth for only 6.2% of women with low-risk pregnancies in Ontario.<sup>41</sup>

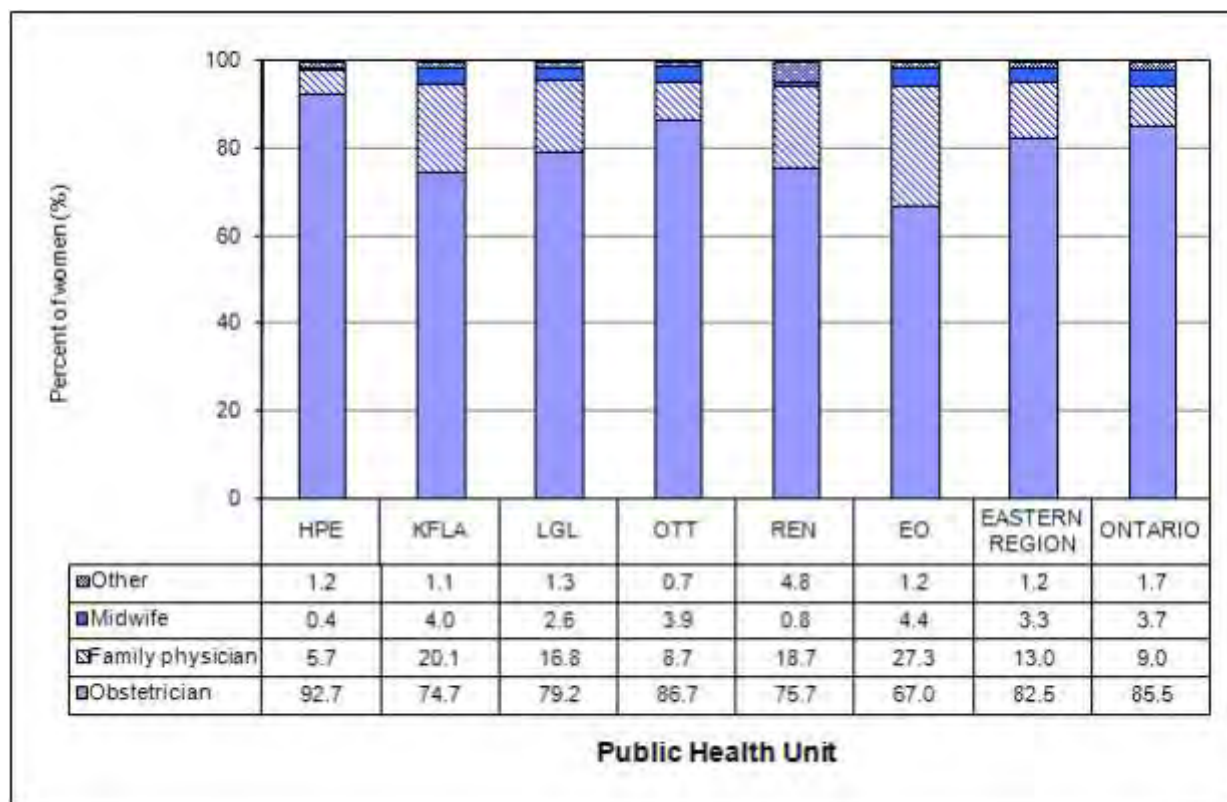
There is an impending shortage of health care professionals providing obstetrical care in Canada.<sup>43</sup> Fewer obstetricians than family physicians are trained each year, and family physicians are increasingly opting out of maternity care. There are approximately 1,650 obstetricians/gynaecologists practicing in Canada, 36% of who plan to retire within the next five years.<sup>43</sup>

Several regions in Ontario are concerned about the capacity to provide perinatal care in the future, given the current pattern of care provision.<sup>41</sup> Exploration of alternate models of inter-professional care to improve access and provide more access to the right care at the right place by the right care provider has been recommended.<sup>44</sup>

Supporting women and their families through pregnancy and birth is an important public health issue. Ontario's public health units provide a comprehensive range of services that aim to support mothers to have positive health outcomes for themselves and their babies. However, additional services are required. Exploring new models of care for ensuring babies and mothers get care in-hospital and upon discharge are important. Potential ideas include:<sup>44</sup>

- Developing and testing collaborative care models, including investigating full scope practices for all care providers, and regulatory, legislative and funding issues to determine the barriers currently in place for interprofessional care models.
- Enhancing midwifery care and reducing wait lists for midwives.
- Exploring the issues associated with enhancing privileges for midwives in local hospitals.
- Exploring the feasibility of regional clinics to meet the needs of babies post discharge who require follow-up, but do not require hospital care for this follow-up (e.g., blood testing for hyperbilirubinemia).
- Explore models of community support to allow for early discharge for stable mothers and babies with 24 and 48 hour follow-up visits for vaginal and cesarean births respectively.

**Figure 1.16 Distribution of type of health care provider who attended the hospital delivery, by public health unit**  
*Eastern Region, 2008*



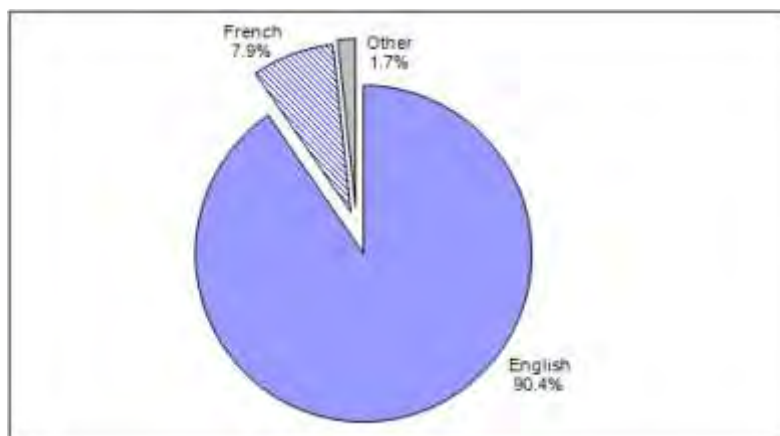
Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The distribution of type of health care provider who attended the hospital delivery, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

Notes  
 1. 'Other' includes nurse practitioners and care providers whose type was unspecified.  
 2. Midwifery-attended **home** births are not included in this figure. See Figure 1.3 for the number of midwifery-attended home births in 2008.

- In 2008, obstetricians were the predominant care provider attending births in the province of Ontario (85.5%) and the Eastern Region (82.5%). Family physicians attended 13.0% of births in the region.
- Midwives were the most responsible care provider at birth for 3.3% of women who gave birth in hospitals. Midwifery-attended hospital births were lowest (less than 1%) in Hastings & Prince Edward counties and Renfrew Health Unit regions, possibly reflecting availability of midwifery services in these areas. **It is important to note, however, that Figure 1.16 includes only those midwifery-attended births that occurred in hospital.**

**Figure 1.17** Distribution of women’s primary language spoken at home\*  
Eastern Region, 2008



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of women’s primary language spoken at home (English, French or other), expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of these estimates.

- The primary language spoken at home by mothers in the Eastern Region in 2008 was English (90.4%). French was the second most common language spoken at home (7.9%). Less than 2% (1.7%) of women reported their primary language to be something other than English or French.
- Each health unit in Ontario must respond to the unique demographics, social conditions and health needs in their community. Language is an important demographic that must be considered in planning health program services and resources to meet the needs of families in the region.

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## CHAPTER 2 HEALTHY PREGNANCY

Two factors that affect healthy pregnancy and birth outcomes are utilization of prenatal care and smoking in pregnancy. Both of these factors are modifiable, and are therefore potential areas to target in order to improve maternal and neonatal health.

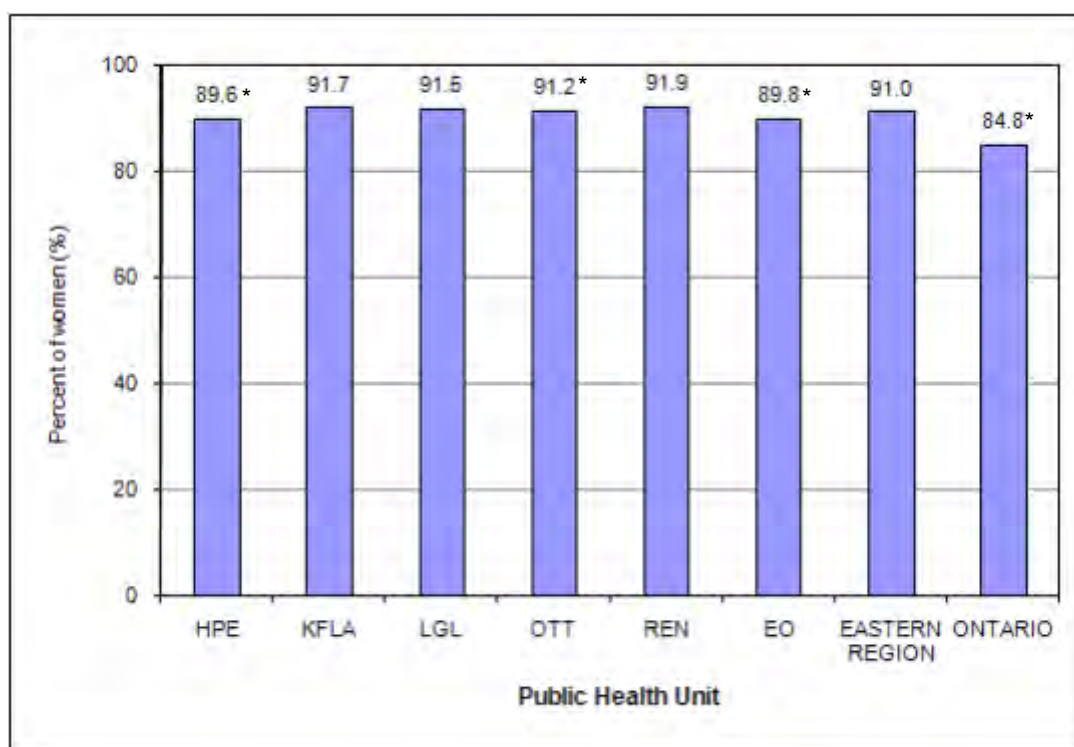
The three major components of prenatal care are risk assessment, treatment for medical conditions or risk reduction, and education.<sup>1</sup> Prenatal care can lead to improvements in perinatal outcomes by identifying and mitigating potential risks and helping women to change potentially harmful behaviours such as smoking and alcohol use.<sup>1</sup> While there is some debate regarding the appropriate frequency and timing of prenatal visits,<sup>2</sup> it is generally accepted that prenatal care is more likely to be effective if women begin receiving care in early pregnancy.<sup>1</sup> The Canadian Maternity Experiences Survey (MES) found that most women across Canada (94.9%) initiated care during the first trimester.<sup>3</sup> This estimate may be higher than actual rates given that the MES only included women who were living with their infant at the time of the survey, and excluded First Nations women living on reserve and institutionalized women. Younger women (15–19 years), women with less than a high school education, and women living in a household at or below the low income cut-off were less likely to start prenatal care during the first trimester.<sup>3</sup>

Smoking in pregnancy is causally associated with serious risks to both the mother and the fetus, including intrauterine growth restriction (IUGR), preterm birth, spontaneous abortion, stillbirth, and placental abruption.<sup>4,5</sup> The adverse outcomes associated with smoking are explored in greater detail in Chapter 5 of this report. The findings of the MES show pre-pregnancy smoking rates in Ontario are lower than in any other province or territory, and smoking rates in Ontario during the third trimester are among the lowest in the country.<sup>6</sup> The MES found that about one in five women in Ontario reported smoking in the three months prior to pregnancy (19.6%) and 8.8% of women reported smoking during the third trimester,<sup>6</sup> suggesting that roughly half of women who smoke prior to pregnancy quit smoking by the third trimester of pregnancy. Quitting smoking before or during pregnancy has been shown to significantly reduce the risk of IUGR and preterm birth.<sup>4</sup> A systematic review of randomized controlled trials found that smoking cessation interventions (beyond informing women of the risks of smoking and advising them to quit) are effective in helping women to stop smoking during pregnancy (overall benefit of approximately 6%), and can reduce the incidence of preterm births and low birth weight.<sup>7</sup>

Maternal age, education, income, and social networks consistently show an inverse relationship with smoking in pregnancy.<sup>4,6</sup> For interventions to become more successful among women with low socio-economic status, an extensive Canadian best practices review suggests that smoking cessation interventions in pregnancy and the postpartum must focus on acknowledging and ameliorating the effects of factors such as poverty and low education, and on the influence of pregnant smokers' social networks.<sup>4</sup> Furthermore, public health messages should be sensitive, non-judgmental, and relevant to the circumstances of these women's daily lives.<sup>4</sup>

Smoking rates in this report reflect smoking at any time during pregnancy.

**Figure 2.1 Proportion of women who attended an antenatal visit with a health care provider during the first trimester, by public health unit**  
Eastern Region, 2008



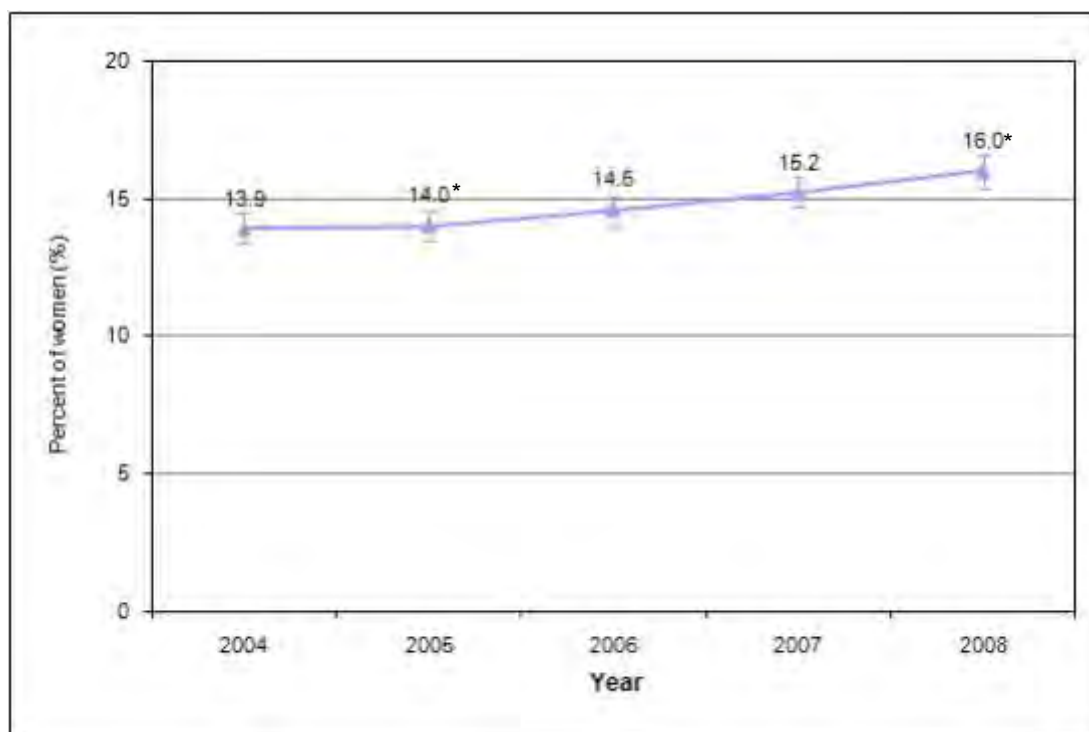
*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who attended an antenatal visit with a health care provider during the first trimester, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- In 2008 in the Eastern Region, rates of first trimester prenatal care in all public health units were above the provincial rate of 84.8%. Overall, 91.0% of women who gave birth in the Eastern Region had at least one prenatal visit with a health care provider during the first trimester. First trimester prenatal care attendance rates range from 89.6% in Hastings & Prince Edward Counties to 91.9% in Renfrew County.

**Figure 2.2 Proportion of women who smoked cigarettes during pregnancy**  
*Eastern Region, 2004–2008*



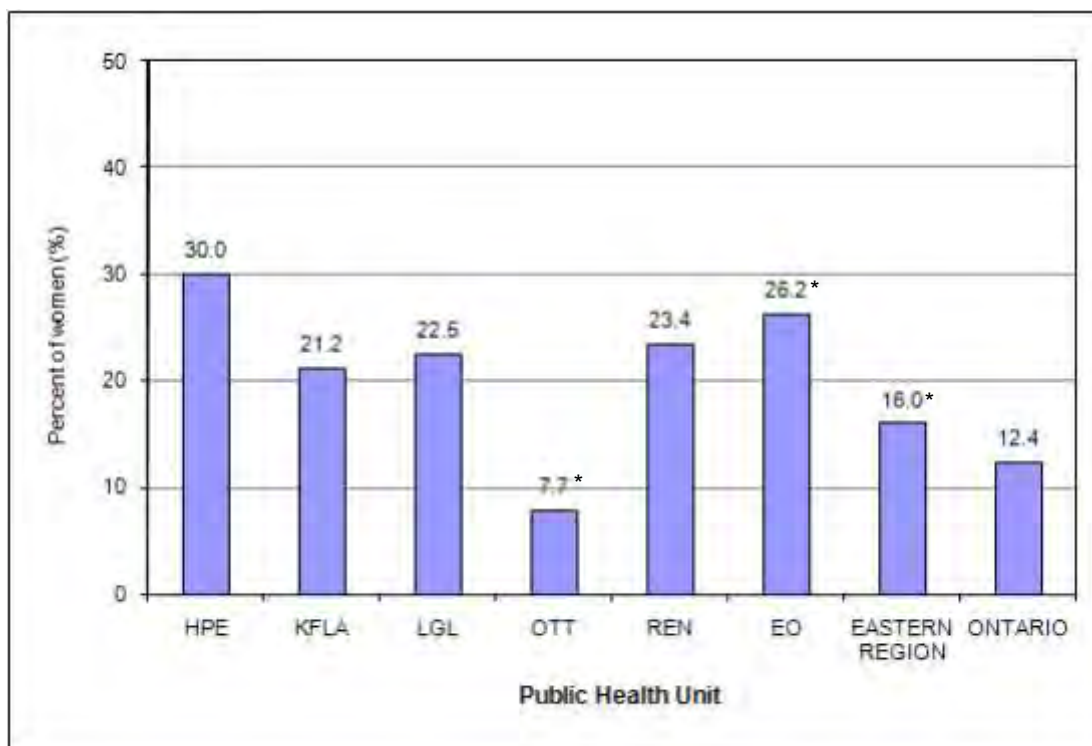
*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of women who smoked cigarettes during pregnancy, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- Rates of cigarette smoking in pregnancy have gradually increased in the Eastern Region over the past five years, from 13.9% (95% CI: 13.4%-14.5%) in 2004 to 16.0% (95% CI: 15.4%-16.6%) in 2008.
- This trend is of some concern and worthy of further study, particularly since the 2008 Canadian Perinatal Health Report reported the opposite trend, with decreases in both national maternal smoking rates (from 17.7% in 2000–2001 to 13.4% in 2005) and in maternal smoking rates in Ontario (from 14.1% in 2000–2001 to 10.3% in 2005).<sup>8</sup> However, these results should be interpreted with caution because of the high proportion of records with missing data in some years (range 7.7% to 16.4% among the estimates presented in the figure). It is unclear whether actual rates of maternal smoking during pregnancy are higher or lower than indicated here.

