

Dear Colleagues:

The Better Outcomes Registry & Network (BORN) Ontario is pleased to release this series of reports that provide an overview of the 2009–2010 fiscal year maternal-newborn outcomes for hospitals within Local Health Integration Networks (LHINs) in Ontario. There are five reports of combined LHINs corresponding to perinatal regions in Ontario. In September 2010, a companion series of seven reports for public health regions in Ontario was distributed.

We hope you find this report informative and useful for guiding 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 hospitals within Local Health Integration Networks (LHINs) 12, 13 & 14 for the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region. It provides data on maternal and newborn health and outcomes of interest to maternal-newborn care providers, administrators, LHIN personnel, government and families in Ontario, for the 2009–2010 fiscal year, and with 5-year trends where possible.

The content and presentation of this report by BORN Ontario differs from previous reports by the Ontario Perinatal Surveillance System in a number of ways. For the first time, we are reporting data by combined LHIN regions for the entire province. Some data are presented for individual LHINs within the region and others focus on the region itself, particularly when numbers are small. In response to input received from hospital care providers, BORN has added a number of new figures to this report, has included definitions for all of the indicators, and has provided additional background information and data interpretation. We greatly appreciate the on-going support of our hospital and regional network colleagues for their assistance and input into the content of these reports.

Quality perinatal health care requires that hospitals work in partnership with colleagues in public health and community agencies. 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).

Acknowledgements

BORN Ontario would like to acknowledge the tremendous work of the hospital personnel and regional maternal/newborn programs we consulted in developing content for this report. We particularly appreciate the guidance of the former Child Health Network (CHN) in Toronto and the former Perinatal Partnership Program of Eastern and Southeastern Ontario (PPESO) who had previously produced regional reports. As we plan for future reports, we are especially interested in hearing from Northern LHINs, smaller hospitals and other regional networks with respect to indicators that are of particular relevance to them. We appreciate the guidance provided by the Scientific Working Group of BORN Ontario and thank them for their contribution.

We also thank BORN Ontario partners who contributed data for this report – Jennifer Milburn from Newborn Screening Ontario, Tianhua Huang from the Ontario Maternal Multiple Marker Screening Program, Seetha Raja from the Ontario Midwifery Program, Vivian Holmberg on behalf of the Ontario Midwifery Program and Alex Rishia who provided data from the Ontario Ministry of Children and Youth Services. Special thanks to Brittan Fell and David King of BORN Ontario who provided help with lay-out for the report, and Karine Tawagi and Yanfang Guo who helped produce graphs.

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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 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 integrate data from the five founding partners – Ontario Maternal Multiple Marker Screening Database, Fetal Alert Network, Niday Perinatal and NICU/SCN Databases, Ontario Midwifery Program Database and Newborn Screening Ontario to permit future analysis, research and reporting across multiple touch points within the maternal-newborn continuum of care.
- Developing and submitting 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**.

Executive Summary

The purpose of this report is to provide an overview of maternal-newborn indicators and trends for policy makers, hospitals, Local Health Integration Networks (LHINs) and clinicians providing maternity services. North Simcoe Muskoka, North East and North West LHINs provide obstetrical services to about 8% (8.2%) of Ontario residents who give birth in Ontario hospitals each year. Many factors influence the demands on both general and highly specialized obstetrical and neonatal services in the region. These include, but are not limited to, the background characteristics and health of the obstetrical population (such as maternal age and underlying medical co-morbidities), risk factors (such as multifetal gestation and previous cesarean), obstetrical practices with regard to the use of intrapartum interventions (such as labour induction and primary or repeat cesarean delivery), and prevalence of adverse newborn outcomes (such as preterm birth, growth restriction, and birth depression).

Some key findings from this report that directly relate to or strongly influence the delivery of obstetrical health services and quality care in the North Simcoe Muskoka, North East and North West LHIN Region are summarized here:

Population profile:

- 12.5% of women who gave birth in 2009–2010 in the North Simcoe Muskoka, North East and North West LHIN Region were 35 years of age or older, which is considerably lower than in the province as a whole. The proportion of women who gave birth at <20 years of age was higher in this region (8.4%), particularly in North West LHIN (12.8%).
- In 2009–2010, 32.7% of women had one or more pre-existing health conditions and 28.5% had one or more obstetrical complications during their pregnancy.
- In 2009–2010, the rate of preterm birth in the North Simcoe Muskoka, North East and North West LHIN Region was 7.3%. The corresponding number of babies born at <37 weeks of gestational age in 2009–2010 was 825.
- Rates of small for gestational age (SGA) were quite stable between 2005–2006 and 2009–2010 in the region. In 2009–2010, 7.2% of singleton live births were SGA, compared with 9.0% for Ontario as a whole. In particular, the rate of SGA in North West LHIN was low (5.9%). Conversely, the rate of large for gestational age (LGA) was higher in this region (13.4%), and particularly in North West LHIN (17.0%), than in the province as a whole (10.4%).
- The multiple birth rate in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 was 3.0%, corresponding to 347 infants.

Having contemporary information on characteristics of the maternal-newborn population and monitoring trends in these characteristics is important for system planning.

Care providers:

- Across the northern LHINs, family physicians continue to be involved in maternal child care at higher levels than in the rest of the province, particularly in North West LHIN, where 40% of hospital deliveries in 2009–2010 were attended by a family physician. In 2009–2010 for the province as a whole, only 8.7% of hospital deliveries were attended by a family physician.

- The proportion of hospital deliveries attended by a midwife was also higher in this region (7.2%) than in the province overall (4.3%). In North West and North East LHINs, 12.2% and 7.3%, respectively, of hospital deliveries were attended by a midwife.

These findings are encouraging and important for keeping birth close to home. Ensuring that this model of obstetric care is sustainable in rural and remote regions is an important health human resource planning issue in Ontario.

Intrapartum interventions:

- The rate of labour induction in the overall obstetrical population was 27.9% and in low-risk nulliparous women was 33.6% in 2009–2010 in the North Simcoe Muskoka, North East and North West LHIN Region and no change in induction rates was observed between 2005–2006 and 2009–2010.
- The largest contributor to the overall rate of cesarean delivery of 28.8% was among women with a term singleton who had given birth by cesarean in a previous pregnancy. Reducing primary cesarean deliveries is one of the most important strategies for reducing the total cesarean rate. Following best practice guidelines for care during labour and initiating an audit and feedback mechanism to monitor practice patterns are important strategies for hospitals and regional programs.

Use of intrapartum interventions has important implications, since they affect service requirements in current and future pregnancies.

Effectiveness:

- In 2009–2010, 88.0% of women had electronic fetal monitoring (either alone or in combination with auscultation) at some time during their labour. In the region, the proportion of women who received auscultation only during labour was 10.2% in the overall obstetric population and 18.3% in low-risk women. Given that clinical practice guidelines recommend auscultation as the primary method of surveillance in low-risk women in labour, there is room for improvement. In the general population, high rates of inductions and epidural analgesia lead care providers to use EFM. Clinical practice guidelines also support auscultation in low-risk women undergoing epidural analgesia.
- The proportion of elective repeat cesarean deliveries at term in low-risk women not in labour performed prior to 39 weeks was 53.1% (4.9% at 37 weeks and 48.2% at 38 weeks). There is clear evidence that this practice can lead to complications in the newborn and in the absence of medical or obstetrical indication, elective repeat cesarean deliveries should be delayed until at least 39 weeks.
- Across the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010, 22.9% of women (280 out of 1,221 women) who were induced and had a documented indication of post-dates pregnancy were <41 weeks of gestational age at the time they gave birth. This was particularly high in North East LHIN (30.8%).
- 64.4% of term live born babies were being exclusively breastfed at the time they were discharged from hospital (72.8% in North Simcoe Muskoka, 61.3% in North East and 57.6% in North West). A further 17.6% of term infants were being supplemented at the time of discharge (i.e., they received a combination of breast milk and formula or other supplement). Breastfeeding support and supplementation rates need further investigation.

- A high proportion of women (89.0%) delivering at term were screened for Group B Streptococcus; however, the rate of screening was slightly lower than other areas of the province and than the overall provincial rate (93.3%).

Best practice guidelines exist for the areas listed above and based on these findings, there are areas where improvement is needed. These examples illustrate where continuous quality improvement initiatives could be implemented. LHINs, hospitals and regional maternal-child programs can examine their data in these areas and design quality improvement programs to improve these indicators where needed.

Future direction:

With the development of the new BORN Ontario database that will be implemented in the fall of 2011, it will be soon possible to examine new variables related to maternal child health, for example, maternal pre-pregnancy body mass index, pregnancy weight gain, Bishop's Score and pregnancy outcomes for women with a positive maternal serum screen. The database has been designed to collect data by **encounter**, which is a health care interaction involving a patient and the provision of services (e.g., a lab test; a delivery; an ultrasound, a newborn screening), and will collect data from multiple encounters during pregnancy, birth and early childhood. With this system architecture, it will be possible to look at individual encounters as well as to look the full perinatal care continuum. Of course, with expansion, ensuring data quality is a high priority. The new BORN database will have improved real-time data verification processes to prevent errors and identify data discrepancies prior to saving a record.

Data provided by the BORN system will help inform health system planners, funders, policy makers, care providers, and women and families about care practices in Ontario. Feedback of data is one of the first steps to enhance awareness of what is being done well and areas for improvement in care. One feedback mechanism that is under development for the new BORN Ontario database is a standardized clinical dashboard to measure performance on key maternal newborn indicators. This innovative project will help Ontario hospitals meet the requirements set out in the newly legislated Excellent Care for All Act (2010) by helping them identify areas where they are doing well and areas where there is room for improvement. BORN Ontario looks forward to being an important partner for transforming data into information and knowledge to help Ontario mothers, children and families have the best possible beginnings to lifelong health.

BORN Ontario acknowledges the unique geography, transfer patterns and health services issues in Northern Ontario that can affect outcomes and influence the context of information presented in this report.

In future years, we hope to be able to develop reports that investigate further some of these differences and provide a more in-depth picture of maternal child health in northern areas as well as explore the unique needs and outcomes of Aboriginal and First Nations populations. BORN recognizes the need for due process in first establishing relationships with Aboriginal and First Nations leaders and stakeholder groups to partner on determining the maternal child health information that would best meet the needs for future planning.

Introduction

This report is based on data primarily from the 2009–2010 fiscal year; however, five-year trends are presented for some variables. The data originate chiefly from the BORN Ontario–Niday Perinatal Database, but also includes other sources of data. The report is divided into six chapters: Regional Profile; Pregnancy; Maternity Health Services; Birth; Postpartum and Newborn; and Maternal and Newborn Screening. The objectives of this report are to:

- Highlight maternal-newborn issues and trends arising from the analysis
- Present a baseline for future examination of trends

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 2009–2010 fiscal year, it is estimated that approximately 97% 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. With the exception of a few figures in Chapter 1, the unit of analysis in this report is the Local Health Integration Network¹ (LHIN) region, based on the deliveries that take place in a hospital in one of the LHINs in the region (i.e., based on location of birth). For the companion series of reports on 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. Both series of reports (available on the BORN website: www.bornontario.ca) differ from previous reports in several ways. Each indicator is now accompanied by its definition, including clarification of the numerator and denominator used for calculation. For graphs that provide a breakdown by individual LHIN, 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 welcome 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, please contact a member of the BORN Ontario team (see **APPENDIX A** for contact information).

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 is our collection of three variables on H1N1 and other influenza-like illnesses in pregnancy, treatment with antiviral medication and receipt of influenza vaccine during pregnancy. This process was implemented on November 2, 2009 for a one-year data collection period. Please visit the BORN Ontario website for more information and to view reports on the findings for this data collection initiative.

Methods

Data Sources

This report was prepared using data from several of the BORN Ontario databases, but the majority of data presented in this report originate from the BORN–Niday Perinatal Database. Information for all births (live births and stillbirths) at ≥ 20 weeks' gestational age is collected in the Niday Perinatal Database. 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.

The Niday Perinatal Database is a web-based system into which data on mothers and babies are directly entered either by care providers or data entry clerks, or extracted and uploaded by a hospital's electronic patient record. The Niday Perinatal Database has been operating in Eastern and Southeastern Ontario since 1997 and has undergone tremendous expansion in recent years. In 2009–2010, the principal time period reflected in this report, approximately 97% 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; therefore, future reports will be able to provide a complete, population-based picture of perinatal health in the province of Ontario.