**Figure 2.3** Proportion of women who smoked cigarettes during pregnancy, by public health unit  
Eastern Region, 2008



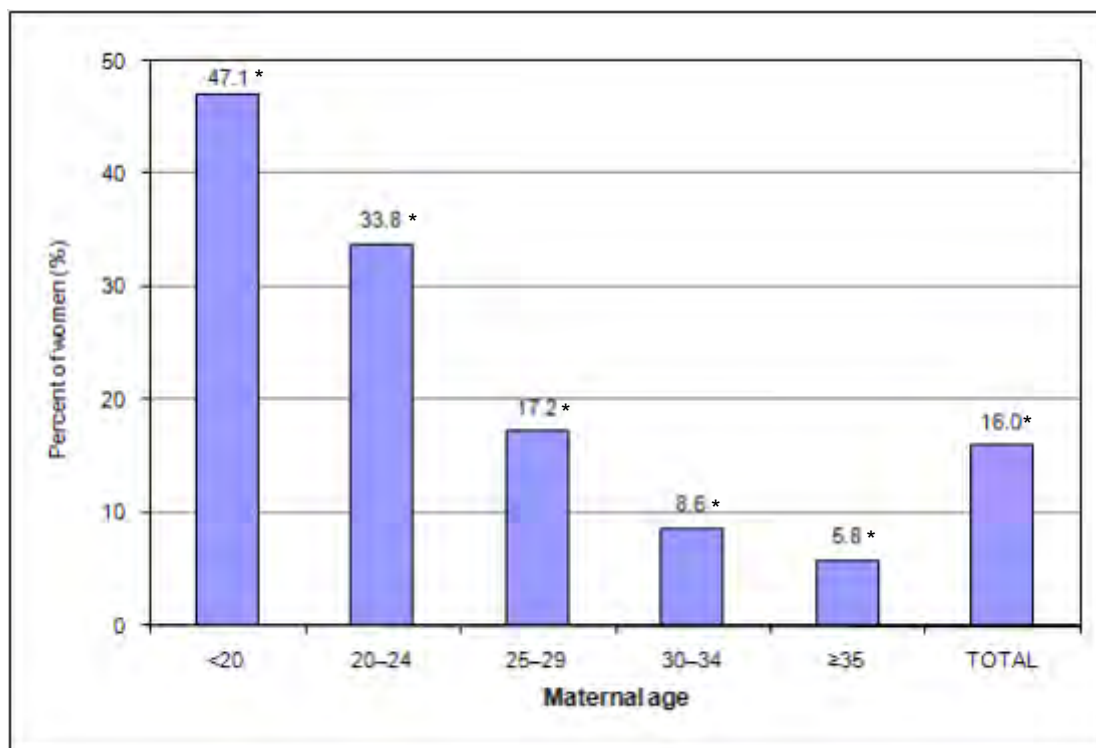
Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The number of women who smoked cigarettes during pregnancy, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- In 2008, the overall rate of smoking in pregnancy in the Eastern Region (16.0%) was higher than the provincial rate (12.4%). There was wide variation in these rates between public health units in the region. The smoking rate in Ottawa Public Health (7.7%) was below the provincial rate, while in all other health units in the region the rates exceeded the provincial rate, with a high of 30.0% in Hastings & Prince Edward Counties.
- These results should be interpreted with caution because of the high proportion of records with missing data in some areas of the Eastern Region. It is unclear whether actual rates of maternal smoking during pregnancy are higher or lower than indicated here.

**Figure 2.4** Proportion of women who smoked cigarettes during pregnancy, by maternal age  
Eastern Region, 2008



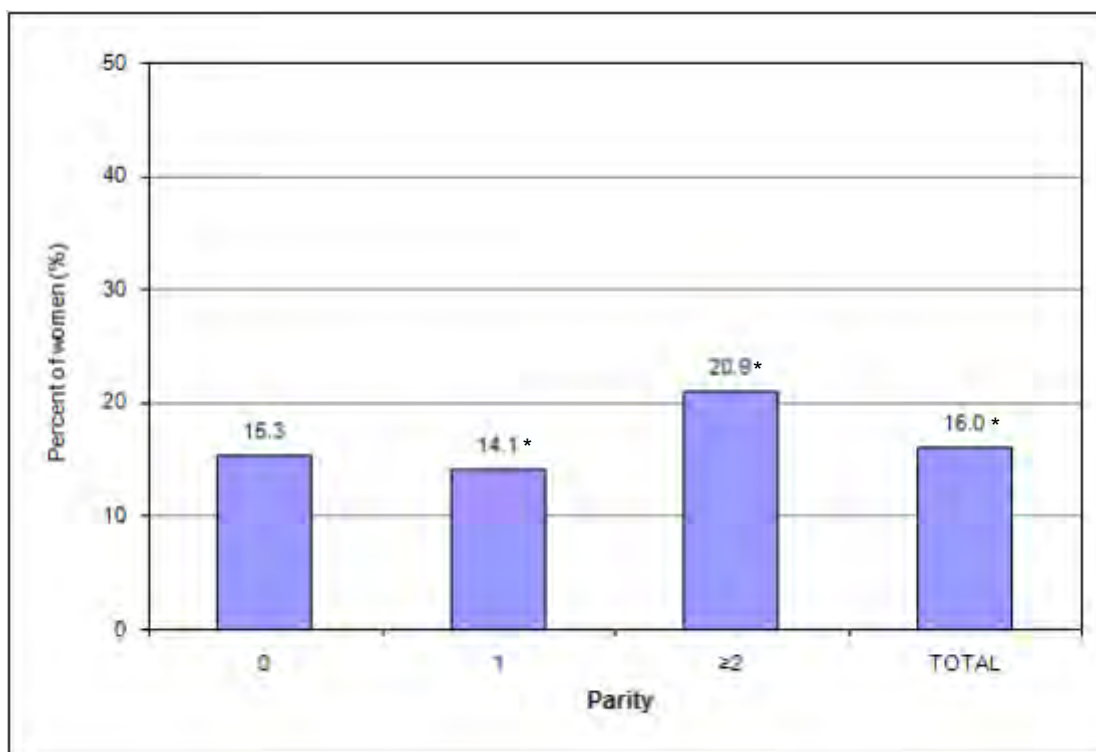
*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who smoked cigarettes during pregnancy, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- Rates of smoking in pregnancy were highest among pregnant women under the age of 20 (47.1%) and decreased with increasing maternal age. Pregnant teens smoked at a rate that was about 8 times higher than that of pregnant women 35 years of age and older. This finding is consistent with national patterns of smoking in pregnancy.<sup>6,8</sup>
- These results should be interpreted with caution because of the high proportion of records with missing data. It is unclear whether actual rates of maternal smoking during pregnancy are higher or lower than indicated here.

**Figure 2.5** Proportion of women who smoked cigarettes during pregnancy, by parity  
Eastern Region, 2008



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who smoked cigarettes during pregnancy, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- The rate of smoking was higher among pregnant women with a parity of two or greater (20.9%) than among those of lesser parity. This finding is consistent with the suggestion that the number of children in the household may be positively associated with maternal smoking.<sup>4</sup>
- These results should be interpreted with caution because of the high proportion of records with missing data. It is unclear whether actual rates of maternal smoking during pregnancy are higher or lower than indicated here.

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## CHAPTER 3 PREPARATION FOR PARENTING

### Introduction

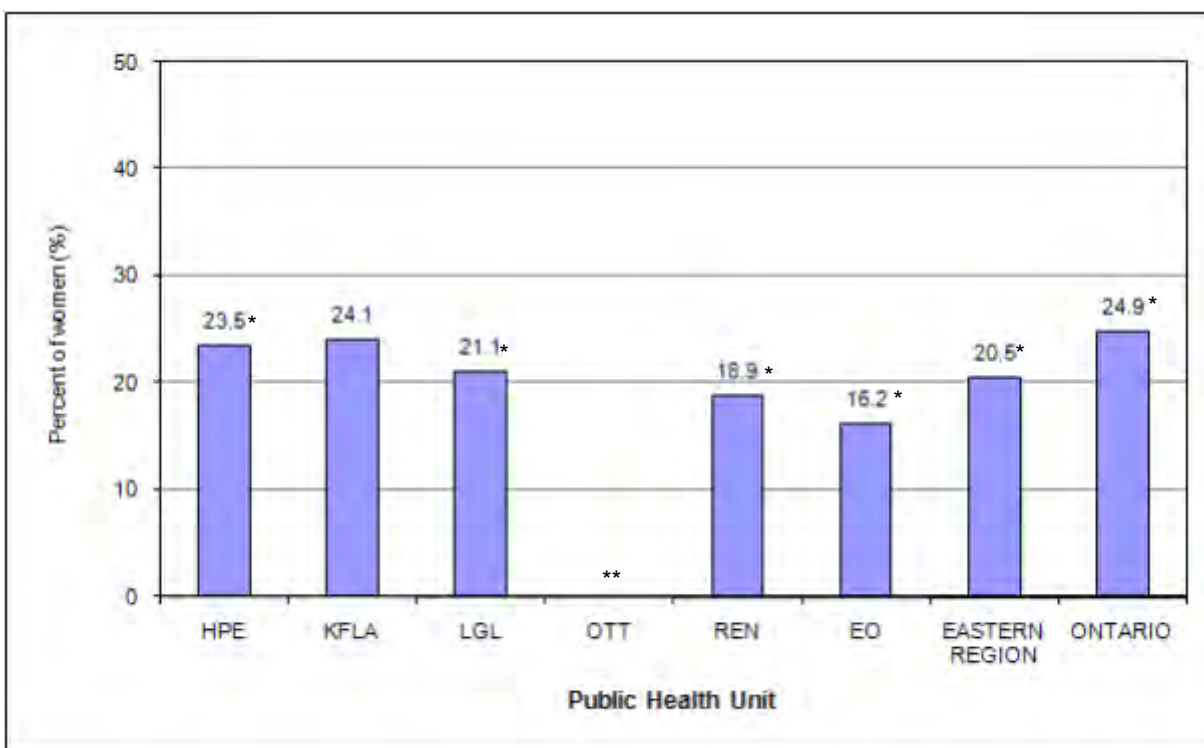
The Ontario Public Health Standards 2008 identify mandatory health programs and services in Ontario.<sup>1</sup> The Reproductive Health Standards for Ontario have been designed “to enable individuals and families to achieve optimal preconception health, experience a healthy pregnancy, have the healthiest newborn(s) possible, and be prepared for parenthood”.<sup>1, p.25</sup> Ontario’s public health units provide prenatal education for pregnant women as part of this mandate. Prenatal classes provide women and their families with information about care options, community supports and lifestyle choices. Reproductive health programs aim to promote healthy behaviors and environments before and during pregnancy to improve outcomes.<sup>2</sup> Rates of prenatal class attendance also provides baseline information for public health units allowing them to identify outreach strategies to encourage attendance, assess needs and identify barriers to attending classes.

While the general effectiveness of childbirth education is unknown,<sup>3</sup> there have been studies looking at the effectiveness within certain population subgroups and for certain outcomes (e.g., breastfeeding).<sup>4</sup> Because there are such a variety of prenatal education options, it is difficult to choose the appropriate outcomes. In some cases there may not be a difference in specific pregnancy outcomes, but the woman or family attending classes may have made important social networking contacts for support. This is also an important outcome.

Monitoring the rate of prenatal class attendance is one way of determining community engagement and use of resources and services – two of the four quadrants of the Balanced Scorecard for Public Health Units.<sup>5</sup> Capture of attendance in the BORN Niday Perinatal Database allows for comparisons of characteristics of women who attend classes versus women who do not and may support Public Health Units in making their prenatal education strategies as effective as possible.



**Figure 3.1** Proportion of women who attended prenatal classes, by public health unit  
Eastern Region, 2008



Data source BORN Ontario (Niday Perinatal Database), 2008

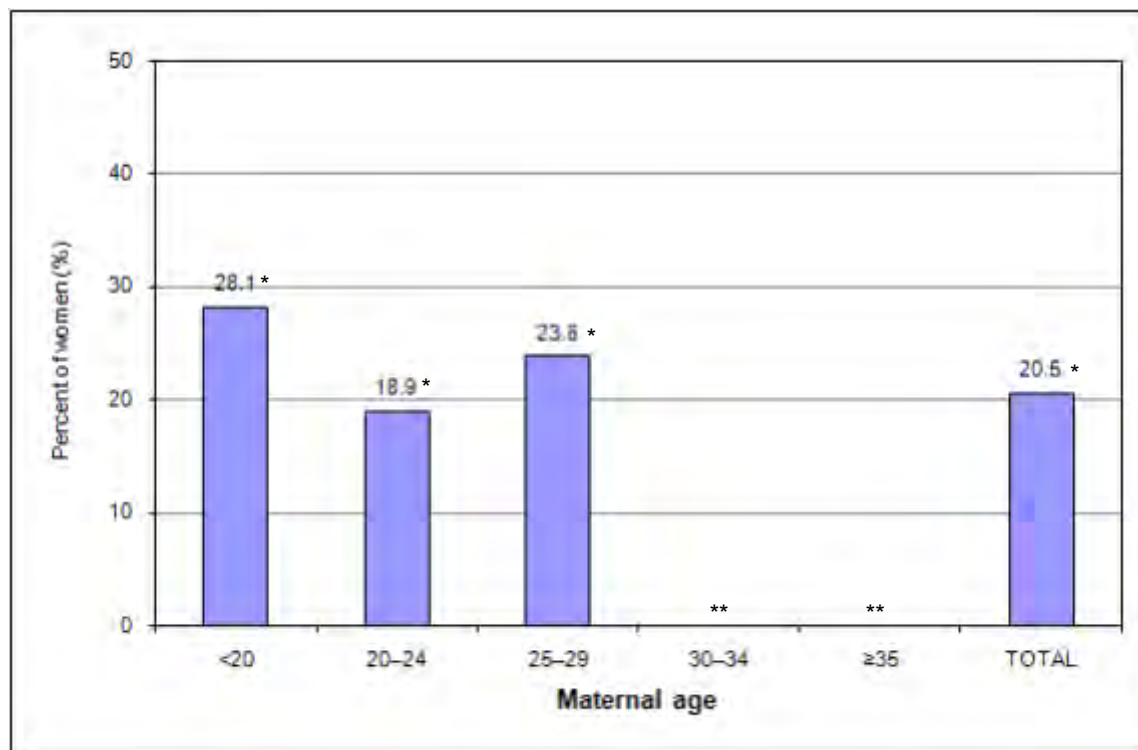
Definition of indicator The number of women who attended prenatal classes, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

\*\* Estimate not shown because more than 30% of records had missing information.

- One in five women (20.5%) in the Eastern Region attended prenatal classes in 2008. The proportion of women attending prenatal classes was lowest in the Eastern Ontario Health Unit area (16.2%). These results should be interpreted with caution because of the high proportion of records with missing data (range 17.7% to 28.7% among the estimates presented in the figure) associated with this variable. It is unclear whether actual prenatal class attendance is higher or lower than indicated here.

**Figure 3.2 Proportion of women who attended prenatal classes, by maternal age**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

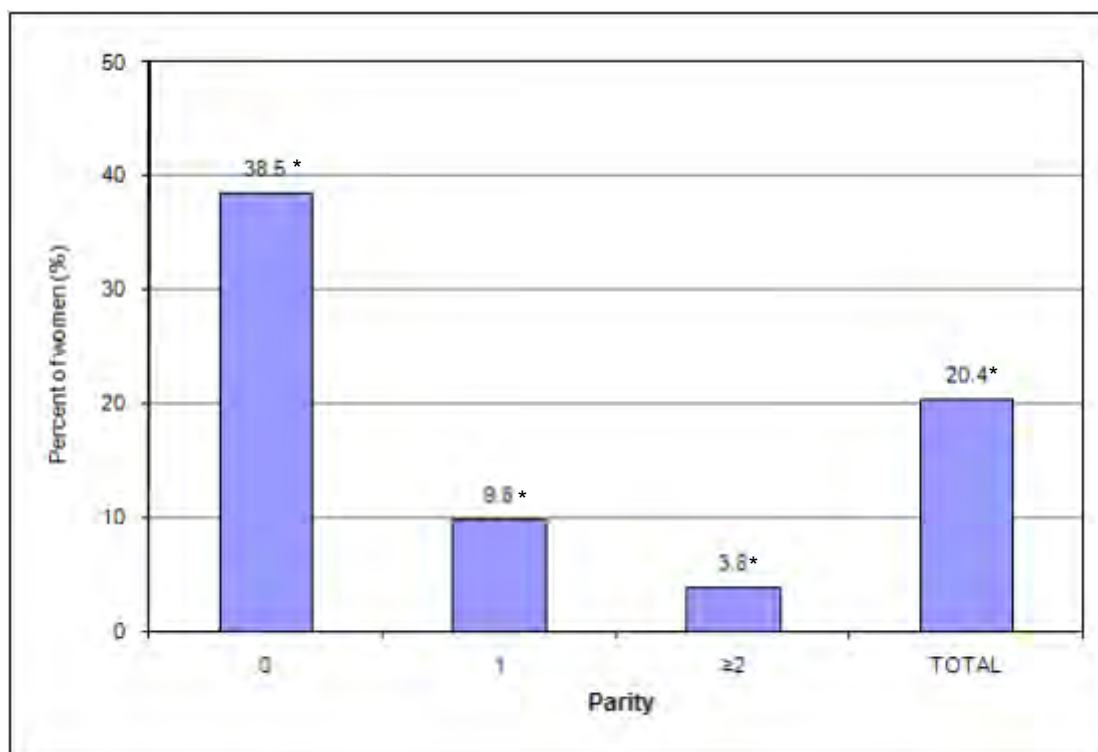
*Definition of indicator* The number of women who attended prenatal classes, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

\*\* Estimate not shown because more than 30% of records had missing information.

- The proportion of women attending prenatal classes was highest for women <20 years of age (28.1%). However, these results should be interpreted with caution because of the high proportion of records with missing data (range 21.3% to 28.7% among the estimates presented in the figure) associated with this variable. It is unclear whether actual prenatal class attendance is higher or lower than indicated here.

**Figure 3.3 Proportion of women who attended prenatal classes, by parity**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who attended prenatal classes, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- As expected, the proportion of women attending prenatal classes was highest for first-time mothers (38.5%) and lowest for women who have had two or more births (3.8%). A similar pattern of decreasing prenatal class attendance with increasing parity was observed in the Canadian Maternity Experiences Survey 2006–2007.<sup>6</sup> These results should be interpreted with caution because of the high proportion of records with missing data (range 22.6% to 30.4%) associated with this variable. It is unclear whether actual prenatal class attendance is higher or lower than indicated here.

## References

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## CHAPTER 4 INFANT AND CHILD HEALTH

### Preterm Birth

Preterm birth, defined as the proportion of live births with a gestational age of <37 completed weeks,<sup>1</sup> is a common, very serious and costly problem and a public health priority.<sup>2</sup> In Canada, the preterm birth rate has increased steadily since 1995; in 2004 the rate was 8.2 per 100 live births.<sup>1</sup> In the United States, preterm birth rates are higher at about 12-13%.<sup>3</sup> According to vital statistics data, the rate of preterm birth in Ontario decreased between 1995 and 2004;<sup>4</sup> however, more recent data from the Niday Perinatal Database shows a stable rate of preterm birth between 2004 and 2008 at 8.3 to 8.4 per 100 live births.<sup>5</sup>

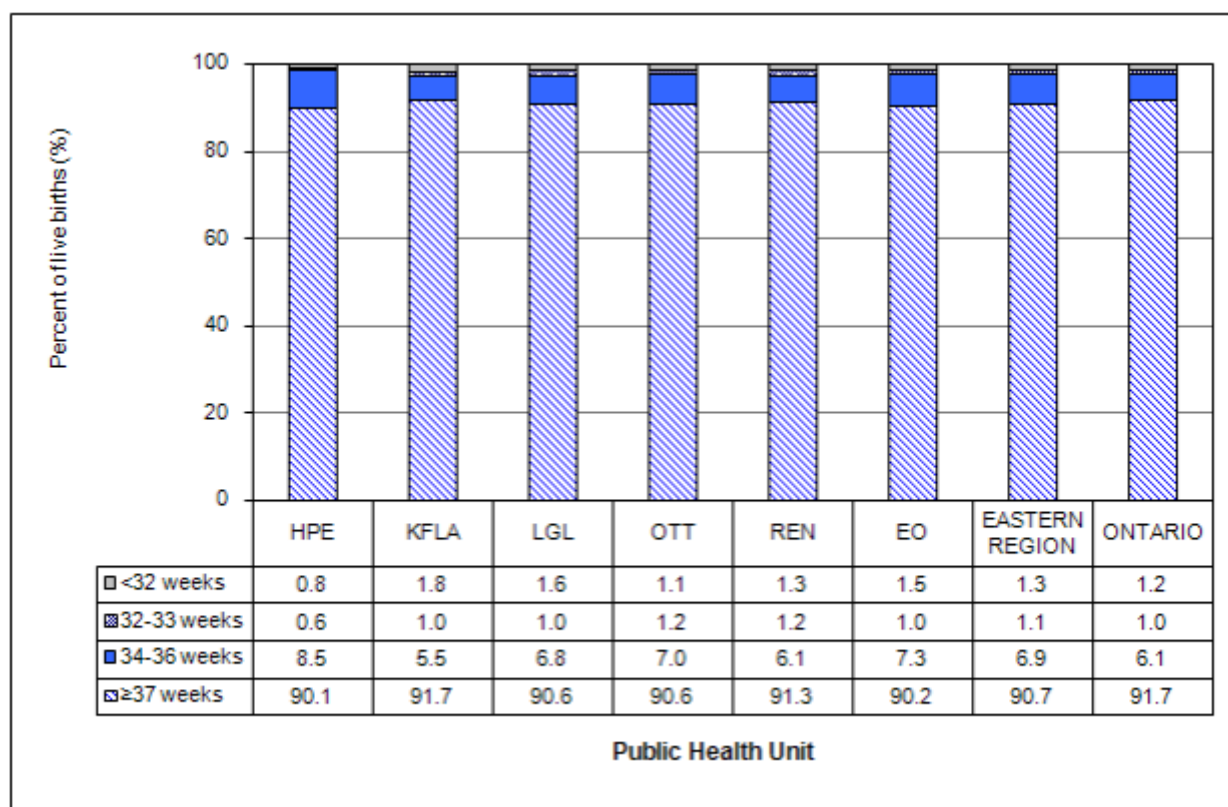


Reasons for the increase in preterm birth rates have been attributed to: increasing maternal age; increased use of assisted reproductive technology leading to more twin and higher-order multiple births; and increased prevalence of risk factors for systemic inflammation starting a cascade effect leading to cervical changes and labour. About 30-35% of preterm births are medically indicated, 40-45% follow spontaneous onset of preterm labour, and 25-30% follow preterm prelabour rupture of membranes (PPROM).<sup>3</sup> The majority of preterm births (60-70%) take place between 34 and 36 weeks. About 20% occur at 32 to 33 weeks, 15% occur at 28 to 31 weeks, and the smallest percentage (5%) occur at less than 28 weeks.<sup>3</sup>

Babies who are born preterm are more likely to die or experience health problems during the first year after birth. In addition to the immediate costs associated with intensive hospital care that is required at birth, preterm birth creates costs related to long-term complications such as respiratory problems, motor and sensory impairment, and neurocognitive impairment.<sup>6</sup>

One of the goals of reproductive health listed by Ontario's Public Health Standards is to increase the proportion of full-term newborns with a healthy birth weight.<sup>7</sup> While many prevention strategies have been developed and tested to reduce rates of preterm birth,<sup>2,8</sup> primary prevention strategies have met with limited success in part because they have been directed only to women at high risk for a preterm birth.<sup>9</sup> Recognizing that preterm births are multifactorial in origin, reflecting complex relationships between socioeconomic, behavioral and biologic factors, it has been suggested that a population health approach be used to address this problem.<sup>9</sup> Such an approach would involve targeting the entire population of women of childbearing age to address a range of factors<sup>9</sup> including prevention of unintended pregnancies, promotion of preconceptional folic acid supplementation, smoking cessation, screening and treatment of infection (e.g., sexually transmitted infections), promotion of healthy prepregnancy weight and promotion of optimal birth spacing.<sup>2</sup>

**Figure 4.1 Distribution of gestational age (weeks) at birth, by public health unit**  
*Eastern Region, 2008*

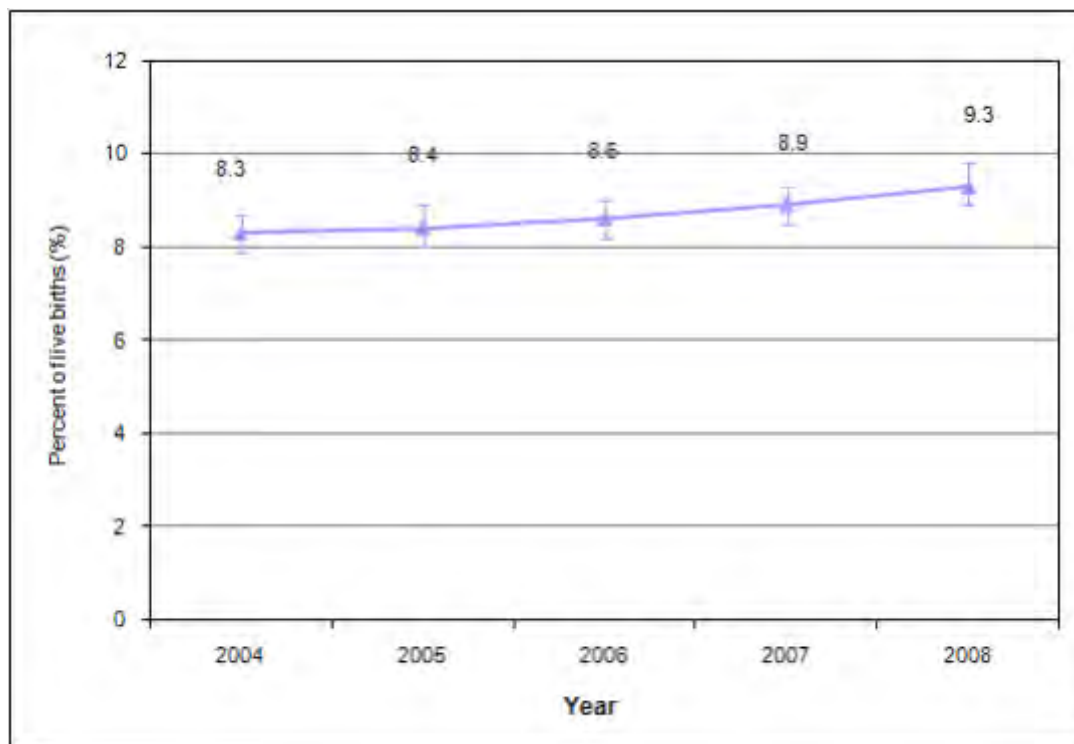


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of categories of gestational age in weeks at the time of birth, expressed as a percentage of the total number of live births (in a given place and time).

- The majority (90.7%) of infants born in 2008 to women who resided in the Eastern Region were ≥37 weeks of gestation at birth (term). This proportion was very stable across the public health unit areas of Eastern Region.
- Among all infants born preterm (<37 weeks), the majority were between 34 and 36 weeks of gestational age at birth.

**Figure 4.2 Rate of preterm birth (<37 weeks of gestation)**  
*Eastern Region, 2004–2008*

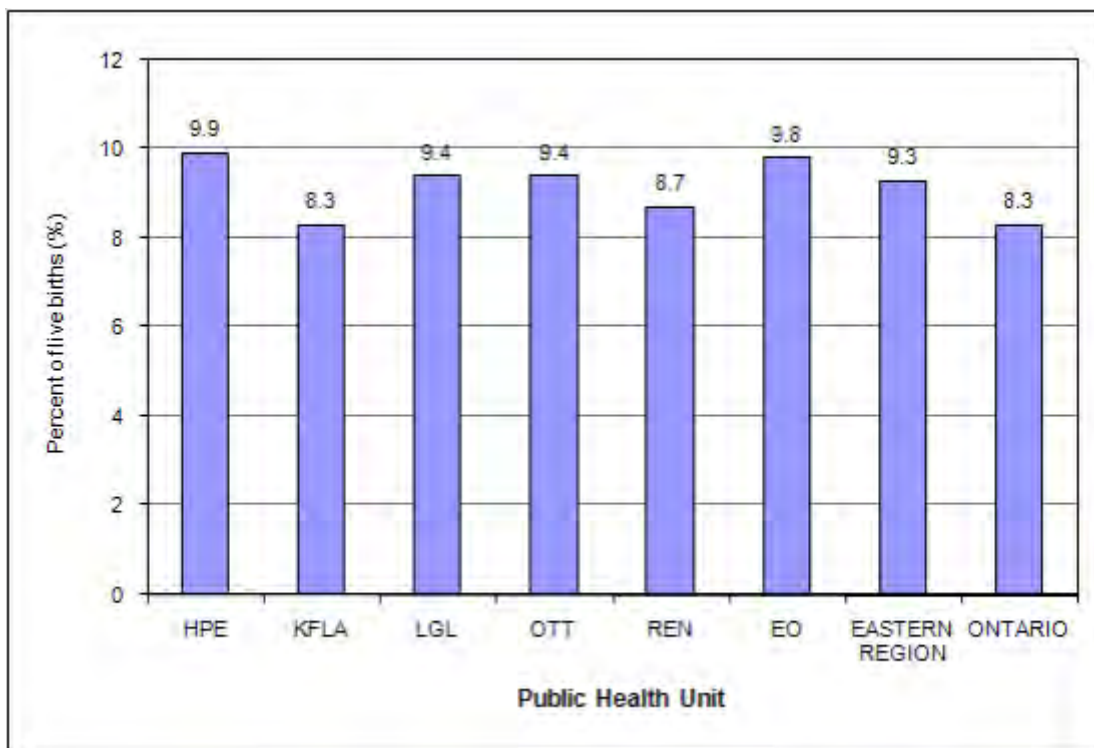


*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of live births with a gestational age of <37 completed weeks of gestation, expressed as a percentage of the total number of live births (in a given place and time).

- The rate of preterm birth among residents of the Eastern Region increased from 8.3% (95% CI: 7.9%-8.7%) in 2004 to 9.3% (95% CI: 8.9%-9.8%) in 2008.
- This trend also reflects an increase in the actual number of babies being born preterm in the region – 1,380 babies in 2004 and 1,579 babies in 2008.

**Figure 4.3** Rate of preterm birth (<37 weeks of gestation), by public health unit  
Eastern Region, 2008

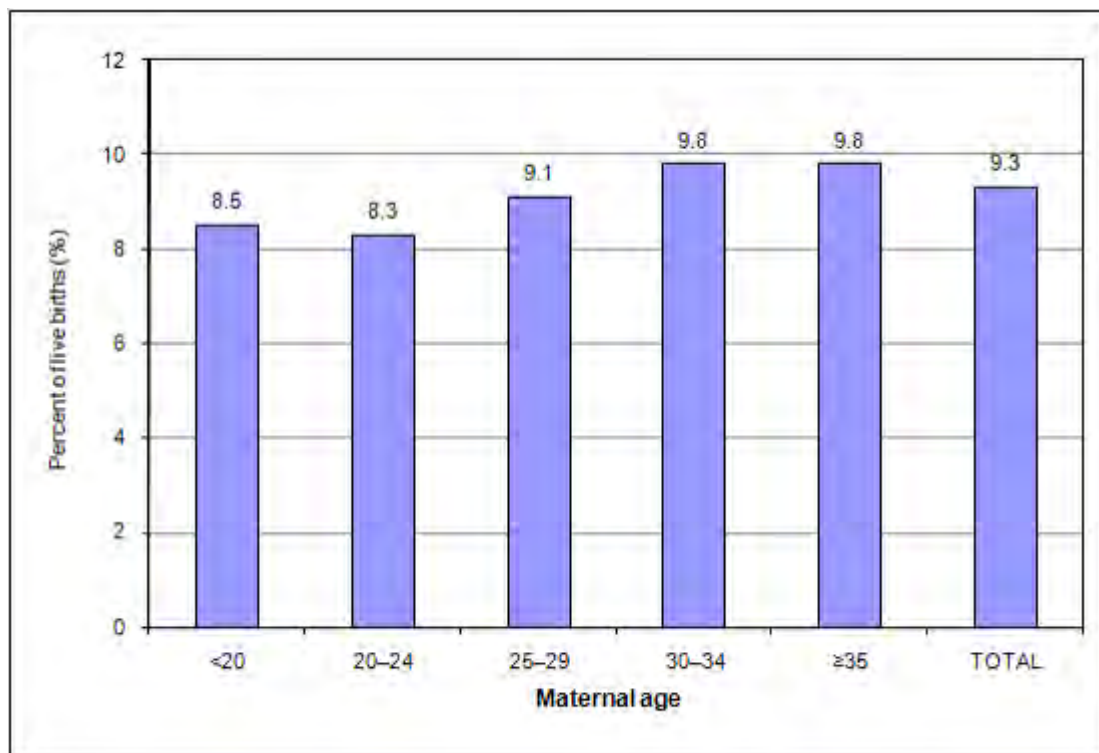


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a gestational age of <37 completed weeks of gestation, expressed as a percentage of the total number of live births (in a given place and time).

- Across the public health unit areas of Eastern Region, the rate of preterm birth in 2008 varied from 9.9% in Hastings & Prince Edward to 8.3% in Kingston, Frontenac and Lennox & Addington.
- Overall in Eastern Region, 1,579 infants were born at <37 weeks of gestation in 2008.

**Figure 4.4 Rate of preterm birth (<37 weeks of gestation), by maternal age**  
*Eastern Region, 2008*

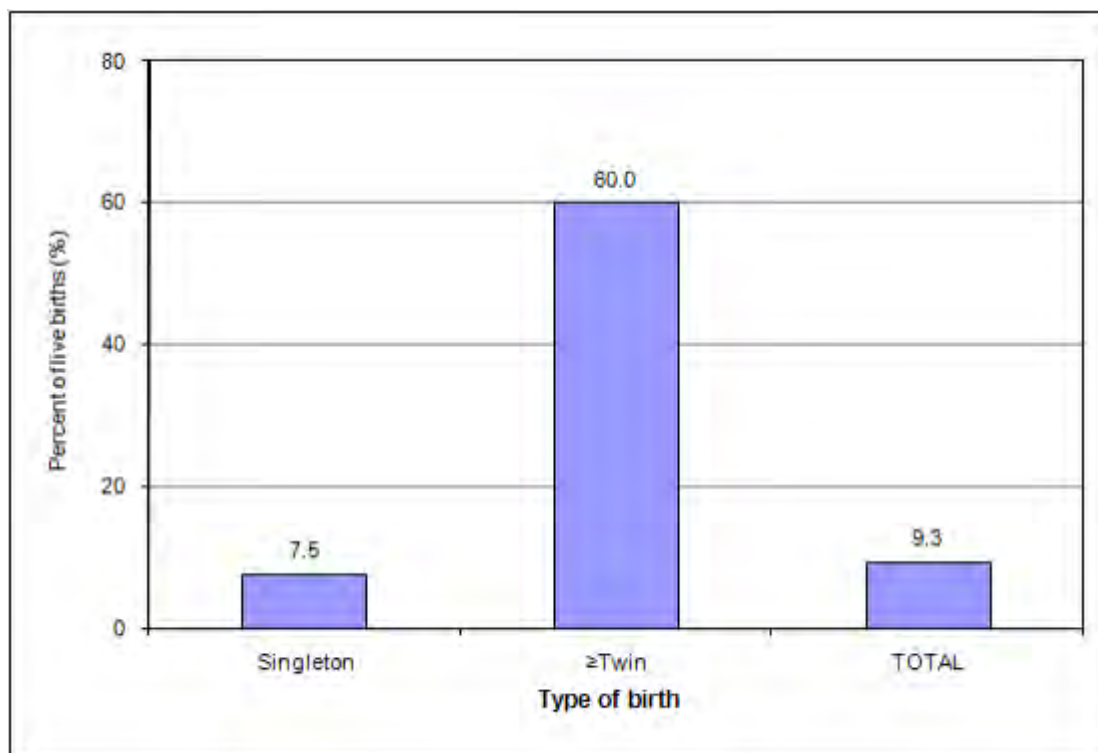


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a gestational age of <37 completed weeks of gestation, expressed as a percentage of the total number of live births (in a given place and time).

- The rate of preterm birth among residents of the Eastern Region in 2008 was modestly higher among women 30 years of age or older, compared with younger women.

**Figure 4.5** Rate of preterm birth (<37 weeks of gestation), by singleton and multiple birth  
Eastern Region, 2008



Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The number of live births with a gestational age of <37 completed weeks of gestation, expressed as a percentage of the total number of live births (in a given place and time).

- The rate of preterm birth varied dramatically by whether the pregnancy was a multiple gestation pregnancy (i.e., twins or higher order) or a singleton pregnancy. In 2008 in the Eastern Region, the rate of preterm birth among singleton live births was 7.5%, while more than half of twins or higher-order multiples were born preterm (60.0%).