BORN Ontario recently compared the number of hospital births captured in the Niday Perinatal Database with those captured in the Canadian Institute for Health Information's Discharge Abstract Database (DAD). The table below shows the number of hospital births captured by the Niday Perinatal Database, expressed as a proportion of the total number of hospital births captured in the DAD over five fiscal years. It is important to consider this expansion of data collection activities in relation to the graphs that present 5-year trends in this report, since a change in a rate over time may be due to an improvement in data capture rather than a true temporal trend.

Total number of ON hospital births	Fiscal year				
	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009
BORN	113,220	120,803	125,724	136,980	139,278
DAD	137,996	139,159	141,173	144,240	142,896
% captured by BORN	82.05%	86.81%	89.06%	94.97%	97.47%

Indicators

The process for choosing indicators for the LHIN 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).^{2,3} Both of these groups had active Niday Perinatal Database subcommittees that advised them on data needs. Consultations with these groups were held in the spring and summer of 2009 to gain further insight on types of analysis. Additionally, in response to advice provided by the Scientific Working Group of BORN, national perinatal surveillance reports^{4,5} were reviewed to ensure consistency between provincial and national reporting and to enhance our ability to contribute to national data initiatives.

Data Analysis

This report presents maternal and infant data primarily for births that occurred during the fiscal year 2009–2010 (April 1, 2009–March 31, 2010); however, selected indicators are presented for a time period of five fiscal years, from April 1, 2005–March 31, 2006 to April 1, 2009–March 31, 2010. A 5-year dataset was extracted from the Niday Perinatal Database in September 2010. **Only hospital births to residents of Ontario were included in the dataset** (records in the Niday Database for home births and for births in Ontario hospitals to women from other Canadian provinces/territories or from other countries were excluded). Hospital births attended by midwives are included in these analyses. Information on home births attended by midwives was provided by the Ontario Midwifery Program and is included in this report, but presented separately (see Figure 1.7).

The majority of the information in this report is analyzed by LHIN of birth. When hospitals enter maternal-newborn data into the Niday Perinatal Database, records are automatically assigned to a LHIN based on the location of the hospital. A few figures in Chapter 1 of this report also present data based on LHIN of maternal residence. The process for assigning LHIN of maternal residence is based on the methodology developed by the Ontario Ministry of Health and Long-Term Care, whereby residential postal code information is merged to the July 2009 Postal Code Conversion File and subsequently to the LHIN Version 11 correspondence file. A manual process of assigning records to a LHIN of maternal residence is carried out, where possible, if the postal code is invalid or unknown using other data fields.

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 interpreted cautiously.

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.⁶ 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.⁴ **Nevertheless, it is important to be mindful that the BORN–Niday Perinatal Database has been evolving rapidly in recent years, and temporal changes in some estimates over the 2005–2006 to the 2009–2010 time period may be related to 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 that were 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 graphs. Footnotes have been added to the figures to alert the reader when more than 10% but less than 30% of records for a particular estimate were missing information. Due to validity concerns, we excluded estimates for which $\geq 30\%$ of records were missing information for that indicator. Footnotes have also been added where needed to clarify other aspects of data quality.

Data Presentation

Most of the data in this report are presented using bar graphs and line graphs. 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 LHIN of birth. These graphs present the estimate(s) for each LHIN, and for comparison purposes also present the LHIN region as a whole, and the overall estimate for the province of Ontario.

Data Quality

In 2009, a quality audit of the BORN–Niday Perinatal Database was completed. In this audit, information from the patient record was re-abstracted in order to assess concordance (accuracy and completeness) between the data in the database and the original 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. A manuscript from this project has been accepted for publication in a scientific journal.⁷ Results from the full report are available by contacting BORN Ontario.

BORN Ontario also performs ongoing data quality checks. At quarterly and annual intervals, data are downloaded and compiled into standardized data quality reports. This process requires each hospital to verify the number of births per month, address data elements with greater than 5% missing data, and respond to individual records that appear to contain logic conflicts. These ongoing activities, as well as the results of the 2009 Niday Perinatal Database data quality audit, are used to improve the system and help sites collect and enter data more efficiently. For example, more logic and verification rules that question conflicts when data are entered have been added and the number of mandatory data fields has been increased. To further enhance data quality and consistency, a data normalization exercise has been

undertaken as part of the build of the new BORN database to reduce duplication of data collection among the partners.

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CHAPTER 1 PROFILE OF NORTH SIMCOE MUSKOKA, NORTH EAST AND NORTH WEST LHIN REGION AND OBSTETRICAL POPULATION

Introduction

The North Simcoe Muskoka, North East and North West (NORTH) Region includes three Local Health Integration Networks (LHINs). The North Simcoe Muskoka LHIN (LHIN 12)¹ serves the District of Muskoka, most of the County of Simcoe and a portion of Grey County and covers a land area of 8,372.34 square km. North Simcoe Muskoka is home to four First Nations and experiences significant seasonal variation in population and demands for related health services. The North East LHIN (LHIN 13)² is comprised of five regions: Sault Ste. Marie/Algoma, Cochrane/Temiskaming, Sudbury/Manitoulin/Parry Sounds, Nipissing and James and Hudson Bay Coasts. These regions have been defined based on hospital referral patterns for the citizens they serve and cover a land area of 395,576.72 square km. Finally, the North West LHIN (LHIN 14)³ covers a land area of 406,819.56 square km, extending from just west of White River to the Manitoba border and from Hudson Bay in the North to the United States border. It encompasses the Thunder Bay and Rainy River Districts and most of the Kenora District. Portions of the First Nations population live in remote areas with road access only in the winter; other communities are accessible only by air. Together, North Simcoe Muskoka, North East and North West LHINs include an estimated population of over 1.2 million.

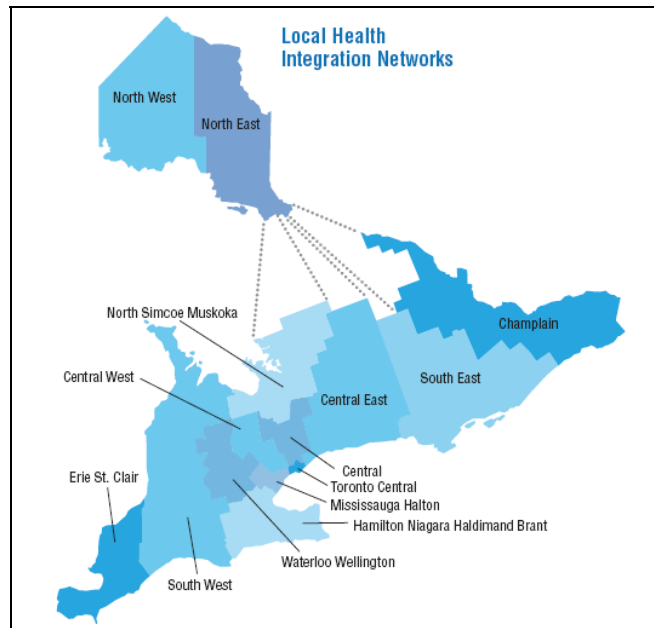
LHIN Number	LHIN Name	Population
12	North Simcoe Muskoka	422,902
13	North East	551,691
14	North West	234,599
12, 13 & 14	NORTH REGION	1,209,192

Sources: Statistics Canada. 2007. *North Simcoe Muskoka Health Integration Network, Ontario (Code3512) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007 [cited 17 Jun 2011]* Available from: <http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E>.

Statistics Canada. 2007. *North East Health Integration Network, Ontario (Code3513) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007 [cited 17 Jun 2011]*. Available from: <http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E>.

Statistics Canada. 2007. *North West Health Integration Network, Ontario (Code3514) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007 [cited 17 Jun 2011]*. Available from: <http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E>.

In the fiscal year 2009–2010, the region had 29 hospital sites providing obstetric and newborn care service: four modified Level III centres, three Level II centres and twenty-two small community hospitals (with less than 500 births per year). Included in the small community hospitals are 10 hospitals with less than 50 births per year (see APPENDIX C for a complete list of all hospital sites).



Source: Cancer Care Ontario: *Insight on Cancer. News and Information on Breast Cancer and Screening in Ontario.* Toronto: Canadian Cancer Society (Ontario Division), October, 2007 [accessed 28 Mar 2011]. Available from: <http://www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=13832>.

During this reporting period, the Northern Perinatal Pediatric Network, with representation from the North East and North West, was an active partner in collaboration of maternal-newborn service delivery in the North. The Northern Perinatal Pediatric Network is committed to continued collaboration with the North East and North West LHINs and with BORN Ontario to facilitate partnerships, share data and support quality improvement strategies.

In addition, an informal network of perinatal care providers was in place in North Simcoe Muskoka LHIN during this reporting period. This network is actively pursuing the establishment of a dedicated Maternal Newborn Child Youth (MNCY) council that will provide LHIN-wide leadership in advancing the care and service delivery models for this population. The future program will increase collaboration, enhance services to address gaps in care, emphasize accountability of health professionals and individuals/caregivers, and improve provision of services to persons residing in adjacent LHINs to provide better access for persons in rural areas.

This report presents data for **Ontario residents** who gave birth in a hospital in either the North Simcoe Muskoka LHIN, North East LHIN or North West LHIN. The hospital sites whose data are included in this report can be found in **APPENDIX C**. Women who resided in the NORTH LHIN Region and gave birth at home under the care of a midwife are presented separately within this report (see Figure 1.7).

The first set of figures in this chapter portrays the distribution of births across the region. Although the majority of women in the NORTH Region give birth in the LHIN in which they reside, there is some mobility across LHIN boundaries. Clinical reasons prompt some of this movement, as some women will need to travel in order to access specialized care, but the reasons why women travel to give birth cannot always be determined from the data available within the BORN–Niday Perinatal Database. Geographical proximity to a hospital in a neighbouring LHIN, access to care providers, change of residence during pregnancy and seeking care near to one’s workplace rather than one’s residence may all contribute to these patterns. Awareness of these patterns is essential for health services planning to ensure that the

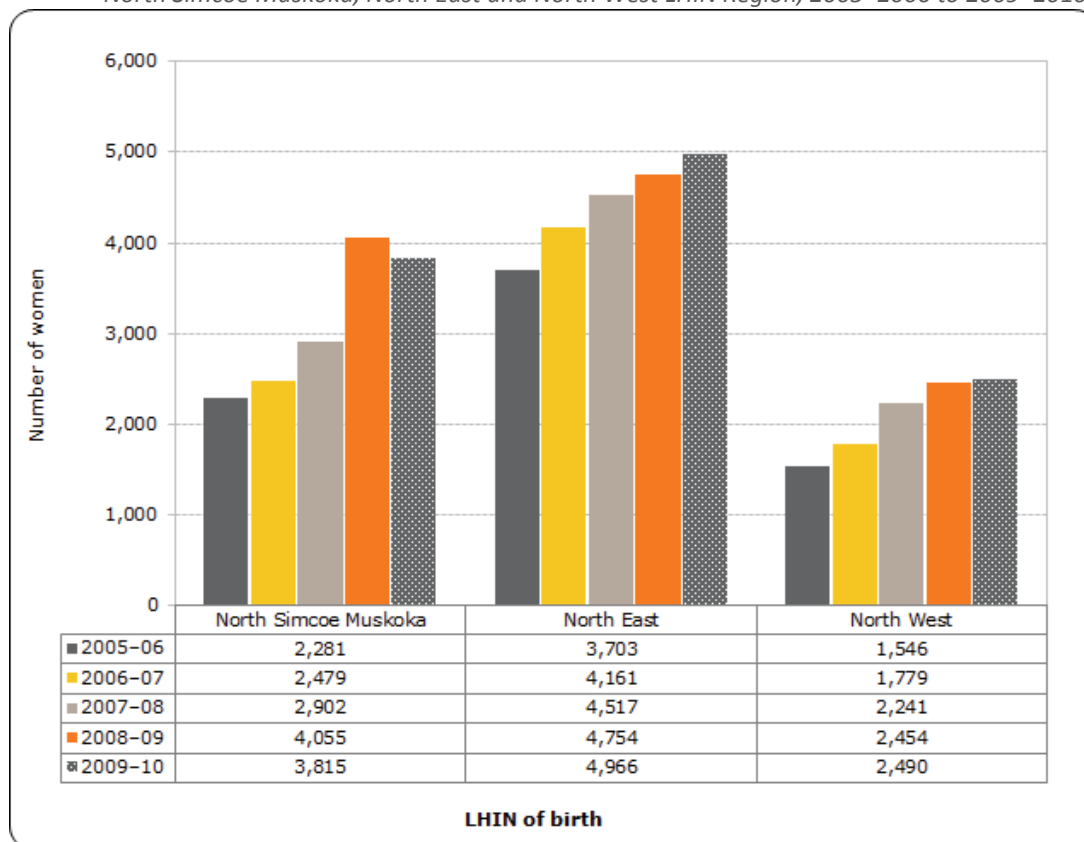
health care system supports appropriate continuity of care for mothers and babies when they return to their home communities, and to ensure that adequate levels of service are available as close to home as possible.