## Small for Gestational Age

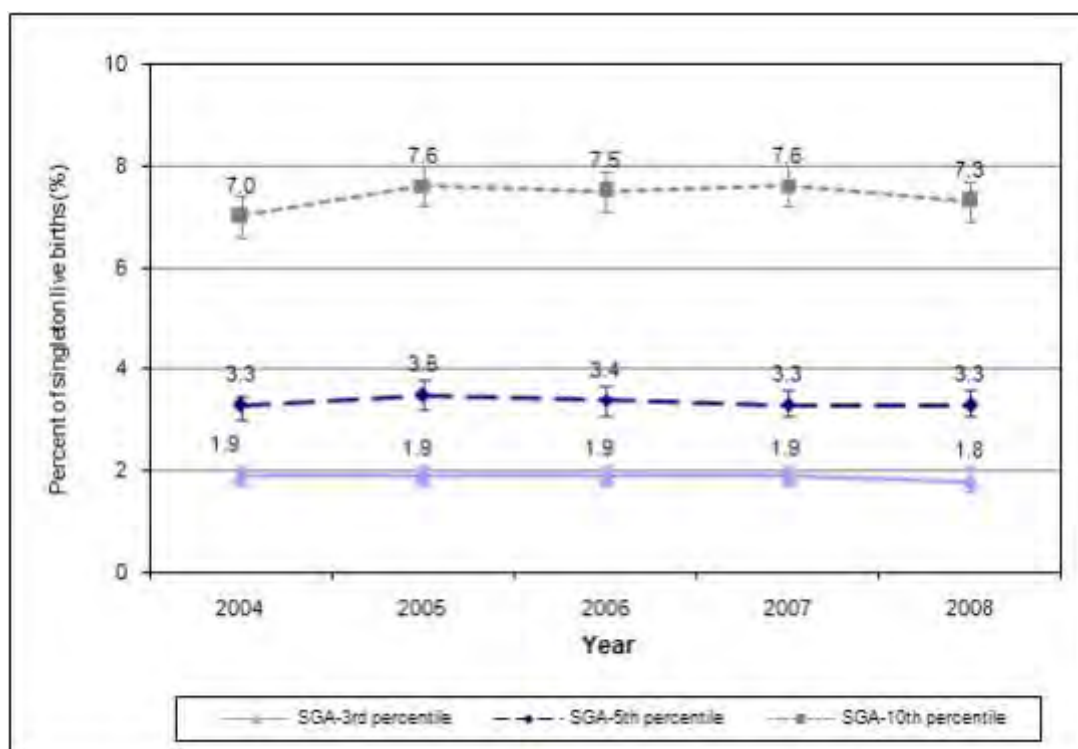
The modulation of fetal growth is a complex relationship between genetic predisposition and the maternal, fetal and placental factors that can restrict or promote growth. Small-for-gestational-age infants are defined as those born with a birth weight less than the sex-specific 10<sup>th</sup> percentile for gestational age.<sup>10</sup> In Canada, the small-for-gestational-age rate decreased between 1995 and 2004 from 10.1 to 7.8 per 100 singleton live births.<sup>11</sup>

In many cases, the growth problem is identified during the pregnancy and the expression “fetal growth restriction” is used to describe the abnormal growth trend. Fetal growth restriction has been associated with an increased risk for stillbirth as well as complications and risks during the periods of labour, birth, and childhood. More recently there has been a growing recognition of the relationship between fetal growth restriction and adult-onset diseases, especially metabolic-related problems such as diabetes and obesity.<sup>12</sup>

At the population level, poor nutrition, substance abuse during pregnancy, and cigarette smoking are all important risk factors for fetal growth restriction and are amenable to prevention strategies. It is estimated that if smoking could be completely prevented during pregnancy, 13.8% of fetal growth restriction cases could be eliminated.<sup>13</sup> Maternal vascular disease secondary to chronic hypertension, diabetes, renal disease, and collagen vascular disease may account for up to one-third of fetal growth restriction.<sup>13</sup>

Small-for-gestational-age rates in this report are based on Canadian population-based growth standards.<sup>14</sup>

**Figure 4.6 Rate of small for gestational age (SGA)**  
*Eastern Region, 2004–2008*

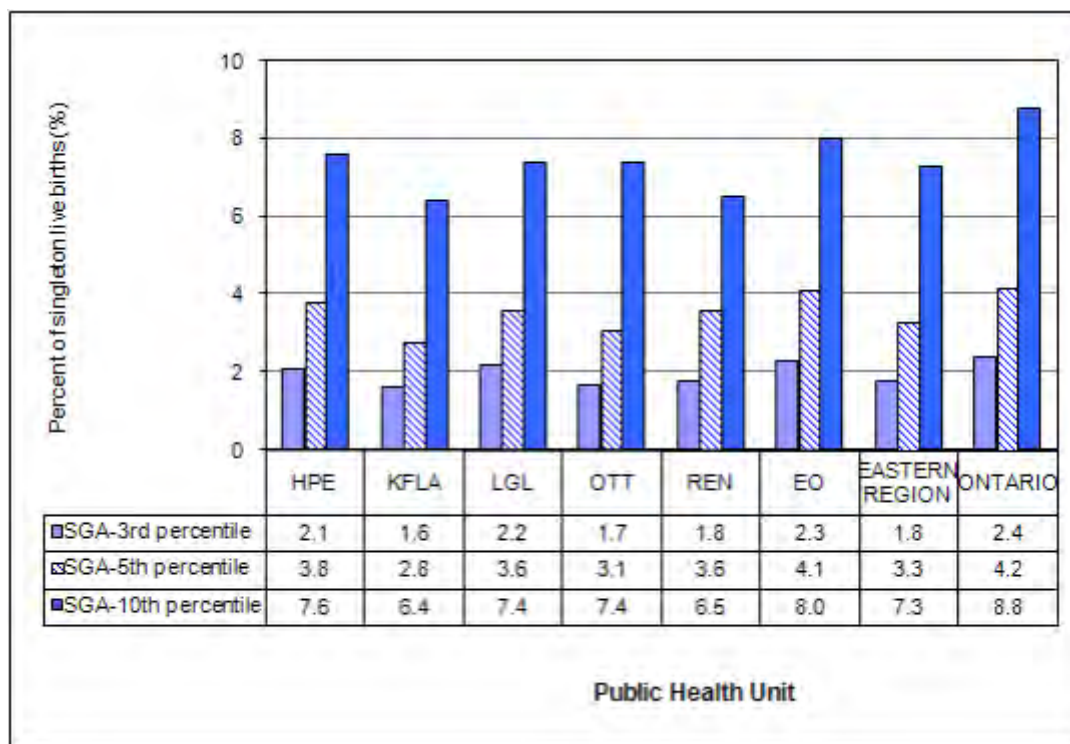


*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of singleton live births with a birth weight below the 10<sup>th</sup> percentile of the sex-specific birth weight distribution for gestational age,<sup>14</sup> expressed as a percentage of the total number of singleton live births (in a given place and time). For this report, the rate of small for gestational age is also presented using the 3<sup>rd</sup> and 5<sup>th</sup> percentile cut-offs.

- The rate of SGA among infants born to women who reside in the Eastern Region has remained stable between 2004 and 2008.

**Figure 4.7 Rate of small for gestational age (SGA), by public health unit**  
 Eastern Region, 2008

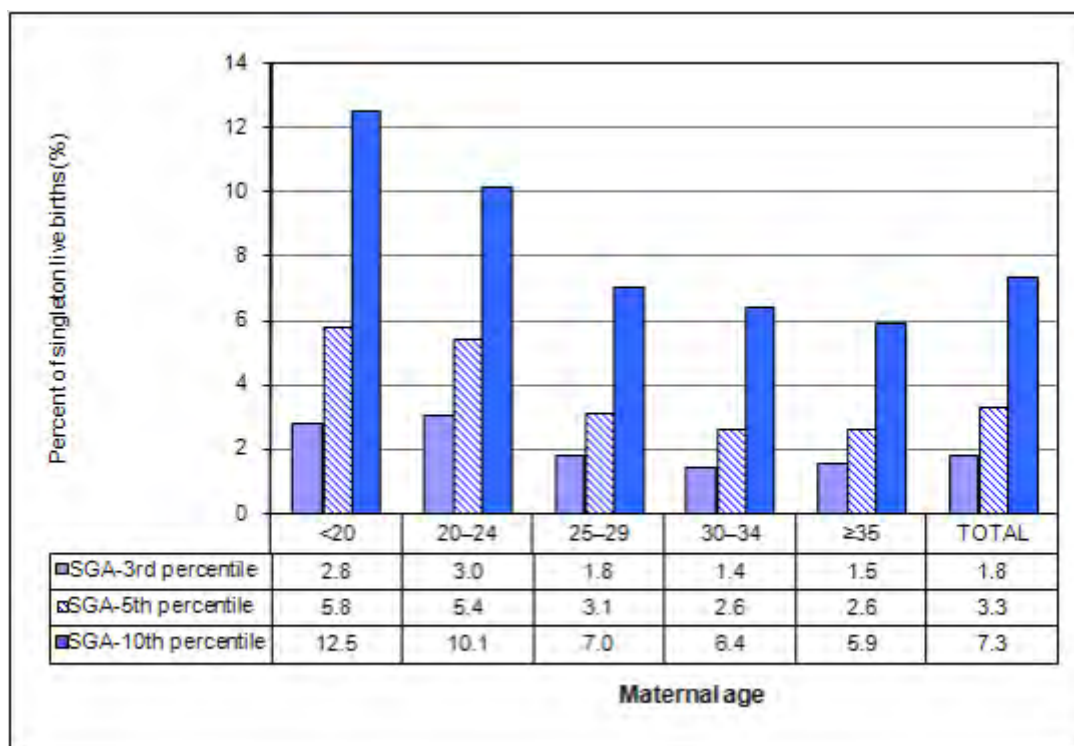


Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The number of singleton live births with a birth weight below the 10<sup>th</sup> percentile of the sex-specific birth weight distribution for gestational age<sup>14</sup> expressed as a percentage of the total number of singleton live births (in a given place and time). For this report, the rate of small for gestational age is also presented using the 3<sup>rd</sup> and 5<sup>th</sup> percentile cut-offs.

- The rate of SGA (based on the 10<sup>th</sup> percentile) among infants born in 2008 to women who reside in the Eastern Region was 7.3%. This was slightly lower than the rate for Ontario (8.8%).
- The rate of SGA (based on the 10<sup>th</sup> percentile) ranged from 8.0% in Eastern Ontario to 6.4% in Kingston, Frontenac and Lennox & Addington.

**Figure 4.8 Rate of small for gestational age (SGA), by maternal age**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of singleton live births with a birth weight below the 10<sup>th</sup> percentile of the sex-specific birth weight distribution for gestational age,<sup>14</sup> expressed as a percentage of the total number of singleton live births (in a given place and time). For this report, the rate of small for gestational age is also presented using the 3<sup>rd</sup> and 5<sup>th</sup> percentile cut-offs.

- The rate of SGA (based on the 10<sup>th</sup> percentile) in the Eastern Region was inversely related to maternal age. In 2008, 12.5% of singleton live births to women under 20 years of age were considered SGA, compared with 5.9% of infants born to women 35 years of age or older.

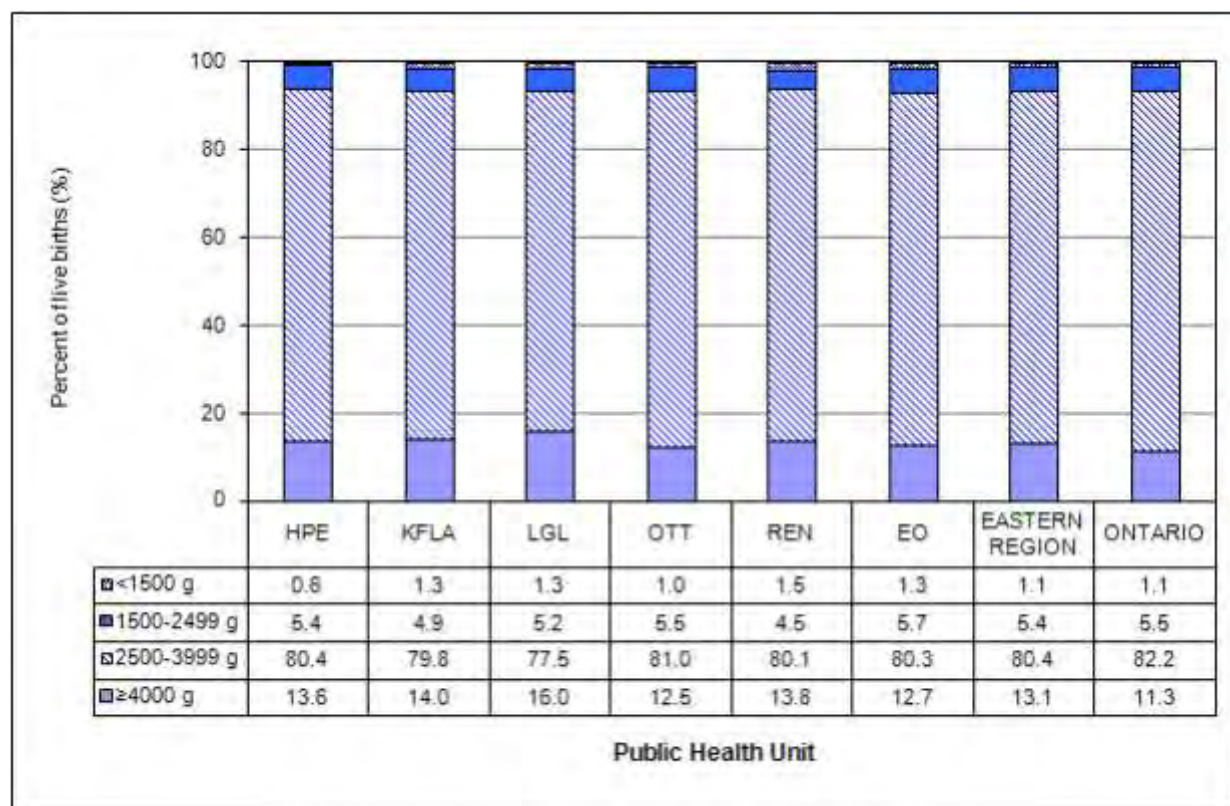
## Low Birth Weight



Low birth weight, defined as a birth weight <2,500 grams, is a widely-used indicator of the general health of newborns, and is an important determinant of infant survival, health and development.<sup>15</sup> Low birth weight encompasses two distinct obstetrical phenomena — preterm birth and inadequate fetal growth (the latter typically measured by small for gestational age at birth) — both of which are associated with increased infant morbidity and mortality.<sup>15</sup> As preterm birth and small for gestational age at birth have different etiologies, it is important to examine these two components of low birth weight separately to better understand and monitor perinatal health.<sup>16</sup> Reliance on low birth weight alone as an indicator of perinatal health is problematic because the trends in its component rates (preterm birth and small for gestational age) may be masked.<sup>16</sup> Nevertheless, because low birth weight is relatively simple to compute and relies only on birth weight information, it is one of the most commonly-used indicators worldwide to compare perinatal health.<sup>15</sup>

To provide context for this report, the Canadian rate of low birth weight between 1995 and 2003 ranged between 5.5% and 5.9%.<sup>15</sup> Over the same time period, the rate of small-for-gestational-age babies decreased from 10.1% to 7.8%,<sup>11</sup> while the rate of preterm birth increased from 7.0% to 8.2%.<sup>1</sup> In Ontario in 2007, the rate of low birth weight among singleton live births was 4.8%.<sup>17</sup>

**Figure 4.9 Distribution of birth weight (grams), by public health unit**  
*Eastern Region, 2008*

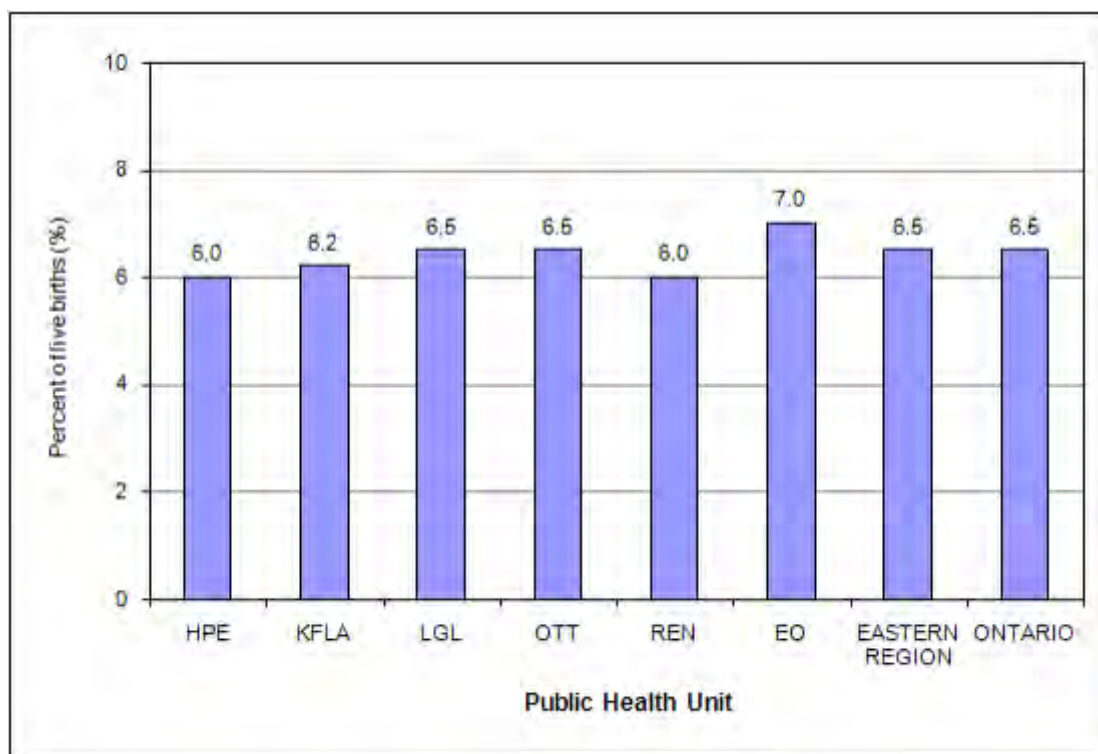


Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The distribution of categories of birth weight in grams at the time of birth, expressed as a percentage of the total number of live births (in a given place and time).

- Approximately 80% of live births to residents of the Eastern Public Health Region in 2008 had a birth weight between 2,500 and 3,999 grams.
- The proportion of live births with low birth weight (<2,500 g) was 6.5% in the Eastern Public Health Region in 2008. This included 5.5% with a birth weight between 1,500 and 2,499 grams and 1.1% with a birth weight of less than 1,500 grams.
- Overall, 13.1% of live births to residents of the Eastern Public Health Region in 2008 had a birth weight of greater than 4,000 grams. This ranged from 16.0% of infants in Leeds, Grenville, and Lanark District Health Unit to 12.5% of infants in the Ottawa Public Health area and is higher than the overall rate of 11.3% in Ontario.