BORN Ontario acknowledges the unique geography, transfer patterns and health services issues in Northern Ontario that can affect outcomes and influence the context of information presented in this report.

In future years, we hope to be able to develop reports that investigate further some of these differences and provide a more in-depth picture of maternal child health in northern areas as well as explore the unique needs and outcomes of Aboriginal and First Nations populations. BORN recognizes the need for due process in first establishing relationships with Aboriginal and First Nations leaders and stakeholder groups to partner on determining the maternal child health information that would best meet the needs for future planning.



Figure 1.1 Number of women who gave birth, by LHIN of birth and fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



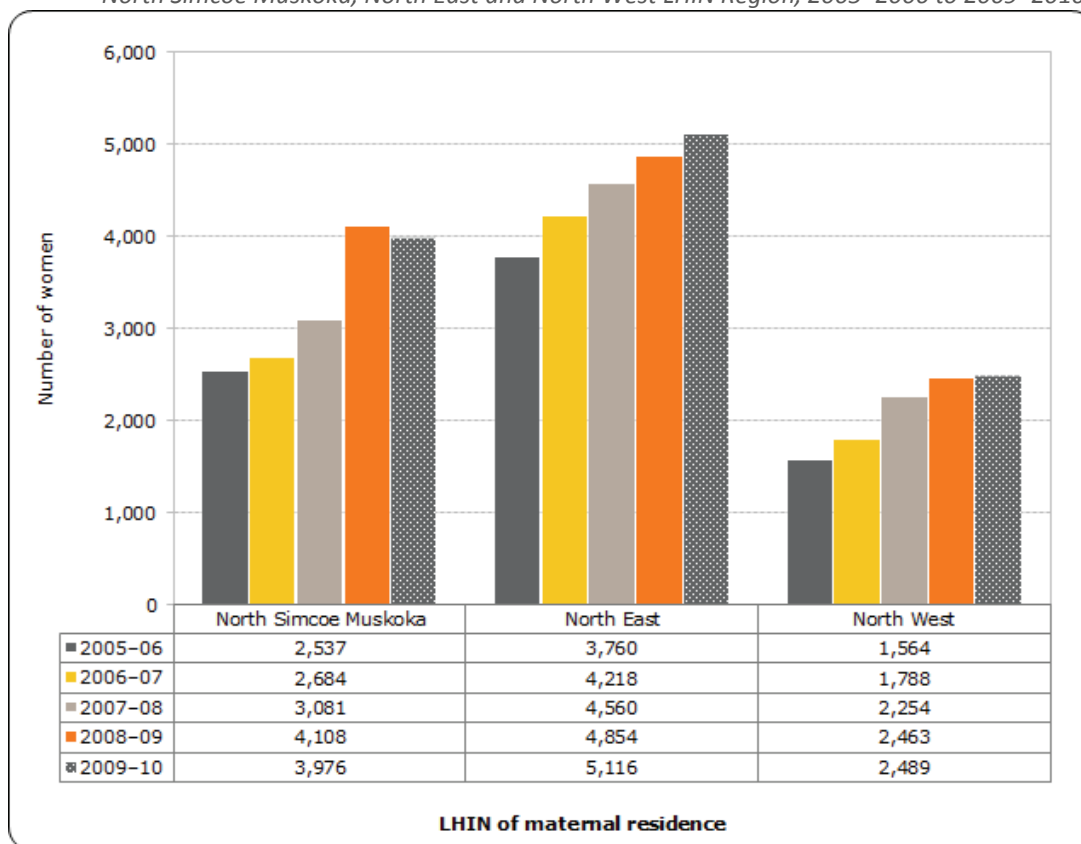
Data source *BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010*
Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator *The number of Ontario women who gave birth in a hospital in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region in 2005–2006 to 2009–2010.*

Notes: 1. *The total number of women who gave birth in a NORTH hospital by fiscal year was: 2005–2006: 7,530; 2006–2007: 8,418; 2007–2008: 9,660; 2008–2009: 11,263; 2009–2010: 11,271.*

- The number of women who gave birth in a hospital in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 was 11,721. This represents 8.3% of the total number of Ontario women who gave birth in an Ontario hospital in 2009–2010 (136,223).
- The total number of women with a hospital birth in North Simcoe Muskoka, North East and North West LHIN Region recorded in the database increased by 49.7% from 7,530 in 2005–2006 to 11,271 in 2009–2010. A substantial component of this increase is due to expansion of data collection activities for the Niday Perinatal Database in the region over this five fiscal year period.

Figure 1.2 Number of women who gave birth, by LHIN of maternal residence and fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



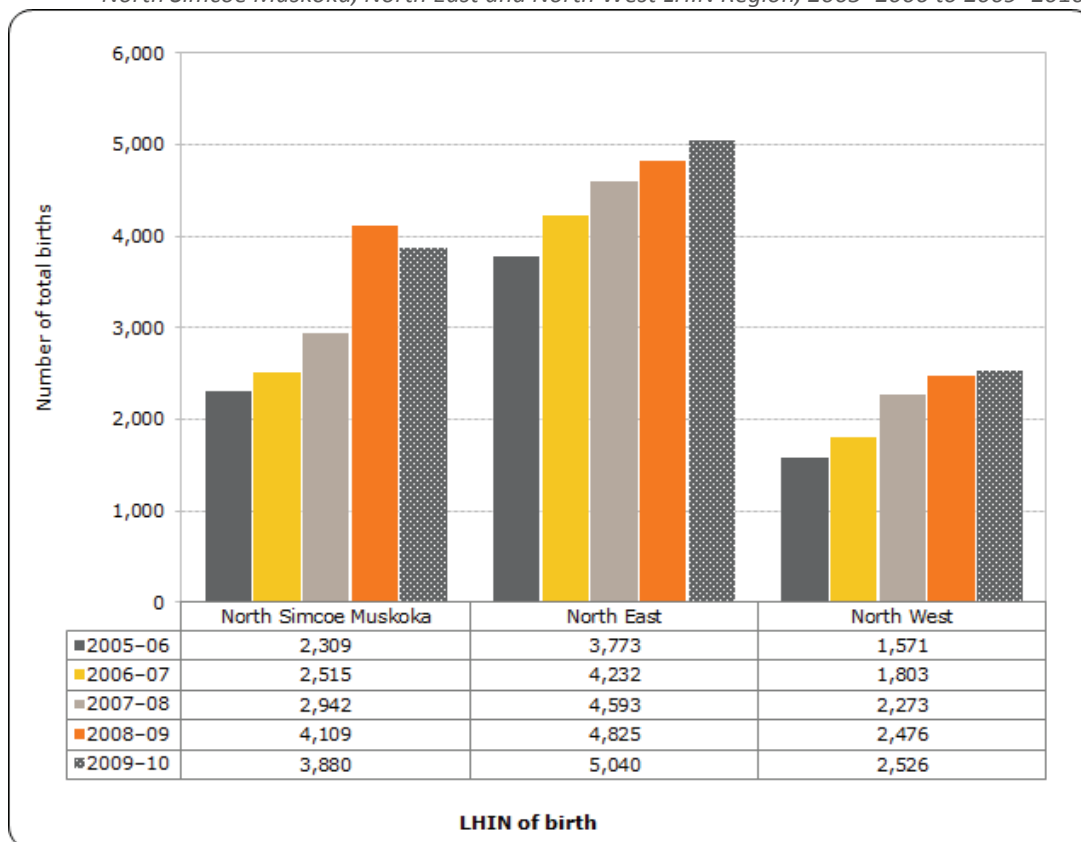
Data source *BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on maternal residence*

Definition of indicator *The number of women residing in each LHIN in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region who gave birth in hospital in 2005–2006 to 2009–2010.*

- Notes:
- The total number of women who resided in the NORTH Region and gave birth in hospital by fiscal year was: 2005–2006: 7,861; 2006–2007: 8,690; 2007–2008: 9,895; 2008–2009: 11,426; 2009–2010: 11,581.*
 - A small number of women in each fiscal year who gave birth in a NORTH hospital, but could not be mapped to a LHIN of maternal residence were excluded. It is possible that some of these women were residents of the region.*
 - The numbers presented in this graph may differ from previous reports using the Niday Perinatal Database as a result of updates and modifications to the database or the methodology of assigning postal codes to LHIN of maternal residence.*

- The number of women who resided in the North Simcoe Muskoka, North East and North West LHIN Region and gave birth in 2009–2010 was 11,581. This represents 8.5% of the total number of Ontario women who gave birth in an Ontario hospital in 2009–2010 (136,223).
- The total number of North Simcoe Muskoka, North East and North West LHIN Region residents with a hospital birth recorded in the database increased by 47.3% from 7,861 in 2005–2006 to 11,581 in 2009–2010. A substantial component of this increase is due to expansion of data collection activities for the Niday Perinatal Database in the region over this five fiscal year period.

Figure 1.3 Number of total births, by LHIN of birth and fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



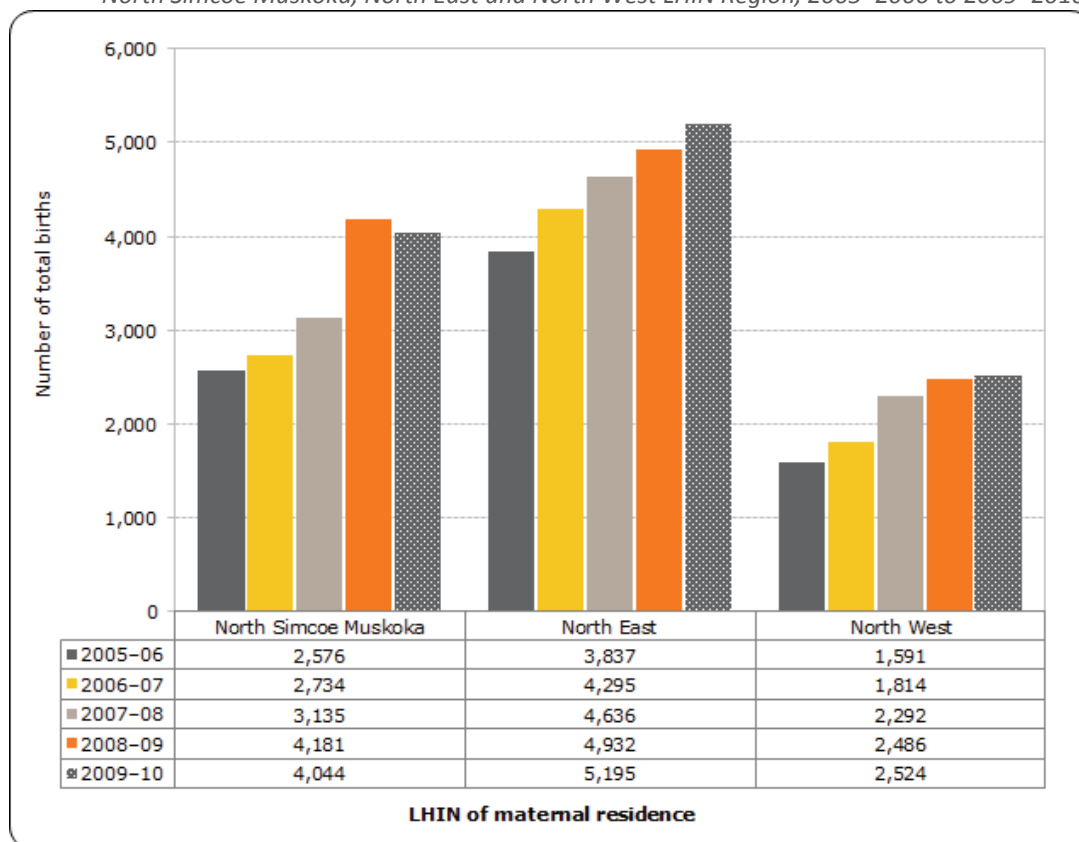
Data source *BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010*
Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator *The number of total births (live births and stillbirths) to Ontario women in a hospital in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region in 2005–2006 to 2009–2010.*

Notes: 1. *The number of total births in a NORTH Region hospital by fiscal year was: 2005–2006: 7,653; 2006–2007: 8,550; 2007–2008: 9,808; 2008–2009: 11,410; 2009–2010: 11,446.*

- The number of total births (live births and stillbirths) in a hospital in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 was 11,446. This represents 8.2% of the total number of hospital births in Ontario in 2009–2010 (138,775).
- Between 2005–2006 and 2009–2010, the number of total births in a hospital in the the North Simcoe Muskoka, North East and North West LHIN Region recorded in the database increased by 49.6% from 7,653 to 11,446. A substantial component of this increase is due to expansion of data collection activities for the Niday Perinatal Database in the region over this five fiscal year period.
- The number of total births at each hospital site in the North Simcoe Muskoka, North East and North West LHIN Region can be found in **APPENDIX C**.