**Figure 4.10 Rate of low birth weight (<2,500 grams), by public health unit**  
*Eastern Region, 2008*

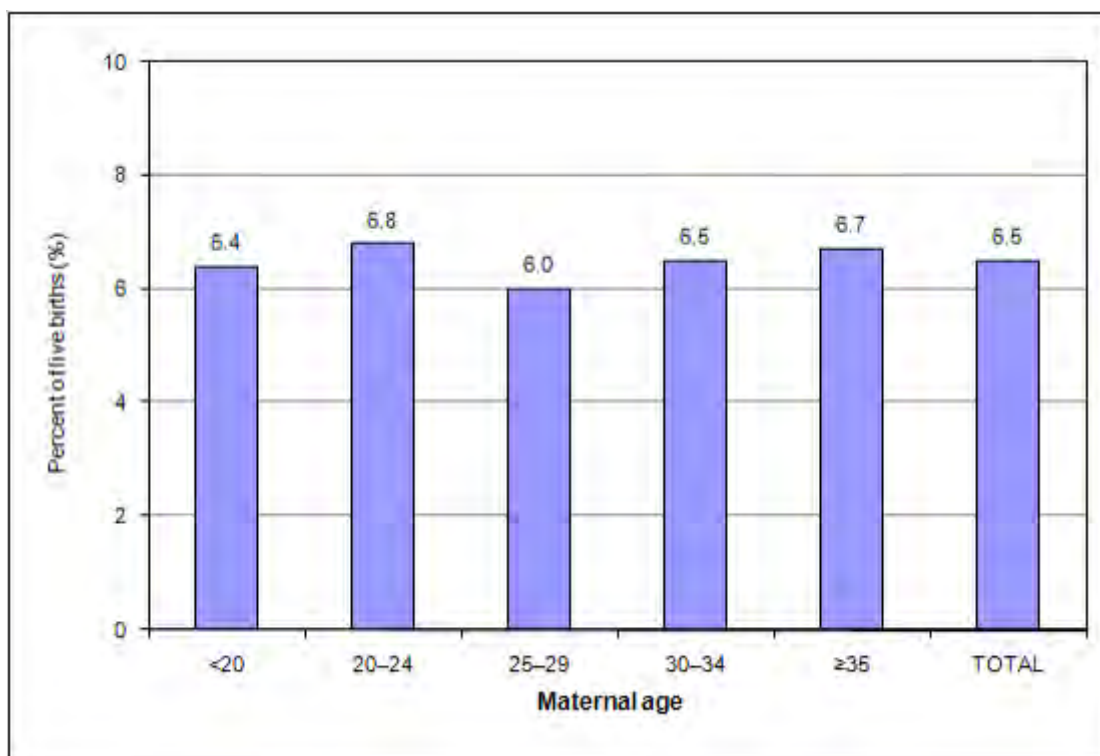


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a birth weight of <2,500 grams, expressed as a percentage of the total number of live births (in a given place and time).

- The rate of low birth weight in the Eastern Public Health Region in 2008 was 6.5%. This varied from 7.0% of live births in the Eastern Ontario Health Unit area to 6.0% in the Hastings & Prince Edward Counties Health Unit and the Renfrew County & District Health Unit.

**Figure 4.11 Rate of low birth weight (<2,500 grams), by maternal age**  
*Eastern Region, 2008*

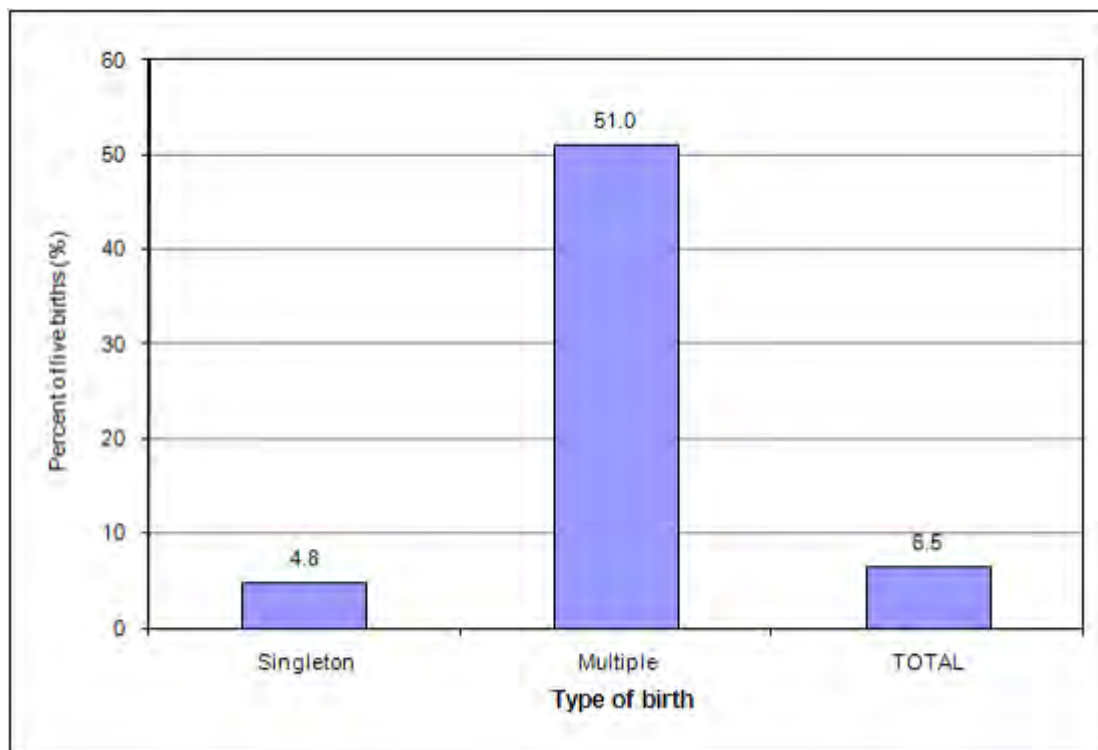


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a birth weight of <2,500 grams, expressed as a percentage of the total number of live births (in a given place and time).

- Low birth weight rates were similar across maternal age groups in the Eastern Region in 2008.

**Figure 4.12 Rate of low birth weight (<2,500 grams), by singleton and multiple birth**  
*Eastern Region, 2008*

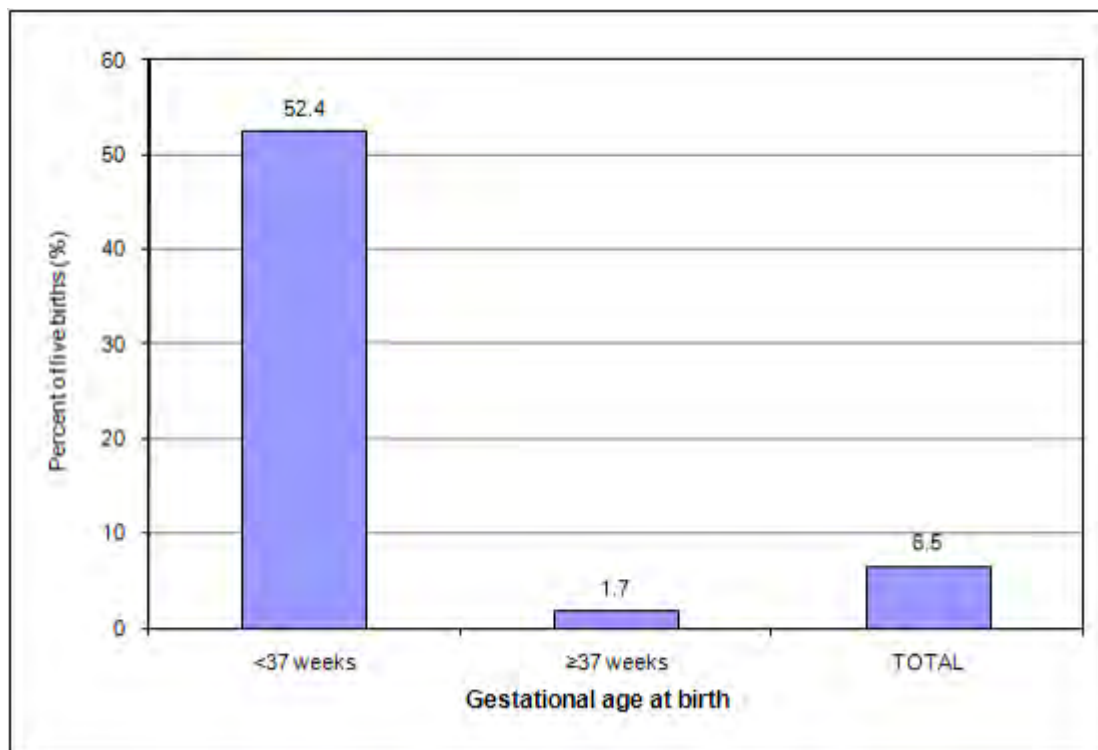


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a birth weight of <2,500 grams, expressed as a percentage of the total number of live births (in a given place and time).

- The rate of low birth weight was vastly different between singleton live births and twin or higher-order multiple live births. In 2008 in the Eastern Region, the rate of low birth weight among singletons was 4.8%, while just over half of twins or higher-order multiples had a low birth weight (51.0%).

**Figure 4.13** Rate of low birth weight (<2,500 grams), by gestational age at birth  
Eastern Region, 2008



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a birth weight of <2,500 grams, expressed as a percentage of the total number of live births (in a given place and time).

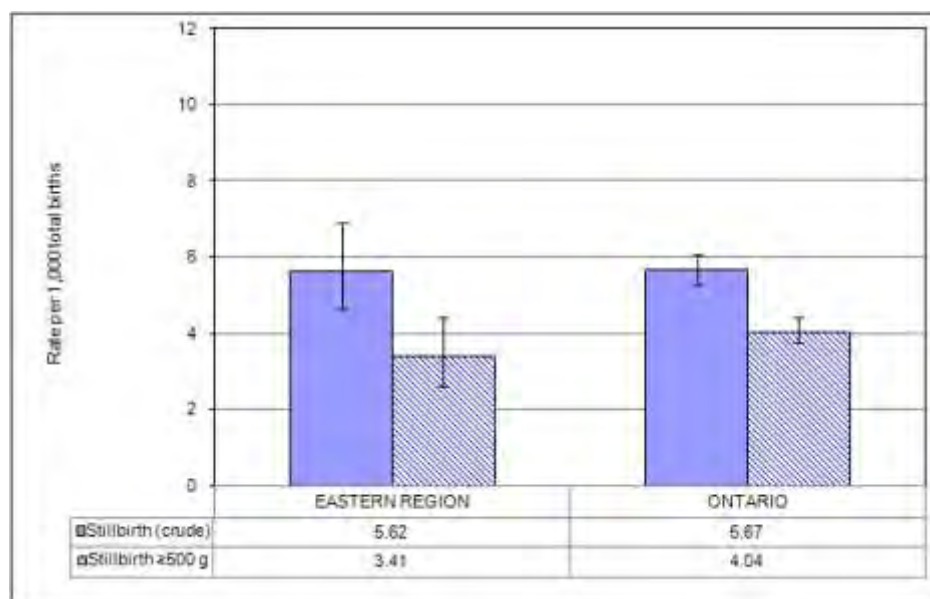
- The importance of preterm birth as a component of low birth weight is illustrated by Figure 4.13, where it can be seen that over half of live births in the Eastern Region in 2008 who were born preterm were also low birth weight (52.4%), while only a very small proportion of infants born at term had a low birth weight (1.7%).

## Stillbirth

Stillbirth, defined as the death of a fetus  $\geq 20$  weeks of gestation or  $\geq 500$  grams, accounts for a large proportion of perinatal deaths (deaths that occur between 20 weeks of gestation and the end of the first week after birth).<sup>18</sup> Stillbirth can result from a range of pathophysiologic circumstances that include congenital anomalies, infection, placental abruption, and fetal malnutrition;<sup>18</sup> however, a large proportion of stillbirths have an unknown cause of death.<sup>19</sup> Risk factors for stillbirth include advanced maternal age, maternal smoking, high pre-pregnancy maternal body mass index, multiple gestation pregnancies and low socioeconomic status.<sup>18,19</sup>

Comparisons of stillbirth rates are often complicated by geographical or temporal differences in stillbirth registration practices.<sup>16</sup> This particularly affects stillbirths at low birth weights and gestational ages<sup>16</sup> and for this reason, calculating gestational age or birth weight-specific rates of stillbirth improves comparability of rates.<sup>20</sup> In 2004, the crude stillbirth rates in Canada (excluding Ontario) and in Ontario, respectively, were 6.0 and 6.3 per 1,000. Stillbirth rates  $\geq 500$  grams were 4.3 and 3.9 per 1,000, respectively.<sup>21</sup>

**Figure 4.14 Rate of stillbirth**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of stillbirths, per 1,000 total births (live births and stillbirths) (in a given place and time). For this report, stillbirth is defined as fetal deaths at  $\geq 20$  weeks' gestation, or with a birth weight of  $\geq 500$  grams. Both the crude stillbirth rate and a birth weight-specific stillbirth rate are presented.

- The crude rate of stillbirth in Eastern Region in 2008 was 5.62 per 1,000 total births, and the rate of stillbirth  $\geq 500$  grams was 3.41 per 1,000 total births.

## Congenital Anomalies

A congenital anomaly is a condition that results from an abnormality of structure, function or metabolism in one or more parts of the body and has the potential to seriously affect health, development or function.<sup>22,23</sup> Accurate estimation of the prevalence of congenital anomalies is complicated by a number of factors. For instance, advances in prenatal diagnosis and termination of pregnancies in which fetal anomalies have been detected has increased in Canada;<sup>24</sup> however, current data systems in most jurisdictions do not systematically capture information on these pregnancies. Also, although congenital anomalies, by definition, are present at birth, they may not be diagnosed until later in life. Finally, prevalence estimates of congenital anomalies vary depending on which anomalies are included in the case definition and the method of case ascertainment.<sup>25</sup>

Major congenital anomalies are generally reported to affect an estimated two to three percent of all births.<sup>25</sup> In Canada in 2004, the prevalence at birth of congenital anomalies (including live born and stillborn babies with one or more congenital anomalies) was estimated at 4.8%.<sup>26</sup> In Canada, congenital anomalies are one of the leading causes of infant death<sup>27</sup> and in 2004–2005 represented the conditions with the highest average cost per acute hospital stay.<sup>28</sup>

At the current time, BORN Ontario estimates of the prevalence of congenital anomalies are limited to information from the Niday Perinatal Database. Historically, there have been problems with data capture for this variable in the database as many congenital anomalies are not identified or diagnosed at birth, and data may not be entered on infants who are transferred to the NICU or special care nursery. Data provided by the Canadian Congenital Anomalies Surveillance System (CCASS) supports the belief that the prevalence of congenital anomalies is underestimated using only the Niday Perinatal Database. For instance, the CCASS estimate for the proportion of infants (live births and stillbirths) with one or more congenital anomalies identified at birth or in the first 30 days after birth was 3.7% in Ontario for 2006.<sup>29</sup> This was more than twice the proportion of infants identified in the Niday Perinatal Database for 2008.

BORN Ontario is currently in the process of developing a new database that will incorporate information from four systems with information on congenital anomalies – the Ontario Multiple Marker Screening Database, the Fetal Alert Network Database and the Niday Perinatal and NICU/SCN Databases. Integration of data from all repositories will ensure a much more complete and accurate picture for reporting the prevalence of congenital anomalies in Ontario. **For the present report, due to the limitations of the congenital anomaly data in the Niday Perinatal Database on which this report is based, the proportion of infants in the region who are born with a congenital anomaly is not reported.**

## Breastfeeding



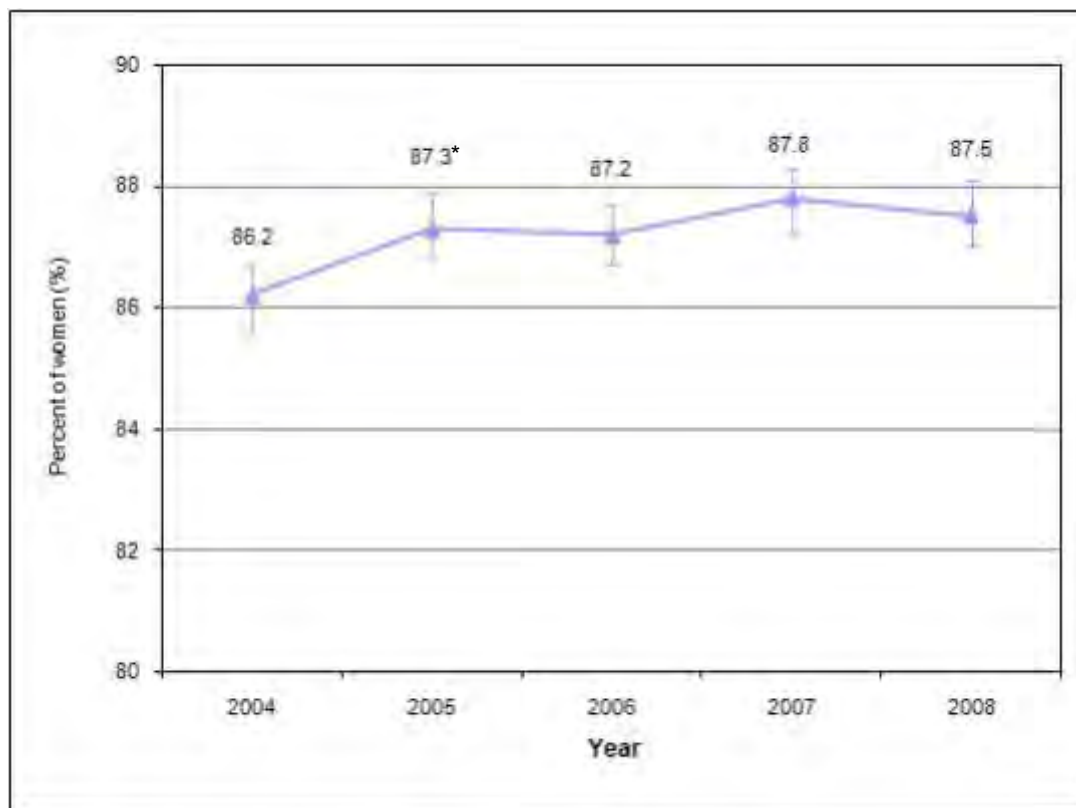
Breastfeeding is unquestionably the best possible method of infant feeding. The Public Health Agency of Canada, Health Canada, the Canadian Paediatric Society and Dietitians of Canada recommend exclusive breastfeeding for the first six months after birth for healthy term infants.<sup>30</sup> The WHO and UNICEF launched the Baby-Friendly Hospital Initiative in 1989 to strengthen maternity practices that support breastfeeding.<sup>31-32</sup> Exclusive breastfeeding is defined as breastfeeding with no other liquid or solid given to the infant.<sup>33</sup> In Canada, estimates from the Maternity Experiences Survey 2006–2007 indicate that 90.0% of women intend to breastfeed and 90.3% of women initiate breastfeeding. However, the rate of exclusive breastfeeding at 6 months was dramatically lower (14.4%). Corresponding rates for Ontario were 90.4%, 90.3% and 15.6%.<sup>34</sup>

Breastfeeding offers numerous benefits for infants (for e.g., growth, immunity and cognitive development)<sup>35-38</sup> and mothers (for e.g., reduced postpartum bleeding, delayed resumption of ovulation and improved bone remineralisation).<sup>39,40</sup> Many of the effects of breastfeeding have a long-term impact which is why exclusive breastfeeding is recommended to six months of age.<sup>38,40-42</sup> Exclusive breastfeeding is associated with lower illness rates than partial or no breastfeeding in a dose-response relationship across all economic groups.<sup>43</sup>

As a region, all care providers providing care to pregnant women and new mothers have a responsibility to support breastfeeding women and create a breastfeeding-friendly community. Helping women with infant feeding is one of the main priorities of care in the postpartum period. Breastfeeding support includes helping the mother to make an informed choice about infant feeding method, learn about feeding cues from the baby, learn how to help the baby latch onto the breast and provide guidance to deal with breastfeeding challenges. Breastfeeding is a skill that takes time and effort for both women and babies to learn; however, the average hospital length of stay for childbirth has been decreasing in Canada<sup>44</sup> and may not allow sufficient time for proper establishment of breastfeeding without continued community support. Public health units have an important role to play during the antenatal and postpartum period in protecting, promoting and supporting breastfeeding in the region by:<sup>7</sup>

- Providing prenatal and parenting programs and services
- Distributing information regarding the benefits of breastfeeding
- Offering breastfeeding support and counselling
- Providing referrals to professionals and community programming and services for breastfeeding support
- Advocating and assisting in the development of policies to support breastfeeding in the workplace, restaurants, shopping malls and other public places.