Figure 1.4 Number of total births, by LHIN of maternal residence and fiscal year
 North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on maternal residence

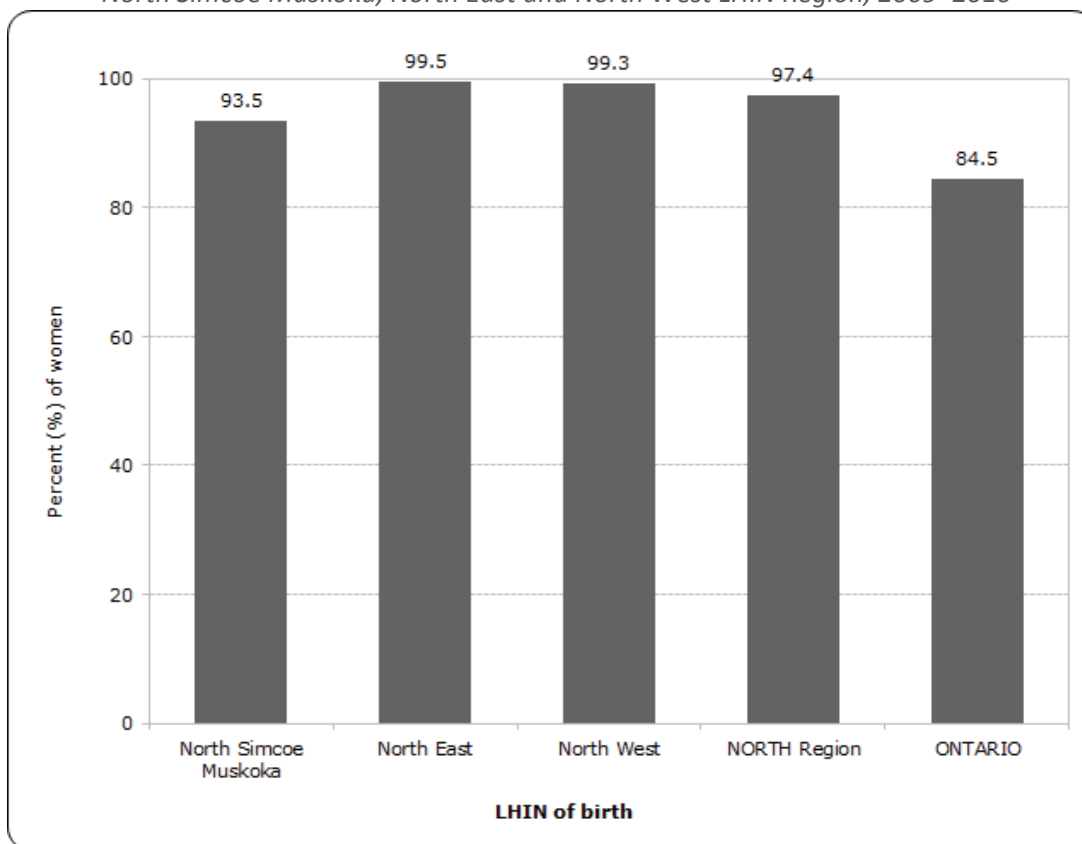
Definition of indicator The number of total hospital births (live births and stillbirths) to residents of each LHIN in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region in 2005–2006 to 2009–2010.

- Notes:
1. The number of total hospital births to women who resided in the NORTH Region by fiscal year was: 2005–2006: 8,004; 2006–2007: 8,843; 2007–2008: 10,063; 2008–2009: 11,599; 2009–2010: 11,763.
 2. A small number of births in each fiscal year were excluded because they occurred in a NORTH hospital, but could not be mapped to a LHIN of maternal residence. It is possible that some of these births were to residents of the region.
 3. The numbers presented in this graph may differ from previous reports using the Niday Perinatal Database as a result of updates and modifications to the database or the methodology of assigning postal codes to LHIN of maternal residence.

- The number of total hospital births to women who resided in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 was 11,763. This represents 8.5% of the number of total hospital births in Ontario in 2009–2010 (138,775).
- The number of total hospital births to North Simcoe Muskoka, North East and North West LHIN Region residents recorded in the database increased by 47.0% from 8,004 in 2005–2006 to 11,763 in 2009–2010. A substantial component of this increase is due to expansion of data collection activities for the Niday Perinatal Database in the region over this five fiscal year period.

Figure 1.5 Proportion of women who had a hospital birth in their LHIN of residence, by LHIN of birth

North Simcoe Muskoka, North East and North West LHIN Region, 2009–2010



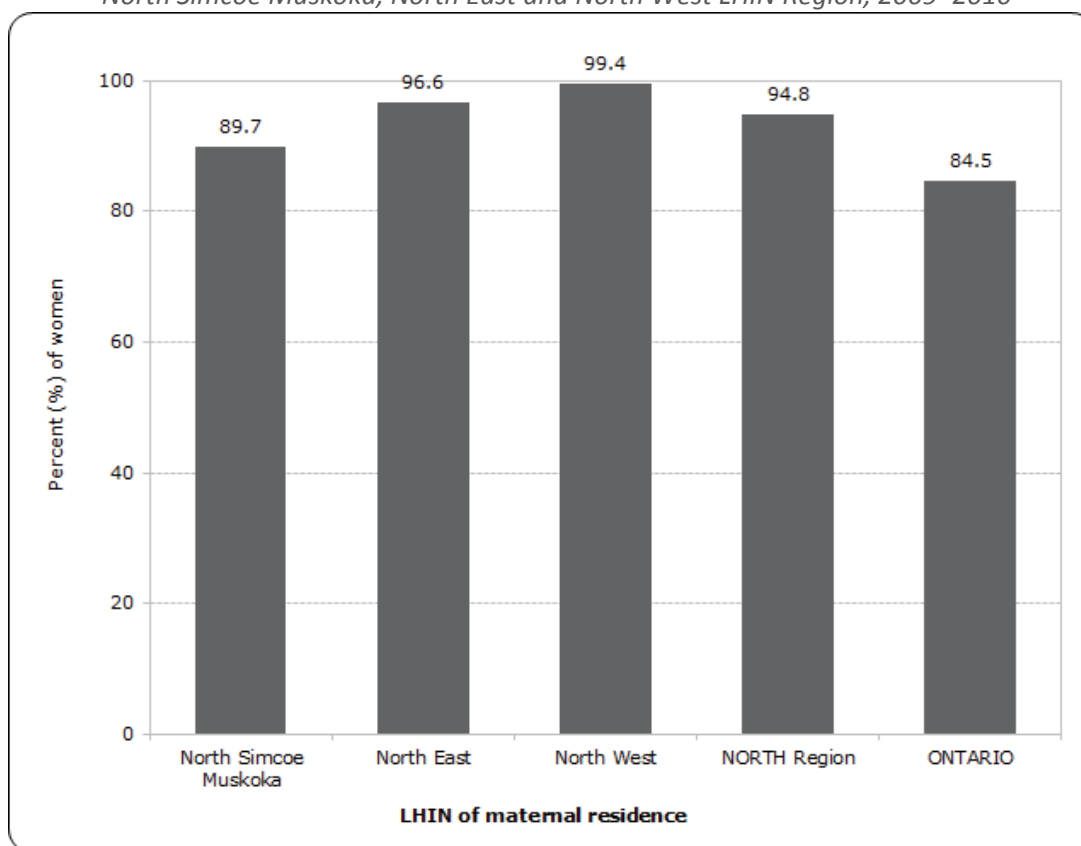
Data source BORN Ontario (Niday Perinatal Database), 2009–2010

Definition of indicator The number of women who resided in the LHIN in which they gave birth, expressed as a percentage of the total number of women who gave birth in a hospital in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region in 2009–2010.

- Among the women who gave birth in a hospital in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010, almost all (97.4%) were residents of the LHIN in which they gave birth. Across Ontario, 84.5% of women reside in the LHIN where they give birth.

Figure 1.6 Proportion of women who had a hospital birth in their LHIN of residence, by LHIN of maternal residence

North Simcoe Muskoka, North East and North West LHIN Region, 2009–2010



Data source BORN Ontario (Niday Perinatal Database), 2009–2010

Definition of indicator The distribution of LHIN of birth (birth occurs in the LHIN in which they reside, in another LHIN in the North Simcoe Muskoka, North East and North West LHIN Region, or in another Ontario LHIN outside the North Simcoe Muskoka, North East and North West LHIN Region), expressed as a percentage of the total number of residents in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region who had a hospital birth in 2009–2010.

Notes: 1. Women who gave birth in a NORTH hospital and had incomplete address information or no fixed residential address were excluded from the figure.

- Among the women who resided in the North Simcoe Muskoka, North East and North West LHIN Region and gave birth in an Ontario hospital in 2009–2010, the proportion who delivered in a hospital in the same LHIN as they resided was 89.7% among residents of North Simcoe Muskoka LHIN, 96.6% among residents of North East LHIN and 99.4% among residents of North West LHIN.

Choice of birthplace

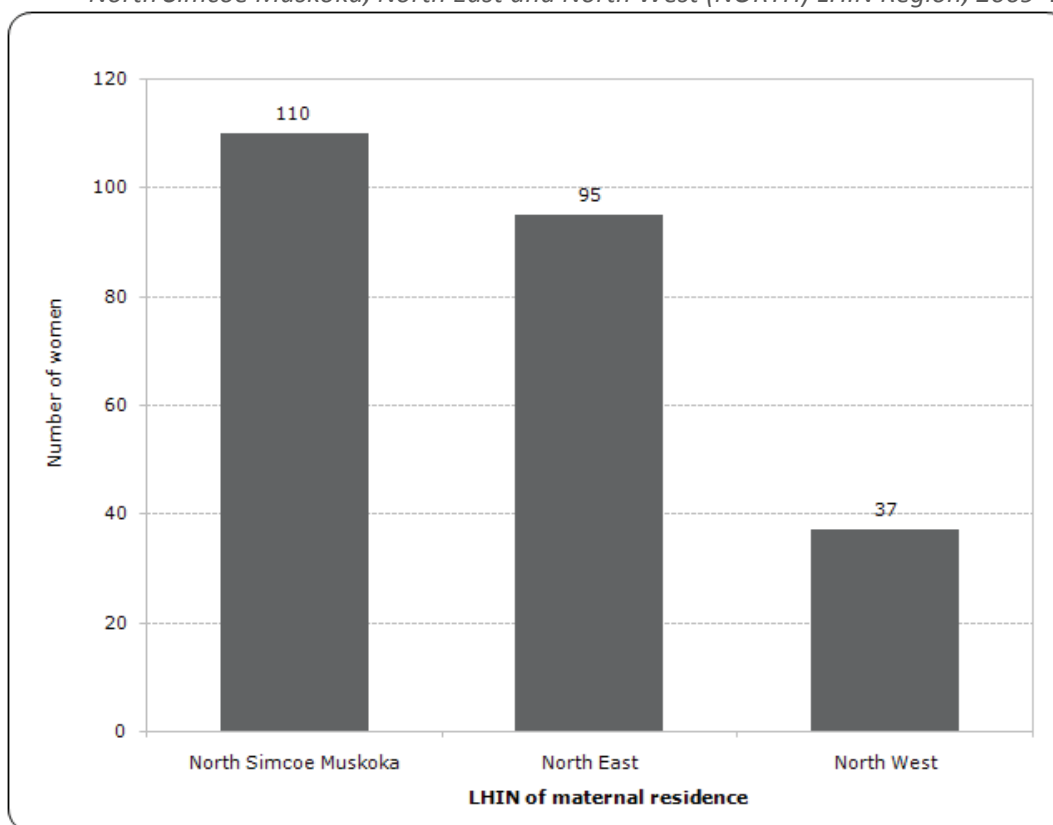
Choice of birthplace is a key component of the model of midwifery care in Ontario – midwives are expected to provide intrapartum care in both the home and the hospital setting, and to support women’s choices. Prenatally, midwives provide each woman with sufficient information in order for her to make an informed decision about where she will plan to give birth. This decision typically involves consideration of any risk factors present in the pregnancy; the distance between the woman’s home and the nearest hospital(s), and the level of obstetrical services available; research evidence regarding the benefits and risks of home and hospital birth; and the woman’s own preferences. The College of Midwives of Ontario has established standards which indicate specific circumstances in which a hospital birth should be planned (e.g., multiple birth, breech, preterm labour, and gestational age of more than 43 completed weeks).⁴ The College’s standards also identify situations in which consultation with or transfer of care to a physician is necessary, which frequently leads to a plan for a hospital birth.⁵

Two Canadian studies have demonstrated that planned home birth is associated with good maternal and neonatal outcomes when midwives are integrated into the health system with good access to emergency services.^{6,7} The integration of midwives within the health care system, good communication between all maternity care providers, and supportive relationships with the hospital teams that provide essential care when serious complications arise, all help to ensure that mothers and babies receive the best possible care.



Figure 1.7 Number of women in midwifery care that gave birth at home, by LHIN of maternal residence

North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



Data source Ontario Midwifery Program Maternal-Newborn Health Reporting System (Ontario Ministry of Health and Long-Term Care), 2009–2010
Local Health Integration Network (LHIN) based on maternal residence

Definition of indicator The number of women residing in the North Simcoe Muskoka, North East and North West (NORTH) LHIN Region who gave birth at home in 2009–2010 under the care of a midwife.

Notes: 1. The numbers presented are reflective of the number of babies born between April 1, 2009 and March 31, 2010.

- The number of women who gave birth at home under the care of a midwife in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 was 242. This represents 2.0% of the total births to **residents** of the region (242 out of 11,763 hospital births + 242 home births) and 8.9% of the total number of home births under the care of a midwife in Ontario in 2009–2010 (242 out of 2,711). Note that the Ontario total includes 34 records that could not be mapped to a LHIN of residence (either due to missing or invalid postal code information). It is possible that some of these records were for residents of the region.
- Across the NORTH Region, the median maternal age of women who gave birth at home under midwifery care in 2009–2010 was 30 years, 25.6% of women were pregnant for the first time (i.e., gravida=1) and 9.9% of women smoked during their pregnancy.
- The median gestational age at birth of babies born at home under midwifery care in 2009–2010 was 40 weeks in the NORTH Region. Median birth weight was 3,600 grams. A high proportion of babies were being exclusively breastfed at three days following birth (91.3%).

Maternal Age

Teen Pregnancy and Birth

Although the proportion of live births to teenage mothers decreased in Canada between 1995 and 2004,⁸ Canada's teenage birth rate is six times higher than that of Japan and Switzerland and more than twice that of Sweden and Finland.⁹ According to Statistics Canada, in 2007, the proportion of live births to mothers 10-19 years of age was 4.2% in Canada and 3.4% in Ontario.¹⁰

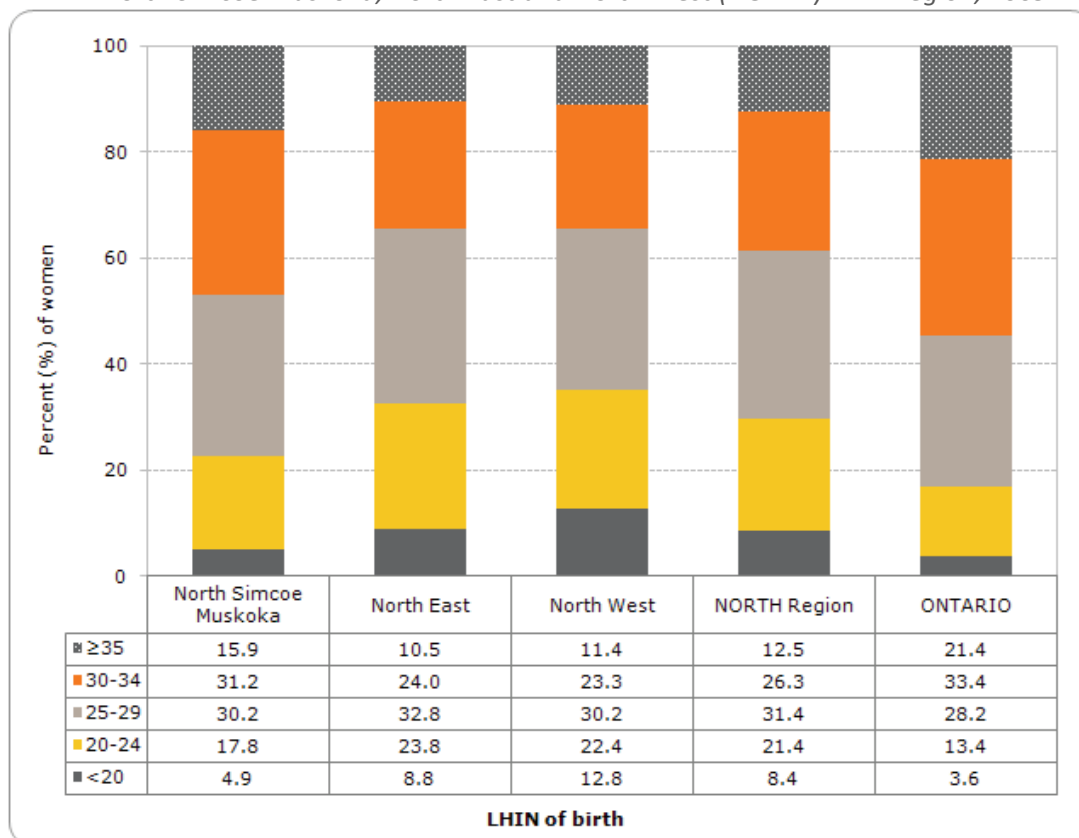
Inadequate prenatal care, physical and sexual abuse, increased likelihood of social deprivation, drug use and smoking,¹¹ poor nutrition resulting in poor maternal weight gain and anemia^{11,12} and premature termination of education^{12,13} are all factors that place teen mothers and their infants at greater risk for preterm and/or low birth weight,^{11,12} and increased perinatal mortality.^{12,14-16} Teen mothers, particularly those with limited social support, are more likely to experience postpartum depression,¹⁷ and they are less likely to breastfeed.¹⁶

Advanced Maternal Age

Increasingly, women are delaying childbearing – in Canada, the proportion of live births to older mothers (≥ 35 years of age) steadily increased between 1995 and 2004.¹⁸ In 2007, the proportion of live births to mothers 35-49 years of age was 18.0% in Canada and 21.2% in Ontario.¹⁰ This trend is important because of the association between higher maternal age and increased 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, perinatal mortality and serious neonatal morbidity).¹⁹⁻²² Health care providers and public education campaigns should inform all women of child-bearing age of the potential risks of advanced maternal age as a means to support informed decisions about the timing of child bearing.²³

Despite the higher risk of perinatal morbidity and mortality with increased maternal age, older first-time mothers often have a higher level of education and socioeconomic status, seek prenatal care earlier and receive good quality maternity care.²⁴ Since higher socioeconomic status is associated with a lower prevalence of risk factors such as pre-pregnancy obesity and smoking during pregnancy,²⁵ older women, especially those who have no chronic conditions, generally have healthy pregnancies and healthy babies.²⁶

Figure 1.8 Distribution of maternal age, by LHIN of birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010

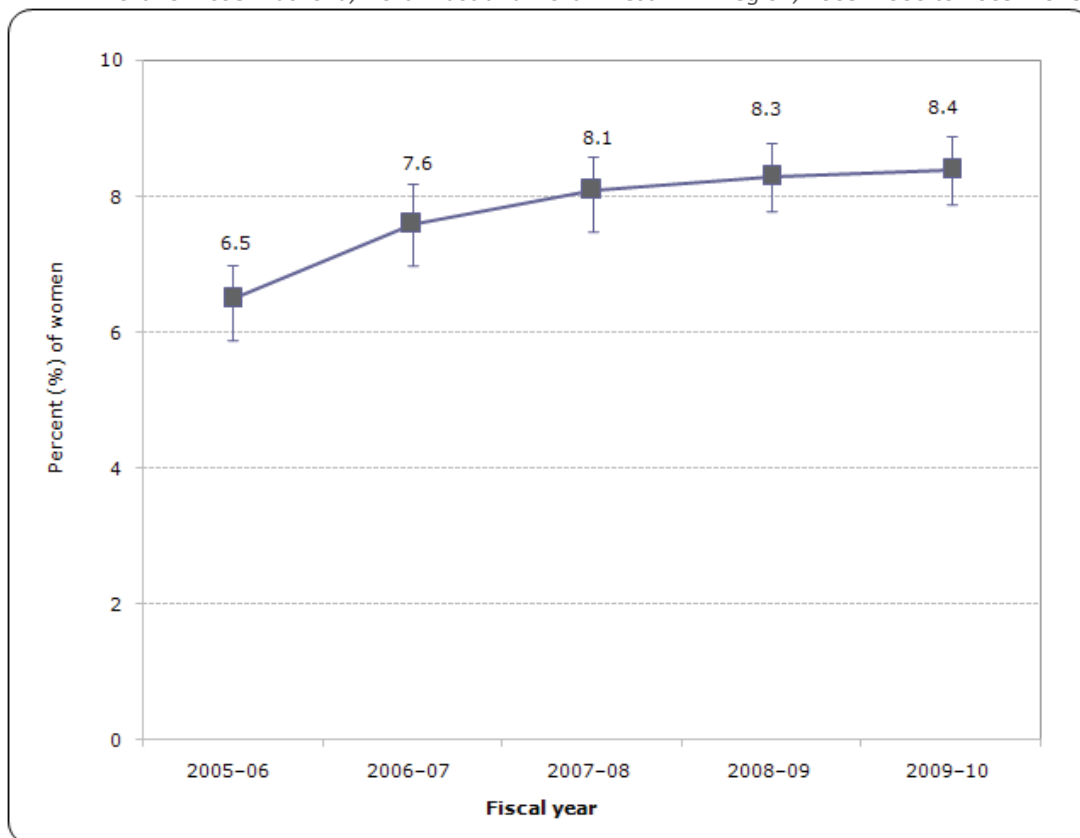


Data source *BORN Ontario (Niday Perinatal Database), 2009–2010*
Local Health Integration Network (LHIN) based on hospital of birth

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).*

- 57.7% of women who gave birth in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 were between the ages of 25 and 34 years.
- The proportion of births to teenage women (less than 20 years of age) in 2009–2010 was 4.9% in North Simcoe Muskoka LHIN, 8.8% in North East LHIN and 12.8% in North West LHIN.
- The proportion of births to women 35 years of age and over in 2009–2010 in the NORTH LHIN Region was 12.5%, lower than the overall background proportion of 21.4% in Ontario. The proportion of births to women who were ≥35 years was higher in North Simcoe Muskoka LHIN (15.9%) than North East LHIN (10.5%) and North West LHIN (11.4%).