**Figure 4.15 Proportion of women who intended to breastfeed**  
*Eastern Region, 2004–2008*



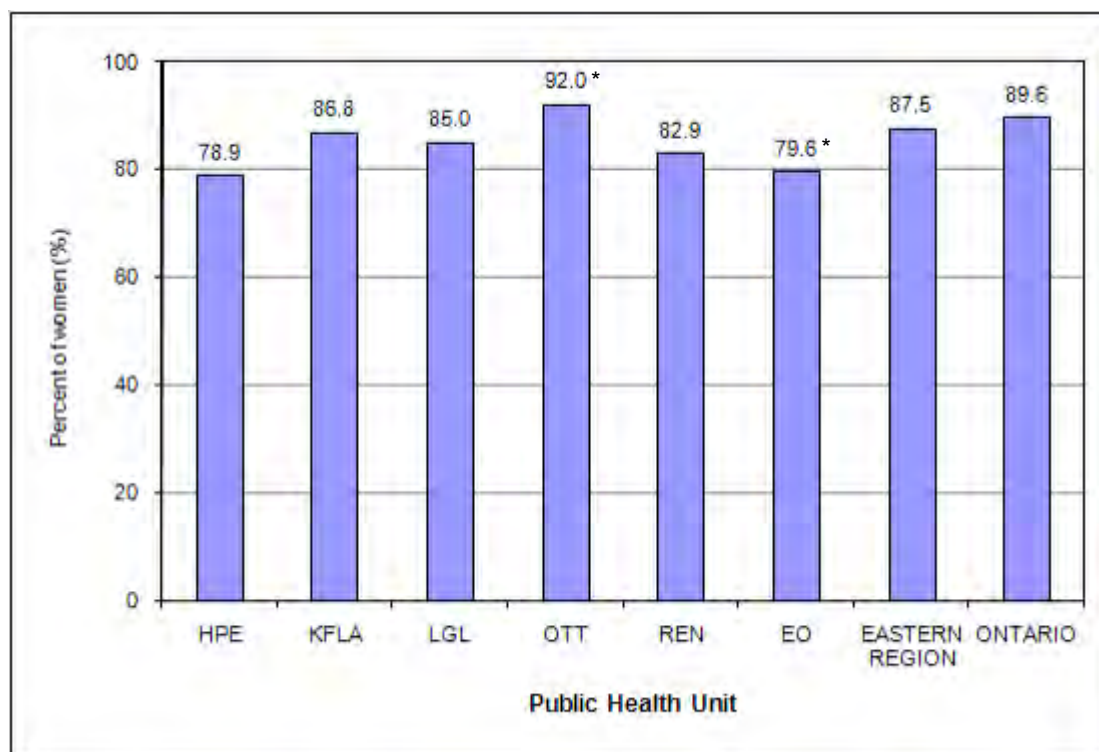
*Data source* BORN Ontario (Niday Perinatal Database), 2004–2008

*Definition of indicator* The number of women who intended to breastfeed their infant(s), expressed as a percentage of the total number of women who gave birth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- The proportion of women intending to breastfeed in the Eastern Region has remained consistently high, between 86.2% (95% CI: 85.6%-86.7%) and 87.8% (95% CI: 87.2%-88.3%) over the five year period between 2004 and 2008.

**Figure 4.16 Proportion of women who intended to breastfeed, by public health unit**  
Eastern Region, 2008



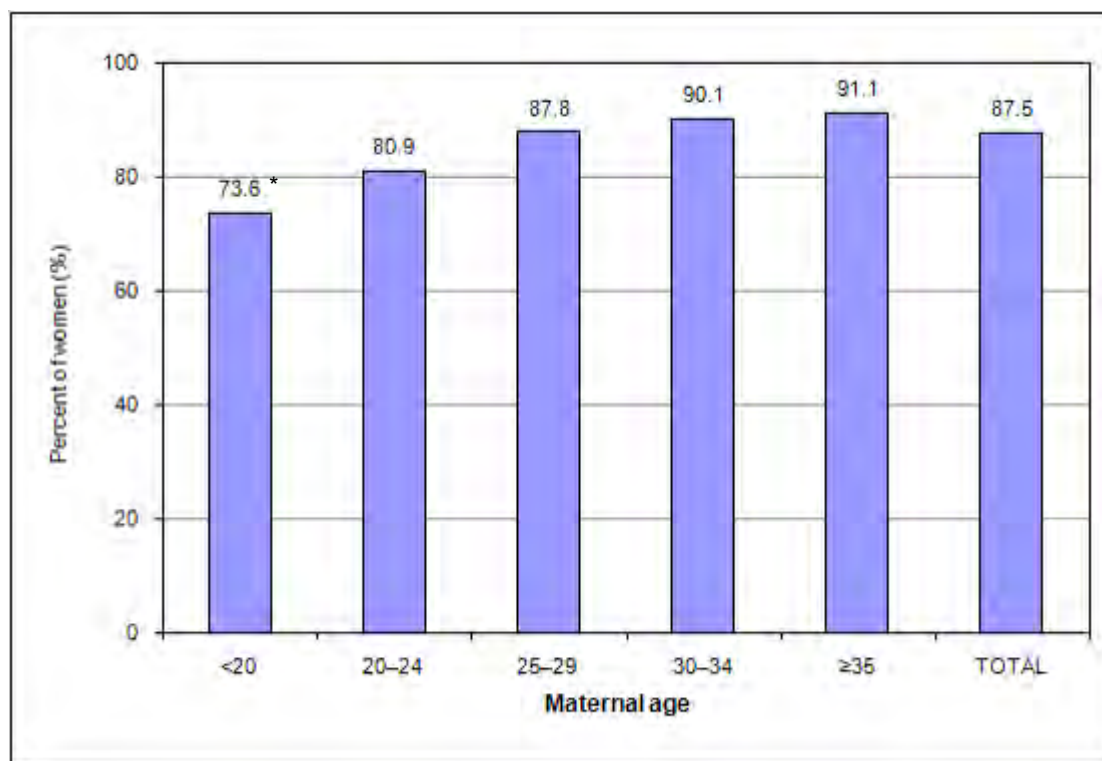
*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who intended to breastfeed their infant(s), expressed as a percentage of the total number of women who gave birth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- Overall, a high proportion (87.5%) of women in the Eastern Region in 2008 intended to breastfeed. Across Ontario, 89.6% of women indicated that they intended to breastfeed. This compares quite closely with the estimate of breastfeeding intention among Ontario mothers who participated in the Maternity Experiences Survey 2006–2007 (90.4%).<sup>45</sup>
- The highest intention to breastfeed rate was found in the Ottawa Health Unit (92.0%), while the lowest rates were noted in Hastings & Prince Edward counties (78.9%) and the Eastern Ontario Health Unit (79.6%) regions. Missing data may have contributed to these findings as 12.1% and 10.5% of the records from the Ottawa and Eastern Ontario Health Unit regions, respectively, were missing information on intention to breastfeed.

**Figure 4.17 Proportion of women who intended to breastfeed, by maternal age**  
Eastern Region, 2008



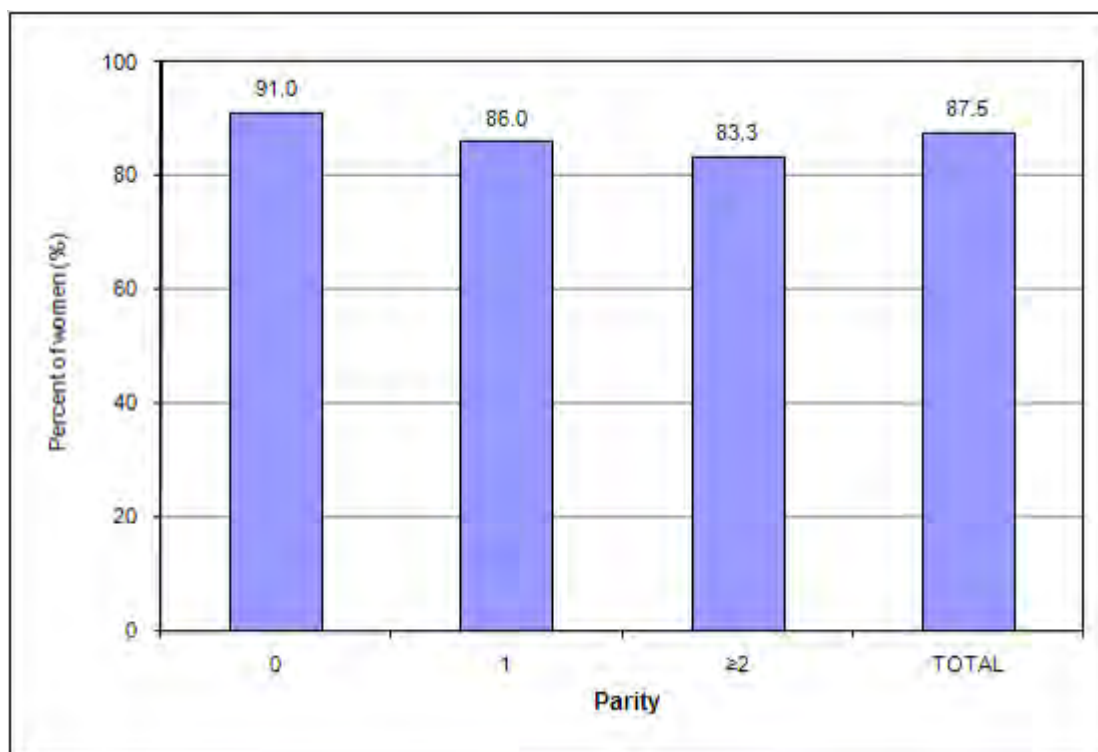
*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who intended to breastfeed their infant(s), expressed as a percentage of the total number of women who gave birth (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

- In the Eastern Region in 2008, a higher proportion of women 30–34 years of age (90.1%) and women ≥35 years of age (91.1%) indicated they intended to breastfeed than younger women. The lowest intention to breastfeed was among women <20 years of age (73.6%); however, missing data may have contributed to these findings as 10.4% of the records for this age category were incomplete.
- A similar pattern of increasing intention to breastfeed with increasing maternal age was observed in the Maternity Experiences Survey 2006–2007.<sup>34</sup>

**Figure 4.18** Proportion of women who intended to breastfeed, by parity  
Eastern Region, 2008

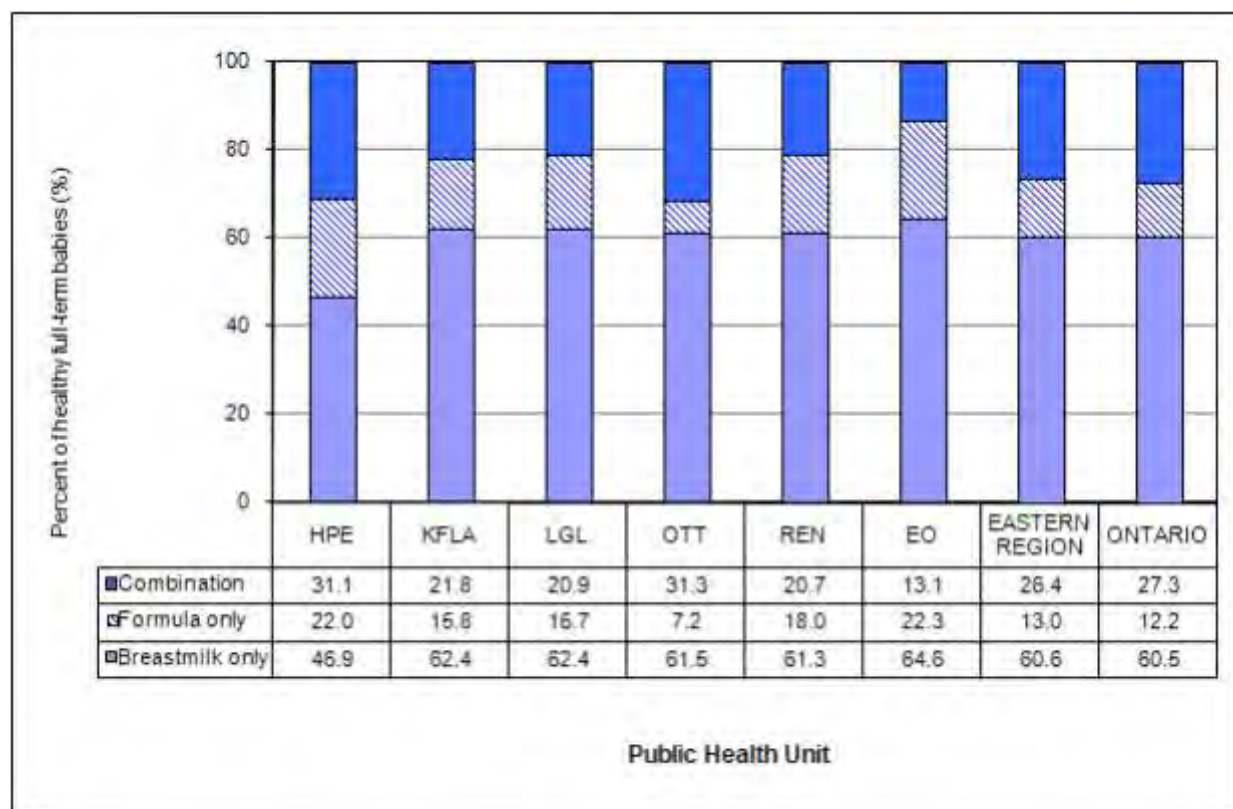


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of women who intended to breastfeed their infant(s), expressed as a percentage of the total number of women who gave birth (in a given place and time).

- Intention to breastfeed was inversely related to parity. In Eastern Region in 2008, first-time mothers (i.e., parity = 0) had the highest intention to breastfeed (91.0%).
- A similar pattern of decreasing intention to breastfeed with increasing parity was observed in the Canadian Maternity Experiences Survey 2006–2007.<sup>34</sup>

**Figure 4.19 Distribution of method of infant feeding while in hospital among healthy full-term babies, by public health unit**  
*Eastern Region, 2008*



Data source BORN Ontario (Niday Perinatal Database), 2008

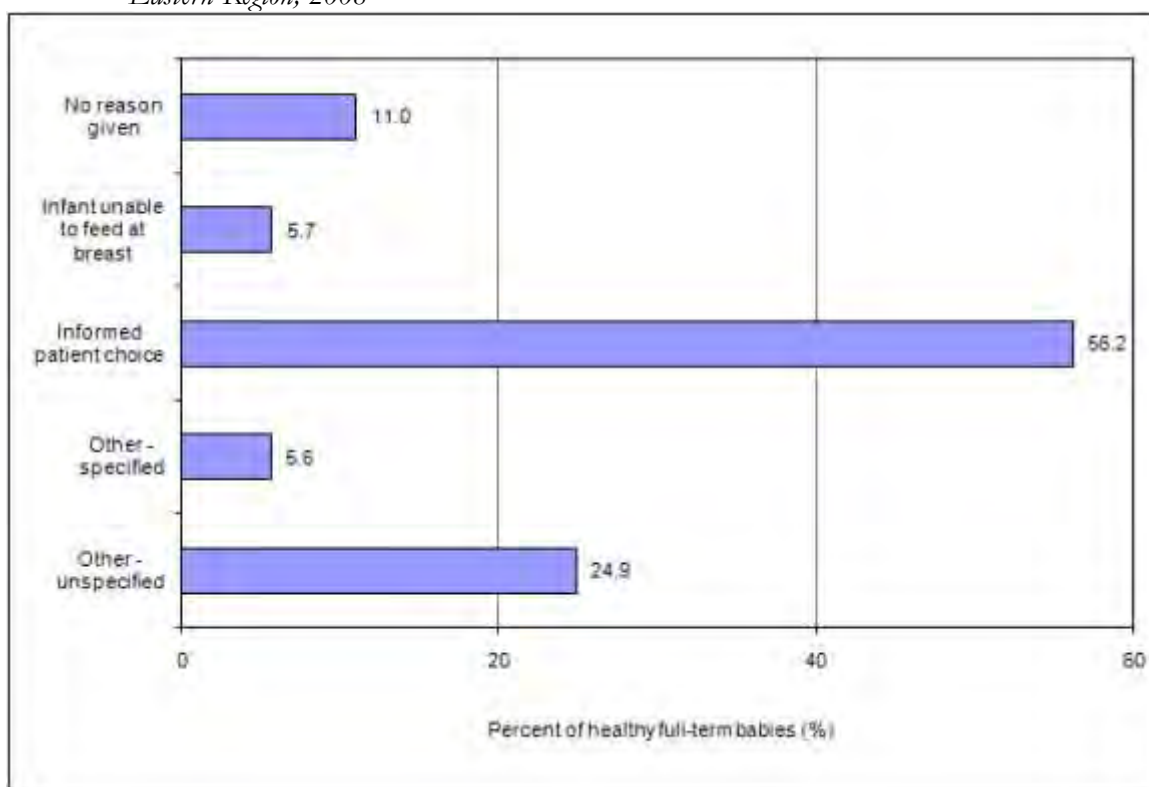
Definition of indicator The distribution of categories of method of infant feeding while in hospital, expressed as a percentage of the total number of healthy full-term babies (in a given place and time).

Notes 1. For this analysis, “healthy full-term babies” was used as the denominator in order to be consistent with the Breastfeeding Committee for Canada recommendations for calculation of rates of breastfeeding statistics.<sup>46</sup> The definition of “healthy full-term babies” used throughout this report is live born infants who were ≥37 weeks of gestational age at birth and were discharged home with their mother (i.e., they were not transferred to NICU or special care nursery).

- Although the majority (60.6%) of healthy full-term infants in the Eastern Region in 2008 received only breastmilk while in hospital, approximately one in four infants received a combination of formula and breastmilk. The health unit with the highest breastmilk-only rate in hospital was the Eastern Ontario Health Unit region (64.6%). The health units with the highest supplementation rates in hospital were Hastings & Prince Edward counties (31.1%) and the Ottawa Health Unit (31.3%) regions. The lowest rate of breastmilk-only feeding was found in Hastings & Prince Edward Counties Health Unit (46.9%).
- These findings are of concern because supplementation with formula during the early establishment of breastfeeding can have negative effects on milk production and supply.<sup>30</sup> The benefits of breastfeeding may also be disrupted and the likelihood that breastfeeding will be successful may be reduced.