Figure 1.9 Proportion of women who were <20 years at delivery, by fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010

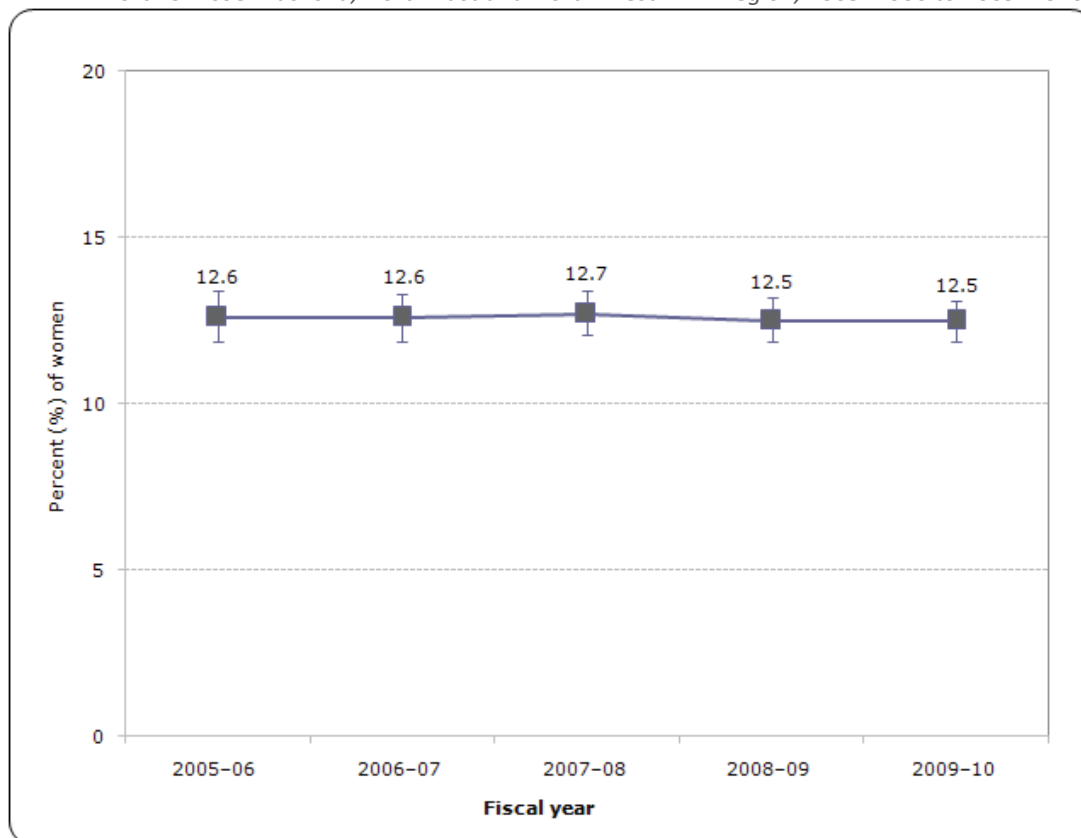


Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women <20 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 in the North Simcoe Muskoka, North East and North West LHIN Region who were <20 years of age increased from 6.5% (95% CI: 5.9–7.0) in 2005–2006 to 8.4% (95% CI: 7.9–8.9) in 2009–2010.
- Comparisons across years should be interpreted with caution due to expansion of data collection activities for the Niday Perinatal Database over this five fiscal year period. The rate for 2009–2010 is likely to reflect the most accurate estimate since data capture for the population was more complete than earlier years.

Figure 1.10 Proportion of women who were ≥ 35 years at delivery, by fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010

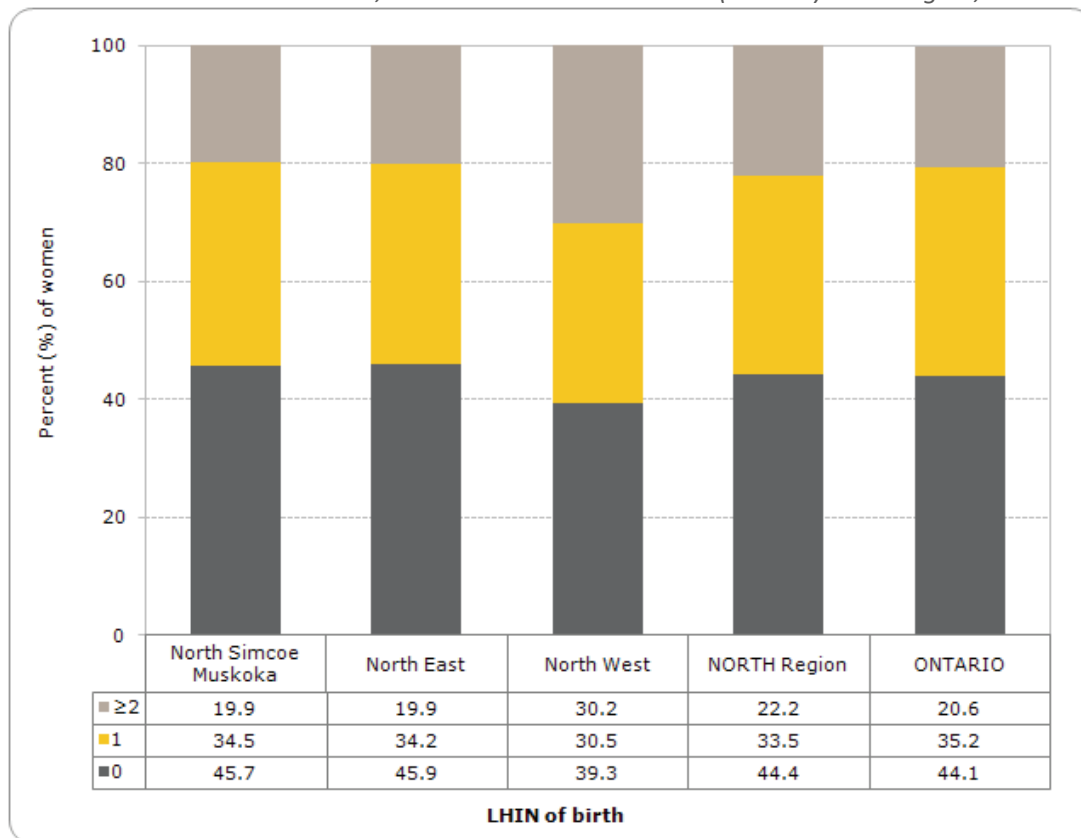


Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women ≥ 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).

- Between 2005–2006 and 2009–2010, the proportion of women giving birth in the North Simcoe Muskoka, North East and North West LHIN Region who were ≥ 35 years of age remained fairly constant. In 2009–2010, 12.5% (95% CI: 11.9–13.1) of women who gave birth were ≥ 35 years.
- Comparisons across years should be interpreted with caution due to expansion of data collection activities for the Niday Perinatal Database over this five fiscal year period. The rate for 2009–2010 is likely to reflect the most accurate estimate since data capture for the population was more complete than earlier years.

Figure 1.11 Distribution of parity, by LHIN of birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010

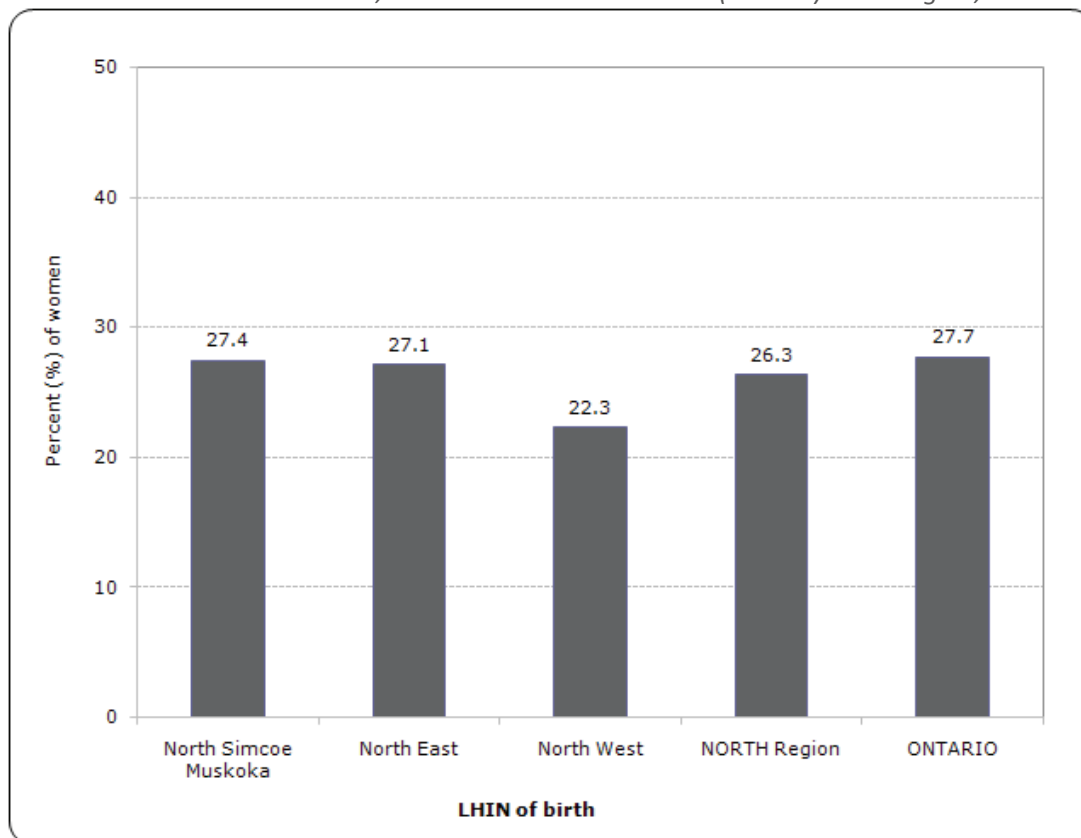


Data source BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

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.

- 44.4% of the women who gave birth in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 were first-time mothers (i.e., parity = 0), similar to the background rate for the province (44.1%).
- The proportion of women who had given birth to two or more previous live births or stillbirths (i.e., parity ≥2) was 30.2% in North West LHIN, considerably higher than North Simcoe Muskoka and North East LHINs (both 19.9%) and the province as a whole (20.6%).

Figure 1.12 Proportion of women who were ≥ 35 years and nulliparous at delivery, by LHIN of birth
 North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010

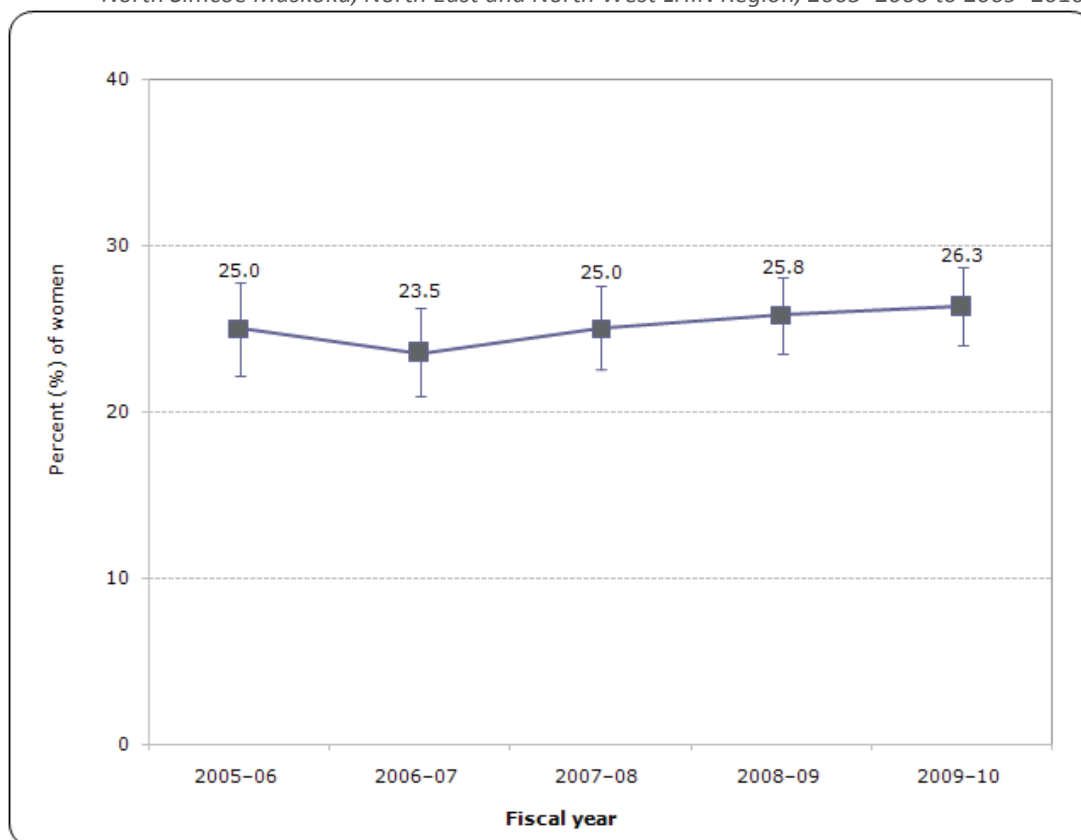


Data source BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

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

- The proportion of women 35 years of age or older who were nulliparous (i.e., parity = 0) at the time of delivery was 26.3% across the North Simcoe Muskoka, North East and North West LHIN Region. For Ontario as a whole, 27.7% of women 35 years of age or older who gave birth in 2009–2010 were nulliparous.

Figure 1.13 Proportion of women who were ≥ 35 years and nulliparous at delivery, by fiscal year
 North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

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

- Between 2005–2006 and 2009–2010, the proportion of women 35 years of age or older in the North Simcoe Muskoka, North East and North West LHIN Region who were nulliparous (i.e., parity = 0) at the time they gave birth changed very little (25.0%, 95% CI: 22.3–27.9 in 2005–2006 and 26.3%, 95% CI: 24.0–28.7 in 2009–2010).
- Comparisons across years should be interpreted with caution due to expansion of data collection activities for the Niday Perinatal Database over this five fiscal year period. The rate for 2009–2010 is likely to reflect the most accurate estimate since data capture for the population was more complete than earlier years.

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CHAPTER 2 PREGNANCY

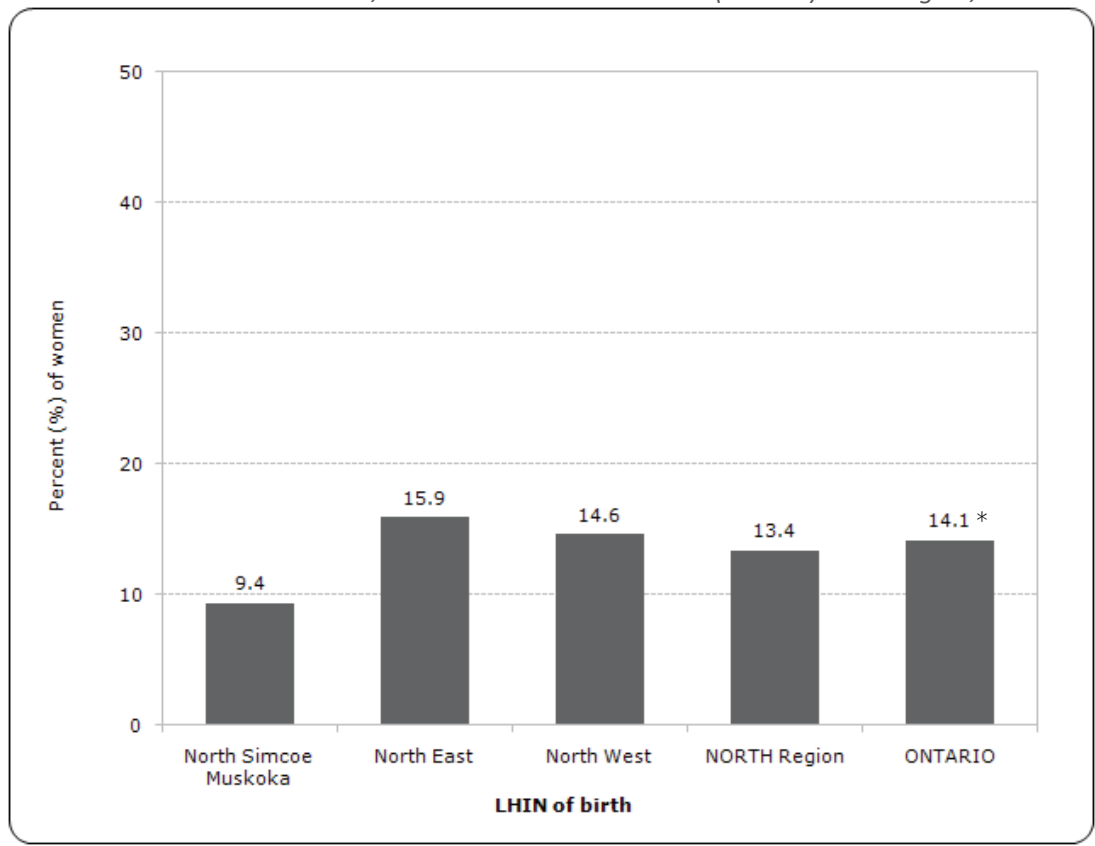
Maternal and fetal health during pregnancy are influenced by many factors that include maternal health status prior to pregnancy, health care received during pregnancy, maternal behaviours during pregnancy (such as diet, exercise and substance use), and medical conditions that arise during pregnancy. Prenatal care aims to optimize perinatal outcomes by identifying potential risks and mitigating them through the appropriate treatment of medical conditions and through the provision of education and support to encourage risk reduction.¹ Despite debate about the ideal frequency and timing of prenatal visits,² there is general agreement that it is optimal for women to begin prenatal care early in pregnancy.¹ While the vast majority of women across Canada initiate prenatal care during the first trimester, 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 are less likely to do so.³

Pre-pregnancy (i.e., non-gestational) diabetes and chronic hypertension are two pre-existing maternal medical conditions that are particularly relevant, due to their association with adverse perinatal outcomes. Diabetes prior to pregnancy is associated with a higher risk of birth defects,^{4,5} perinatal and infant mortality,⁵ as well as fetal macrosomia.⁵ Chronic hypertension is associated with both increased maternal morbidity (such as preeclampsia, gestational diabetes and placental abruption)⁶ as well as increased risk of small for gestational age at birth⁷ and perinatal mortality.⁸ Many women who have medical conditions such as these require additional evaluation and treatment during pregnancy. Information on pre-existing maternal medical conditions has been collected by the BORN–Niday Perinatal Database since 2005 and is reported in this chapter. A complete list of conditions captured in the database can be found in **APPENDIX D**.

Similarly, women who develop obstetrical complications during the course of their pregnancy also require enhanced assessment and treatment to manage the complications. Obstetrical complications during pregnancy have been captured by the database since 2005 (see **APPENDIX E** for a complete list). This consists of several of the most common obstetrical complications associated with adverse outcomes including gestational diabetes, gestational hypertensive disorders, placental conditions (placenta previa and placental abruption), preterm rupture of membranes, as well as fetal growth concerns.

In the last few years, outcomes associated with assisted human reproduction (AHR) have received considerable attention in both mainstream and obstetric literature. Ovulation induction, in vitro fertilization, intracytoplasmic sperm injection and frozen embryo transfer are increasingly used in Canada to achieve pregnancy. In 2007, the number of births (live births and stillbirths) following a pregnancy achieved by AHR was at least 4,499,⁹ which represents approximately 1.2% of the total births in Canada for that year.¹⁰ Pregnancies conceived by AHR have been shown to be more likely to be associated with numerous adverse perinatal outcomes;^{11–15} however, there remain unanswered questions with respect to distinguishing the effect of AHR from the underlying infertility itself.^{14,15} One of the most important consequences of AHR is multifetal pregnancy – in 2006, 43.1% of live births and stillbirths following AHR in Canada were twins and 2.9% were triplets or higher order.¹⁶

Figure 2.1 Proportion of women who did not attend an antenatal visit with a health care provider during the first trimester, by LHIN of birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



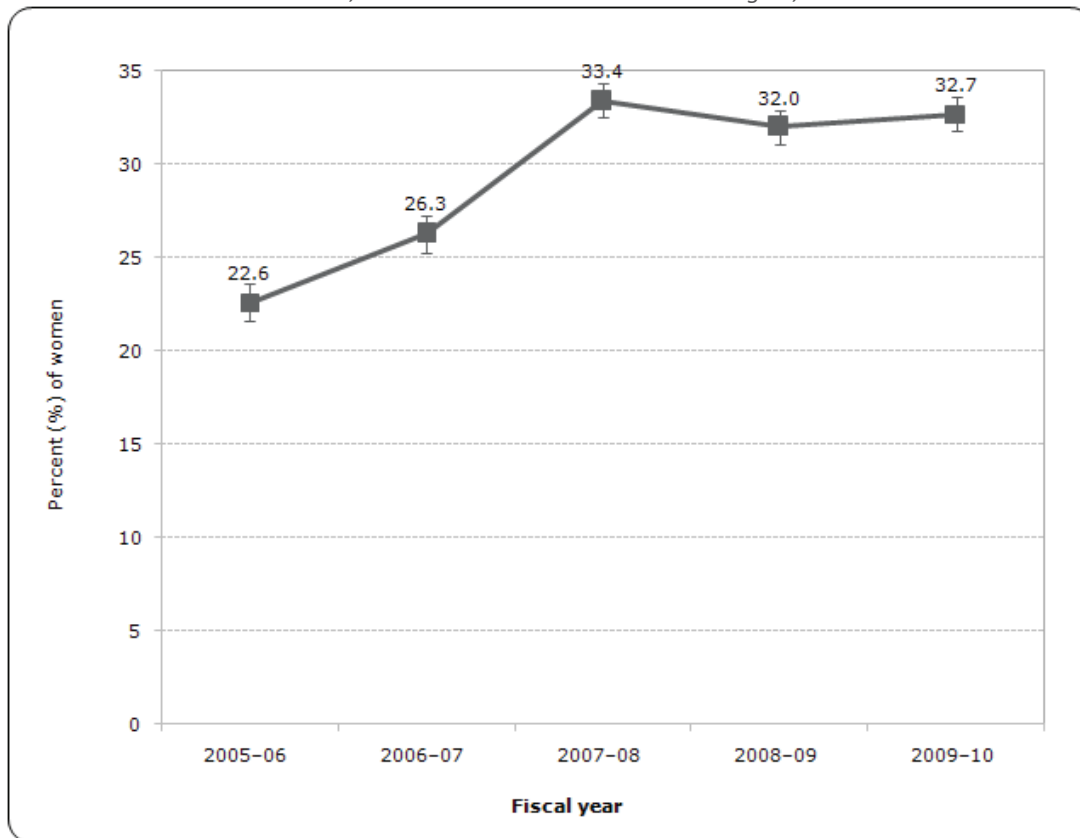
Data source BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women who **did not** attend 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 these estimates.

- In 2009–2010, the proportion of women who **did not** attend a first trimester prenatal care visit was 9.4% in North Simcoe Muskoka, 15.9% in North East LHIN and 14.6% in North West LHIN. For the province of Ontario overall, 14.1% of women **did not** attend a first trimester prenatal care visit (21.3% missing).