**Figure 4.20 Reasons for supplementation of infant feeding while in hospital among healthy full-term babies**

*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

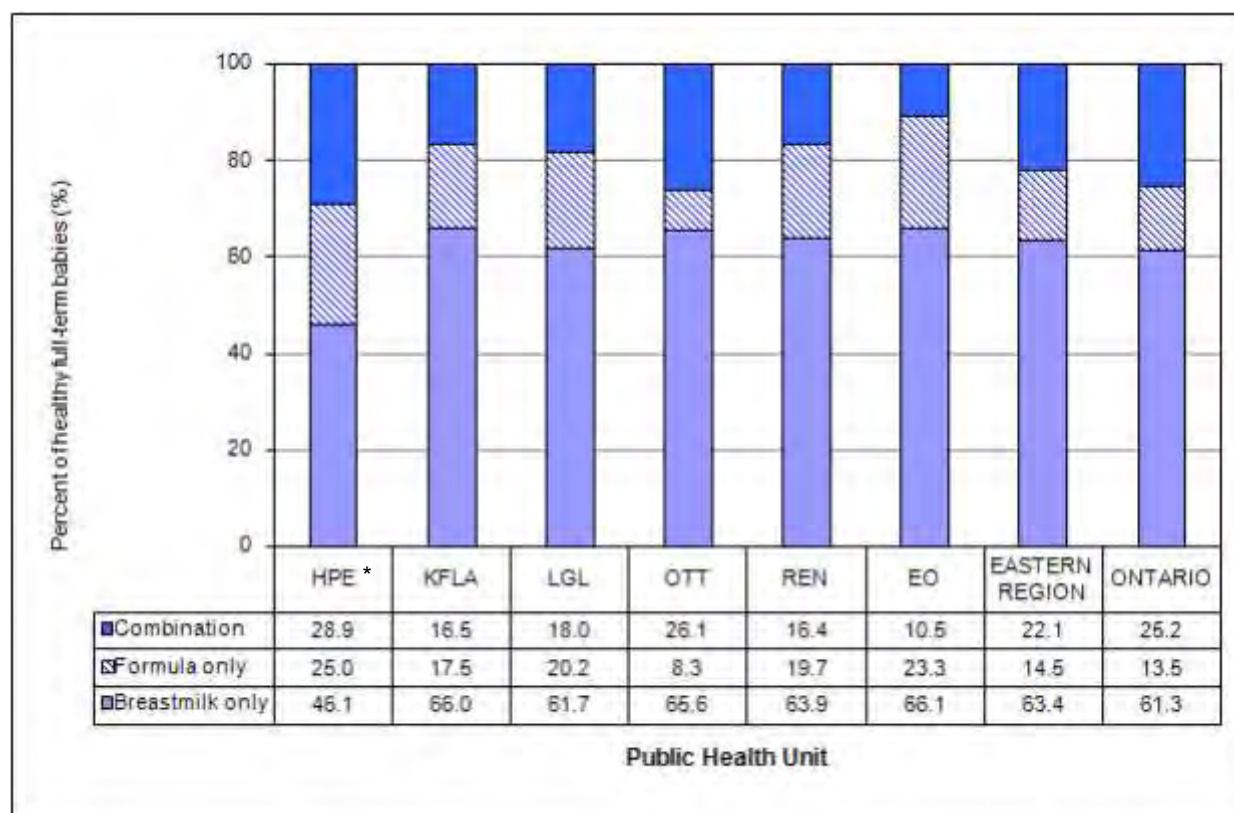
*Definition of indicator* The number of women who indicated one or more reasons for supplementing their infant's feeding while in hospital, expressed as a percentage of the total number of healthy full-term babies who had their feeding supplemented (i.e., received a **combination** of breastmilk and formula) while in hospital (in a given place and time).

*Notes*

1. For this analysis, "healthy full-term babies" was used as the denominator in order to be consistent with the Breastfeeding Committee for Canada recommendations for calculation of rates of breastfeeding statistics.<sup>46</sup> The definition of "healthy full-term babies" used throughout this report is live born infants who were  $\geq 37$  weeks of gestational age at birth and were discharged home with their mother (i.e., they were not transferred to NICU or special care nursery).
2. Women were able to indicate more than one reason for supplementing their infant's feeding; therefore, percentages in this figure do not add up to 100%.
3. Other specified includes: breast reconstructive surgery; clinical evidence of severe dehydration; hypoglycemia, unresponsive to feeding; inborn errors of metabolism; mother taking contraindicated medication; mother and baby separated; and severely ill mother.

- The most common reason given for supplementation of infant feeding while in hospital in the Eastern Region in 2008 was 'informed patient choice' (56.2%). Other-unspecified reasons for supplementation were given for 24.9% of babies who were supplemented while in hospital. For 11.0% of babies, 'no reason' was indicated as the rationale for supplementation.
- Further exploration of this issue (care practices, policies and procedures, education for parents and decision making processes used for supplementation in hospitals) is essential to fully understand the triggers that lead to supplementation prior to discharge from hospital.

**Figure 4.21 Distribution of method of infant feeding at discharge among healthy full-term babies, by public health unit**  
Eastern Region, 2008



Data source BORN Ontario (Niday Perinatal Database), 2008

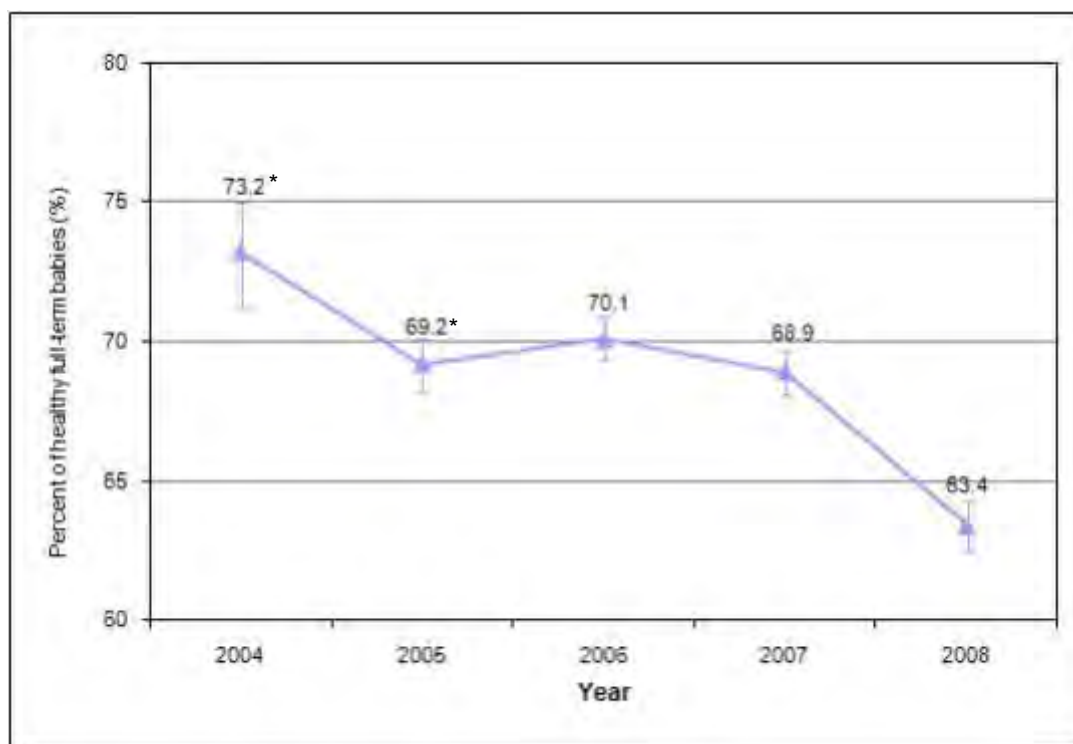
Definition of indicator The distribution of categories of method of infant feeding at discharge, expressed as a percentage of the total number of healthy full-term babies (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

Notes 1. For this analysis, “healthy full-term babies” was used as the denominator in order to be consistent with the Breast-feeding Committee for Canada recommendations for calculation of rates of breastfeeding statistics.<sup>46</sup> The definition of “healthy full-term babies” used throughout this report is live born infants who were  $\geq 37$  weeks of gestational age at birth and were discharged home with their mother (i.e., they were not transferred to NICU or special care nursery).

- Although the majority of healthy full-term infants (63.4%) in the Eastern Region in 2008 were receiving only breastmilk at discharge from hospital, approximately one in five infants were being fed a combination of formula and breastmilk. The health unit regions with the highest breastmilk-only rates at discharge from hospital were Eastern Ontario (66.1%), Kingston, Frontenac and Lennox & Addington (66.0%), and the Ottawa Health Unit (65.6%). The health units with the highest supplementation rates were Hastings & Prince Edward counties (28.9%) and Ottawa Health Unit (26.1%) regions. The lowest rate of breastmilk-only feeding (46.1%) was found in the Hastings & Prince Edward Counties Health Unit region; however 10.1% of the records from this health unit were missing information.

**Figure 4.22 Rate of exclusive breastfeeding at discharge among healthy full-term babies**  
Eastern Region, 2004–2008



Data source BORN Ontario (Niday Perinatal Database), 2004–2008

Definition of indicator The number of infants who were exclusively breastfed at the time of discharge from hospital, expressed as a percentage of the total number of healthy full-term babies (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of this estimate.

Notes

1. For this analysis, “healthy full-term babies” was used as the denominator in order to be consistent with the Breastfeeding Committee for Canada recommendations for calculation of rates of breastfeeding statistics.<sup>46</sup> The definition of “healthy full-term babies” used throughout this report is live born infants who were  $\geq 37$  weeks of gestational age at birth and were discharged home with their mother (i.e., they were not transferred to NICU or special care nursery).

- The rate of exclusive breastfeeding at time of discharge from hospital has decreased from 73.2% (95% CI: 71.2%-75.0%) in 2004 to 63.4% (95% CI: 62.5%-64.3%) in 2008. This trend should be interpreted with caution, however, since 11.4% and 14.8% of the records, respectively, were missing information on breastfeeding status at discharge in 2004 and 2005.

## Screening

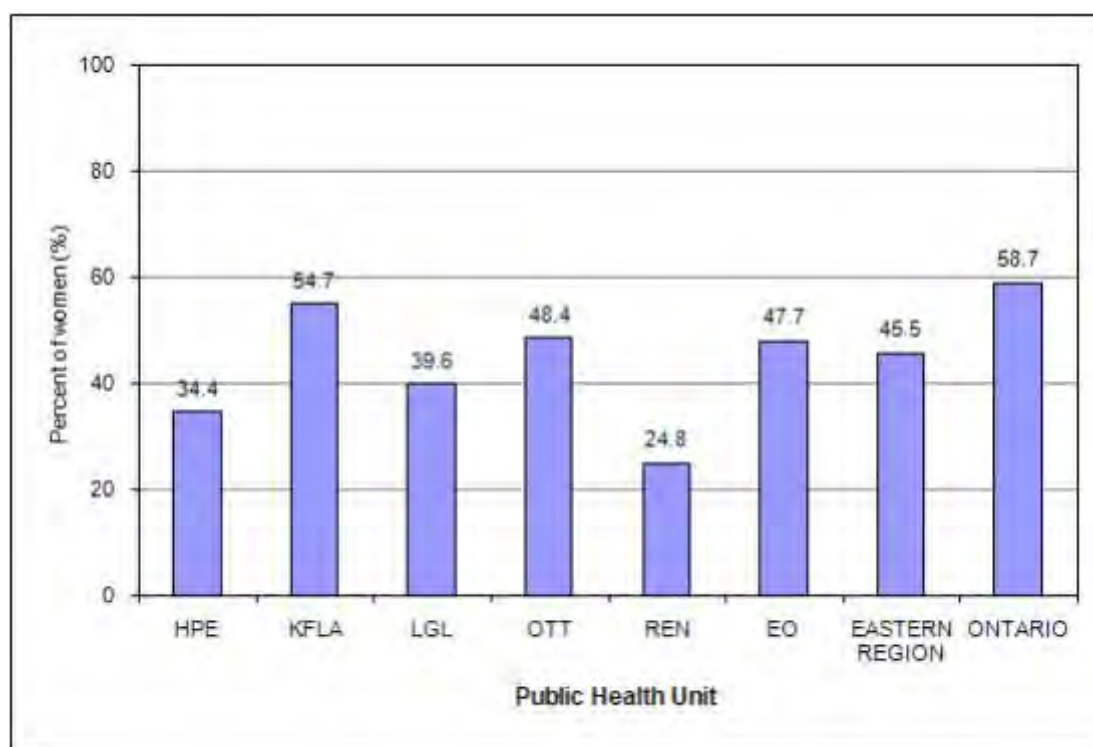
Screening for potential problems in pregnancy and early childhood is well established within maternal newborn programs in Ontario. In this report we are able to provide information on:

- prenatal screening that detects fetuses at potentially higher risk of certain congenital anomalies and genetic conditions
- postpartum screening done in hospitals to detect families and newborns at risk that may require special services
- postpartum hearing screening to detect babies at risk for hearing loss
- postpartum newborn screening to detect babies at risk for one of 28 rare diseases



The Ontario Maternal Multiple Marker Screening Program coordinates integrated prenatal screening at the provincial level in Ontario. Early in pregnancy, women can choose to have optional prenatal screening to determine the chance of having a baby with Down syndrome, trisomy 18 or an open neural tube defect. Further information on this screening program is available at: <http://www.health.gov.on.ca/english/public/program/child/prenatal/>.

**Figure 4.23 Proportion of women who have undergone Maternal Multiple Marker Screening, by public health unit**  
Eastern Region, 2008



*Data source* BORN Ontario (Ontario Maternal Multiple Marker Screening Program Database and Niday Perinatal Database), 2008

*Definition of indicator* The number of women who had Maternal Multiple Marker Screening completed, expressed as a percentage of the total number of women who had a live birth or stillbirth (in a given place and time).

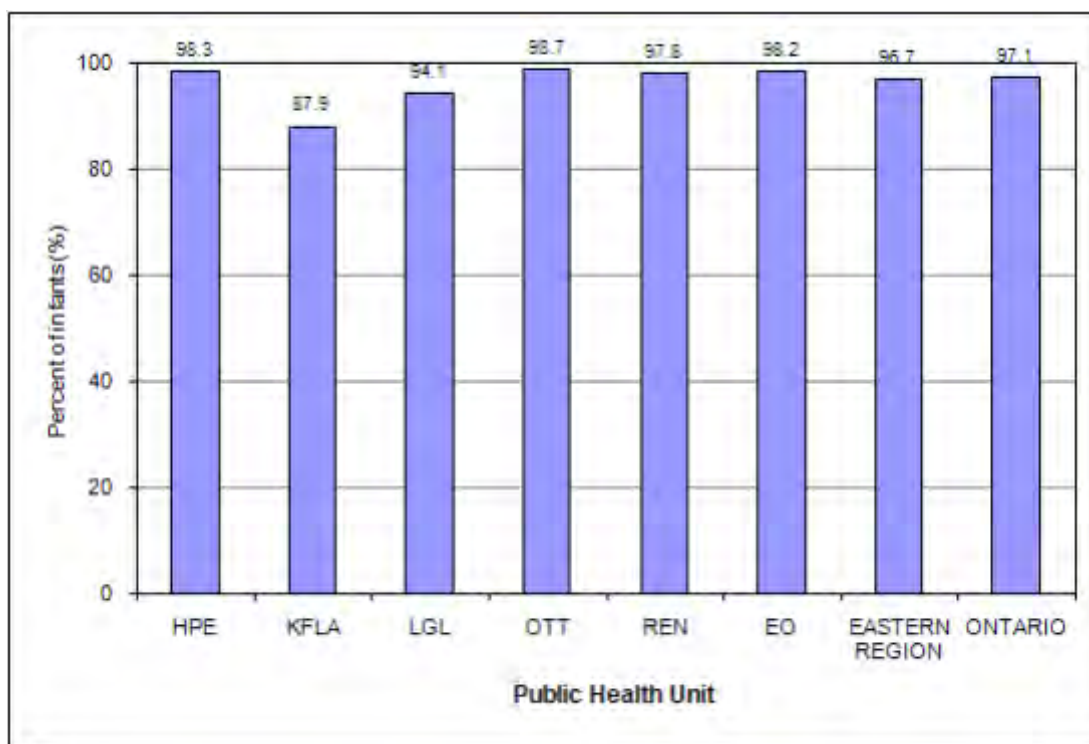
*Notes*

1. The numerator information comes from the Ontario Maternal Multiple Marker Screening Program Database and the denominator information comes from the Niday Perinatal Database. These two data sources are **not** linked together and have some differences in the target population for data collection. For example, women who underwent Maternal Multiple Marker Screening and had a pregnancy loss prior to 20 weeks of gestation would not be recorded in the Niday Perinatal Database.

- The proportion of women in the Eastern Region who underwent maternal multiple marker screening in 2008 was 45.5%. This ranged from a high of 54.7% of women in Kingston, Frontenac and Lennox & Addington to 24.8% in Renfrew County & District health unit.

The Parkyn Tool is used to screen newborns for risk of developmental disabilities because of birth complications/outcomes or social or health issues in the newborn's environment. The screening tool is completed by nurses prior to hospital discharge and the form is then transmitted to the public health unit. Higher scores are used to help public health nurses target families needing early assessment and assistance.

**Figure 4.24 Proportion of infants with a Parkyn Screen completed, by public health unit**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of infants who had a Parkyn Screen completed, expressed as a percentage of the total number of live born babies who were discharged home with their mother (in a given place and time).

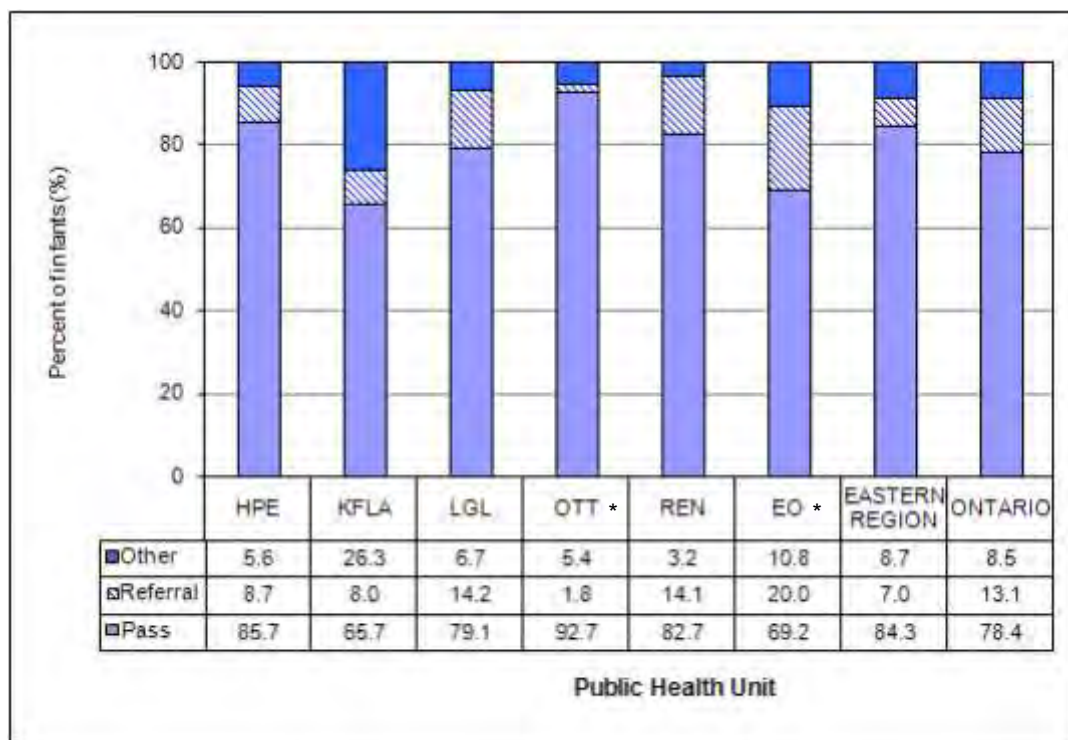
*Notes*

1. For this analysis, the denominator included only live born babies who were discharged home with their mother because information on this variable for infants who are transferred to the NICU or special care nursery is not captured in the Niday Perinatal Database.

- With the exception of Kingston, Frontenac and Lennox & Addington health unit at 87.9%, the percentage of infants with a completed Parkyn Screen in the Eastern Ontario public health region is relatively consistent, ranging from 94.1% to 98.7%.
- The proportion of infants in the Eastern public health region who were considered at high risk based on a Parkyn Screen score of nine or greater was 20.2% in 2008. This varied from a low of 17.6% of infants in the Ottawa public health region to a high of 29.0% in Hastings & Prince Edward counties. The overall proportion of infants in Ontario who received a Parkyn Screen score of nine or greater in 2008 was 21.4%.<sup>47</sup>

The Ontario Infant Hearing Program aims to screen all babies in the early newborn period for potential hearing loss. Because the newborn and early childhood period are very critical for language development, this program strives for early identification of potential hearing problems so appropriate services can be put in place for children needing assistance. Undetected hearing loss is a marker for delayed language development and this in turn can lead to problems in school and other behavioural problems. A thorough description of the screening program, and the follow-up steps is available at: <http://ihp.mtsinai.on.ca/english/newbornscreening.htm>.

**Figure 4.25 Distribution of hospital-based infant hearing screening test results, by public health unit Eastern Region, 2008**



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The distribution of hospital-based infant hearing screening test results, expressed as a percentage of the total number of live born babies who were discharged home with their mother (in a given place and time).

\* Between 10% and 30% of records had missing information and were excluded from the calculation of these estimates.

- Notes*
1. For this analysis, the denominator included only live born babies who were discharged home with their mother because information on this variable for infants who are transferred to the NICU or special care nursery is not captured in the Niday Perinatal Database.
  2. Other includes: inconclusive/ no result and testing not done.

- Of the babies screened for hearing in hospital in 2008, 65.7% to 92.7% obtained a pass. The need for referral is greatest in the Eastern Ontario (20.0%) health unit; however, this result should be interpreted with caution because of the high proportion of records with missing data in the Eastern Ontario health unit area (19.4%).

The Newborn Screening Ontario program tests a small blood sample, usually taken from a baby's heel around the time of birth, to determine whether they might be at risk of having one of 28 rare but treatable diseases. A thorough description of the screening program, including the conditions that are included in the screening panel, is available at: <http://www.newbornscreening.on.ca>.

**Figure 4.26 Number of infants with newborn screening completed and proportion who screen positive, by public health unit**  
*Eastern Region, 2008*

Public Health Unit	Number of infants with newborn screening completed	Number with a positive screen	Proportion of infants with a positive screen
Has. ngs & Prince Edward Counties Health Unit	1,509	11	0.73
Kingston, Frontenac and Lennox & Addington Public Health	1,908	9	0.47
Leeds, Grenville and Lanark District Health Unit	1,448	9	0.62
Ottawa Public Health	9,072	89	0.98
Renfrew County & District Health Unit	980	8	0.82
Eastern Ontario Health Unit	1,858	20	1.08
EASTERN REGION	16,775	146	0.87
ONTARIO	130,681	1,162	0.89

*Data source* BORN Ontario (Newborn Screening Ontario Database), 2008

*Definition of indicator* The number of infants with a positive newborn screening test, expressed as a percentage of the total number of infants with newborn screening completed (in a given place and time).

- The proportion of infants in Eastern Region with a positive screen on newborn screening was 0.87% of all those with screening completed. The corresponding number of babies with a positive screen was 146 in 2008 among residents of Eastern Region.

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## CHAPTER 5 SMOKING DURING PREGNANCY

It has been suggested that smoking is the single most important modifiable cause of adverse pregnancy outcomes.<sup>1</sup> As mentioned in Chapter 2 of this report, smoking in pregnancy increases the risk to the fetus of intrauterine growth restriction (IUGR), preterm birth, spontaneous abortion, placental complications and stillbirth.<sup>1,2</sup> It also increases the risk of sudden infant death syndrome (SIDS), childhood asthma and respiratory illness, and has been associated with neurodevelopmental and behavioural problems and some childhood cancers.<sup>1,3–6</sup> Some of the long-term health impacts for the babies born to women who smoke during pregnancy are a consequence of the perinatal complications they experience such as preterm birth and intrauterine growth restriction.<sup>7</sup>

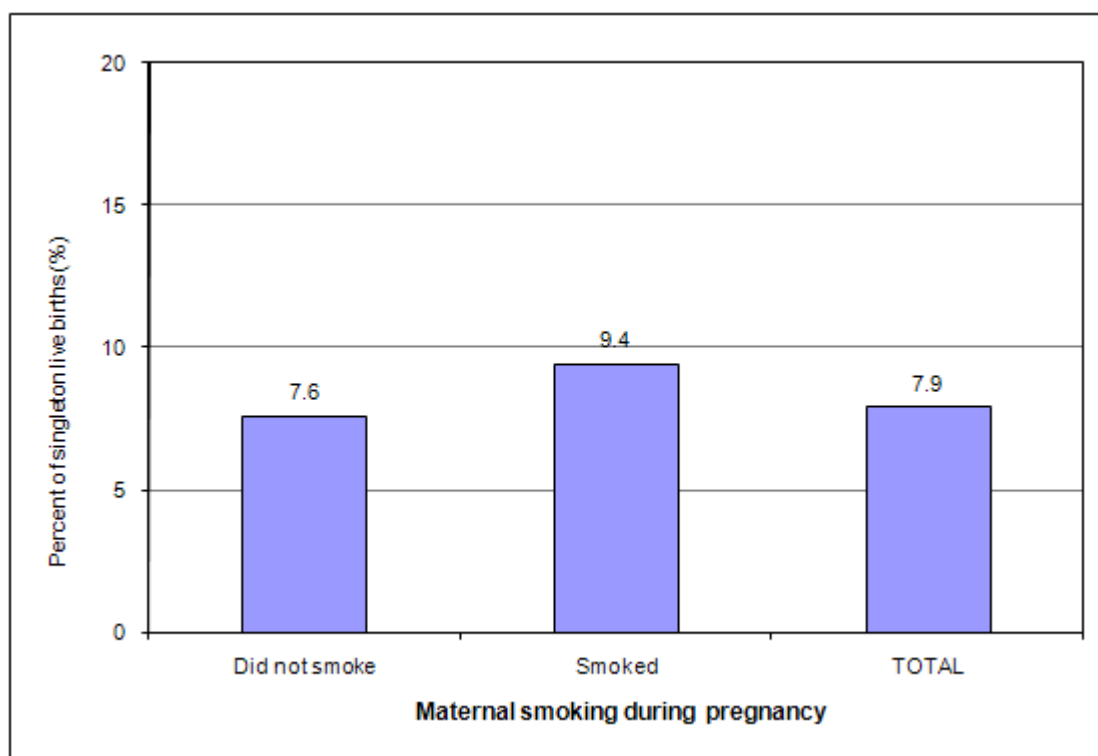
Preterm birth rates have a profound impact on perinatal health, and account for more than 80% of complications and deaths that occur around the time of birth.<sup>7</sup> Preterm birth is the leading cause of cerebral palsy.<sup>7</sup> Preterm babies are more likely to die or experience health problems during the first year of life. For example, babies born between 34 and 36 weeks of gestation are 4.5 times more likely to die in their first year than babies born at term, and those born before 28 weeks are 170 times more likely to die.<sup>7</sup> In addition to the immediate costs associated with intensive hospital care that is required at birth, preterm birth creates long-term costs related to long-term complications such as respiratory problems, motor and sensory impairment, and neurocognitive impairment.<sup>7</sup>

Low birth weight refers to a birth weight of less than 2,500 grams. Many babies with low birth weight are preterm babies, but low birth weight also includes some term babies who are small for gestational age. Low birth weight is associated with both short and long-term adverse health outcomes, which vary based on the underlying cause (e.g., preterm versus small for gestational age).<sup>7</sup>

Small for gestational age refers to babies whose birth weight is below the tenth percentile based on gestational age. Different weight distribution charts are used based on infant sex. Babies who are symmetrically small have a poorer prognosis than those who have grown asymmetrically (i.e., head is normal size but body is small).<sup>7</sup> Symmetrical growth restriction often has an underlying genetic or infectious cause, and can entail underdevelopment of the brain.<sup>7</sup> Asymmetrical growth restriction is associated with an increased risk of cardiovascular and metabolic dysfunction later in life.<sup>7</sup>

At a population level, rates of preterm birth, low birth weight, and small for gestational age are all affected by the proportion of pregnant women who smoke during pregnancy. The rates of preterm birth and low birth weight reported in this chapter differ from those described in Chapter 4 because the analysis in this chapter is restricted to singleton live births.

**Figure 5.1** Rate of preterm birth (<37 weeks of gestation) among singleton live births, by maternal smoking during pregnancy  
Eastern Region, 2008

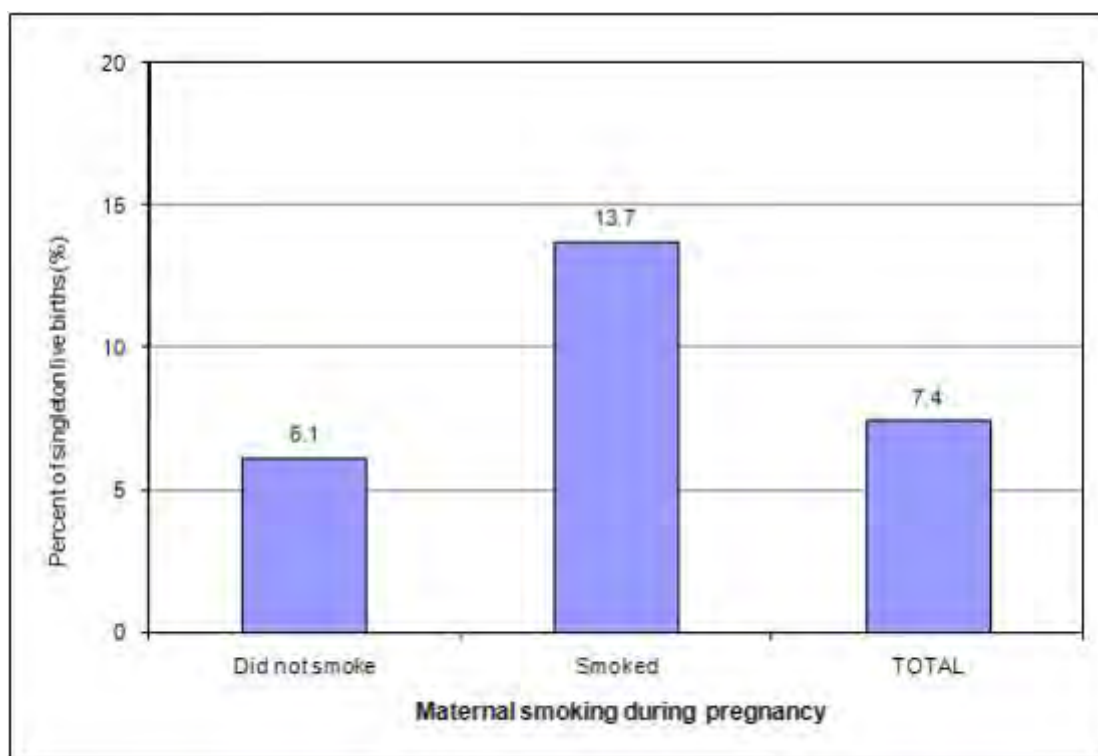


Data source BORN Ontario (Niday Perinatal Database), 2008

Definition of indicator The number of live births with a gestational age of <37 completed weeks of gestation, expressed as a percentage of the total number of live births (in a given place and time). For this figure, the analysis is restricted to singleton live births.

- Overall in the region in 2008, 7.9% of singleton live births occurred before 37 weeks' gestation. This rate was higher among women who smoked during pregnancy (9.4%) than among women who did not smoke (7.6%).

**Figure 5.2 Rate of small for gestational age (<10th percentile) among singleton live births, by maternal smoking during pregnancy**  
*Eastern Region, 2008*

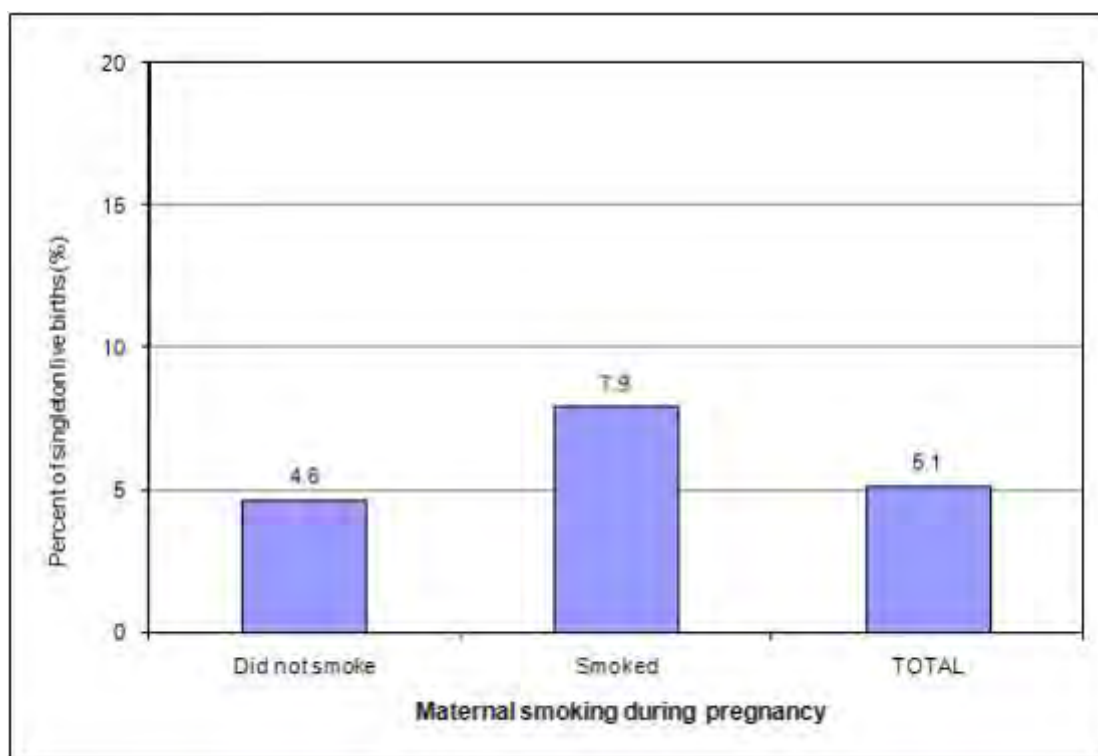


*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of singleton live births with a birth weight below the 10<sup>th</sup> percentile of the sex-specific birth weight distribution for gestational age, expressed as a percentage of the total number of singleton live births (in a given place and time).

- In 2008 in the Eastern Region, 7.4% of singleton live births had a birth weight below the 10<sup>th</sup> percentile (based on sex and gestational age). More than twice as many babies born to mothers who smoked during pregnancy were small for gestational age (13.7%) compared with babies born to non-smoking mothers (6.1%).

**Figure 5.3 Rate of low birth weight (<2,500 grams) among singleton live births, by maternal smoking during pregnancy**  
*Eastern Region, 2008*



*Data source* BORN Ontario (Niday Perinatal Database), 2008

*Definition of indicator* The number of live births with a birth weight of <2,500 grams, expressed as a percentage of the total number of live births (in a given place and time). For this figure, the analysis is restricted to singleton live births.

- The rate of low birth weight (<2,500 g) in the region in 2008 among singleton live births was 5.1%. This rate was higher among babies born to women who smoked during pregnancy (7.9%) than among babies born to non-smokers (4.6%).

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## APPENDIX B – Accessing BORN Ontario Data

We assist individuals and groups with acquiring and using BORN Ontario data for quality improvement or research projects. BORN Ontario generally receives three different types of requests for assistance with data:

1. Assistance with accessing and using BORN data collected within the person's own institution. These types of requests are usually handled by the BORN Regional Coordinators (contact information in **Appendix A**).
2. Requests for aggregate information about certain variables, such as the rate of cesarean delivery within a certain region (e.g., LHIN or the entire province). In this case, the request is received and evaluated by BORN Ontario. If there are no privacy issues or concerns about how the data will be used, and the data are truly aggregate, BORN logs the request and provides the data once appropriate agreements are signed regarding security and publication.
3. Requests for a dataset with some variables that may be considered personally identifying information. This type of request is usually associated with a particular research question or quality improvement initiative for which the individual wants to have the freedom to analyze the data to draw conclusions or test a hypothesis. BORN manages this type of request in accordance with the provisions of the *Personal Health Information Protection Act* (PHIPA).

For applications relating to Personal Health Information, BORN Ontario adheres to the principle of providing the minimum personal health information necessary for the purposes of the research. BORN works with the Electronic Health Information Laboratory (eHIL) at the Children's Hospital of Eastern Ontario (CHEO) to de-identify data sets. We are also currently working with the Research Ethics Board at CHEO to set up a process for assessing all BORN data requests and doing expedited REB review as warranted.

Before contacting BORN Ontario with requests for data, we encourage researchers to learn more about the data we have available. Once the new BORN database is completed, we will have a comprehensive list on our website (<http://www.bornontario.ca>). In the meantime, the BORN–Niday Perinatal Database variables can be found at: <https://www.nidaydatabase.com/info/pdf/DefinitionsNidayPerinatalDatabase09.pdf>.

For other BORN Ontario founding partner data, please contact us and we will guide you to information on their data variables.

Please contact Ann Sprague ([asprague@ottawahospital.on.ca](mailto:asprague@ottawahospital.on.ca)) for data application requests, including further breakdown of the data tables provided in this report.



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