Figure 2.2 Proportion of women with pre-existing health conditions, by fiscal year
North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



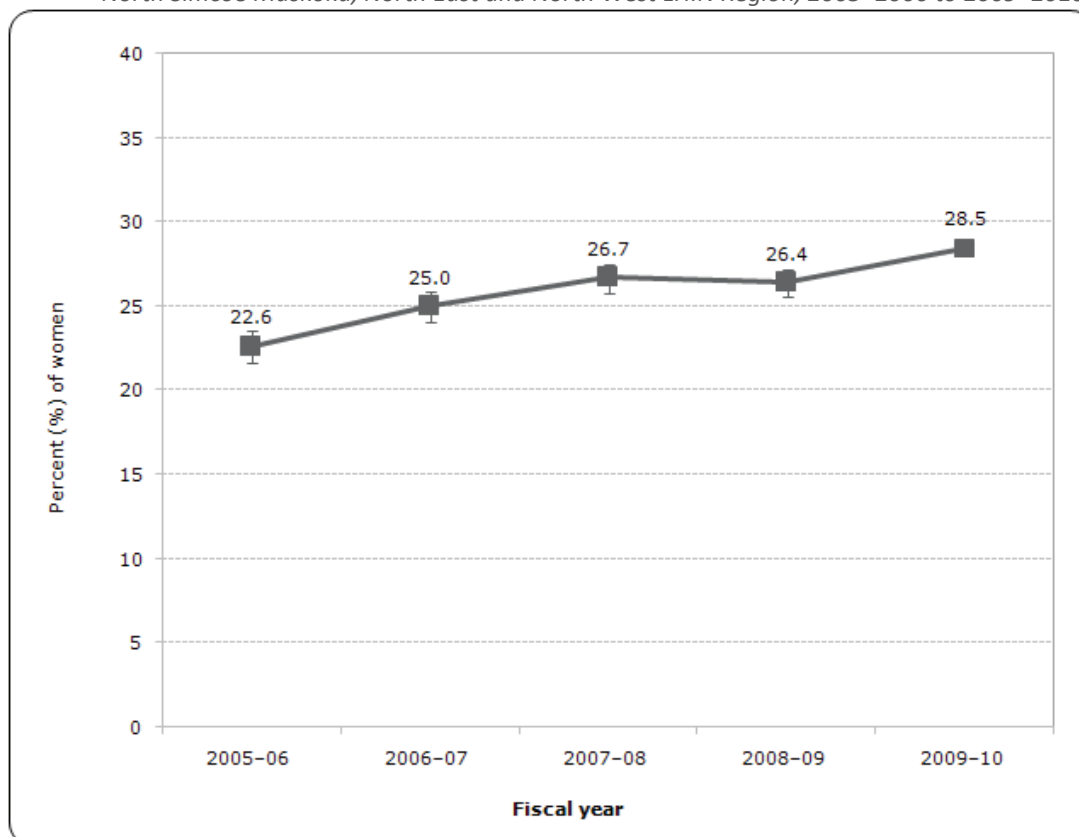
Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women with one or more pre-existing health conditions, 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. A complete list of the pre-existing maternal health condition categories collected by the database can be found in APPENDIX D.

- In 2009–2010, the most common pre-existing conditions were psychiatric disorders/mental illness (14.7%), chronic disease (e.g., asthma, hypertension, diabetes and heart disease – 11.0%) and other (10.7%).
- The proportion of women with one or more pre-existing health conditions increased from 22.6% (95% CI: 21.6–23.6) in 2005–2006 to 32.7% (95% CI: 31.8–33.6) in 2009–2010.
- Comparisons across years should be interpreted with caution due to expansion of data collection activities for the Niday Perinatal Database over this five fiscal year period. The rate for 2009–2010 is likely to reflect the most accurate estimate since data capture for the population was more complete than earlier years.

Figure 2.3 Proportion of women with obstetrical complications during pregnancy, by fiscal year
 North Simcoe Muskoka, North East and North West LHIN Region, 2005–2006 to 2009–2010



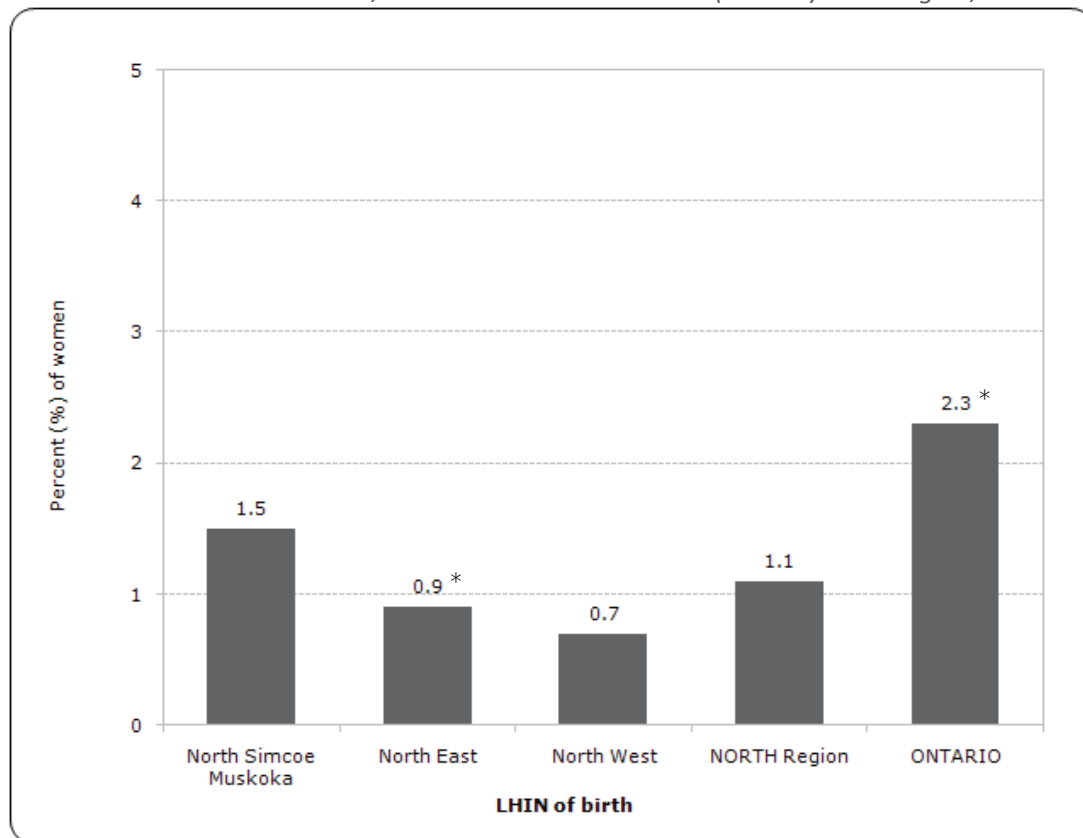
Data source BORN Ontario (Niday Perinatal Database), 2005–2006 to 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women with one or more obstetrical complications 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).

Notes: 1. A complete list of the obstetrical complication categories collected by the database can be found in APPENDIX E.

- In 2009–2010, the most common obstetrical complications were other (9.9%), hypertension (gestational or transient – 5.1%) and gestational diabetes (3.7%), followed by pre-eclampsia (2.5%) and premature rupture of membranes (PROM – 2.2%).
- The proportion of women with one or more obstetrical complications during pregnancy increased from 22.6% (95% CI: 21.6–23.6) in 2005–2006 to 28.5% (95% CI: 27.7–29.3) in 2009–2010.
- Comparisons across years should be interpreted with caution due to expansion of data collection activities for the Niday Perinatal Database over this five fiscal year period. The rate for 2009–2010 is likely to reflect the most accurate estimate since data capture for the population was more complete than earlier years.

Figure 2.4 Rate of assisted conception, by LHIN of birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



Data source BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of women who used reproductive assistance for the current 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 these estimates.

Notes:

1. At the time of data entry, only one category for this variable can be selected from the following options: intrauterine insemination, in-vitro fertilization, intracytoplasmic sperm injection, and ovulation induction (for example, clomiphine citrate, injectable gonadotropins, GnRH pump and bromocriptine). Because there are no specific instructions currently in place with respect to which code should take priority in the event that more than one type of reproductive assistance is used to achieve the pregnancy, individual categories are not reported.

- Overall, 1.1% of women who gave birth in the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010 had used some form of reproductive assistance to achieve the current pregnancy.
- The results for North East LHIN and for the province as a whole should be interpreted with caution because of the high proportion of records with missing data (17.8% and 18.0%, respectively). It is unclear whether the actual proportions of women who used reproductive assistance are higher or lower than indicated here.

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CHAPTER 3 MATERNITY HEALTH SERVICE ISSUES

Level of Care

Levels of care in Ontario hospitals are designated by the Ontario Ministry of Health and Long-Term Care. These designations reflect the scope of medical services available at a particular hospital and the acuity and complexity of patients cared for at that hospital. At the time this report was prepared, three levels of care designation for maternal-newborn services existed within the North Simcoe Muskoka, North East and North West LHIN Region (see summary below). A list of all hospitals and their corresponding level of care can be found in **APPENDIX F**. In May 2011, recommendations regarding new maternal and newborn levels of care designation were announced by the Provincial Council for Maternal Child Health (PCMCH). These will likely phase in over the next several years and future reports will reflect these new designations.

Level of care	Description
I	Provide care for healthy mothers and infants >36 weeks' gestation
II	Provide care for mothers and infants ≥32 weeks' gestation
Modified III (M3)	Provide care for mothers and infants ≥29 weeks' gestation without additional high risk maternal or fetal conditions

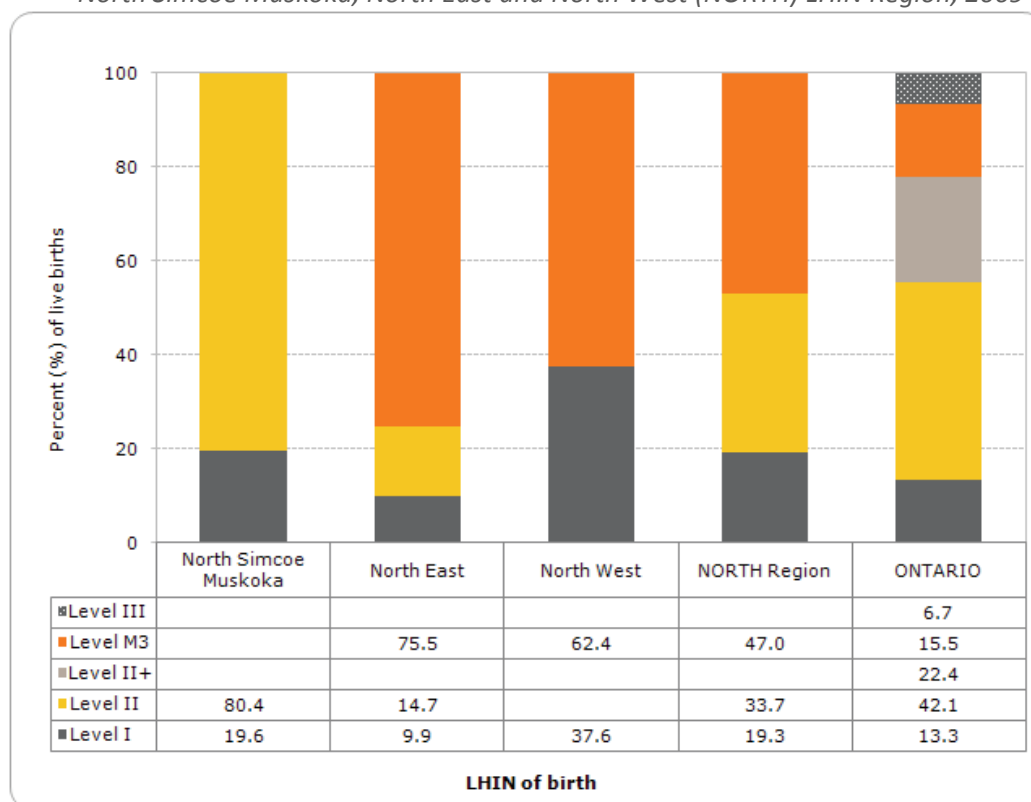
The effective operation of distinct level of care designations (supported by a defined scope of services) is a fundamental component of a regionalized neonatal-perinatal care system.¹ Level of care designations are beneficial for several reasons:¹

- They permit articulation and examination of standards that must be met for provision of specified levels of care;
- They facilitate the transfer of patients from one facility to another through common understanding of their relative capabilities and expectations;
- They help streamline planning and allocation of resources.

Appropriate Level of Care

Research examining the outcomes of babies born at or before 32 weeks' gestation in Canadian hospitals indicates that outcomes are better when these babies are born at a tertiary care center (i.e., a Level III hospital), even after adjusting for perinatal risk factors.² Specialist care, staffing levels, the equipment that is available and the avoidance of stress caused by transport after birth have all been suggested as factors that might contribute to this difference.² Subsequent research has continued to demonstrate that very-low-birth-weight babies have the best survival rates when they are born in hospitals with NICUs that provide a high level of care and have a high patient volume.³ While late preterm infants (born at 34–36 weeks' gestation) have very low rates of morbidity and mortality compared with early preterm infants, they are at increased risk for a wide range of complications including respiratory distress, temperature instability, hypoglycemia, kernicterus, apnea, seizures and feeding problems when compared with infants born at term.⁴ Given the increased likelihood that late preterm babies will require NICU care, it is generally recommended that births prior to 36 weeks occur in at least a Level II hospital.

Figure 3.1 Distribution of live births at each level of care, by LHIN of birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



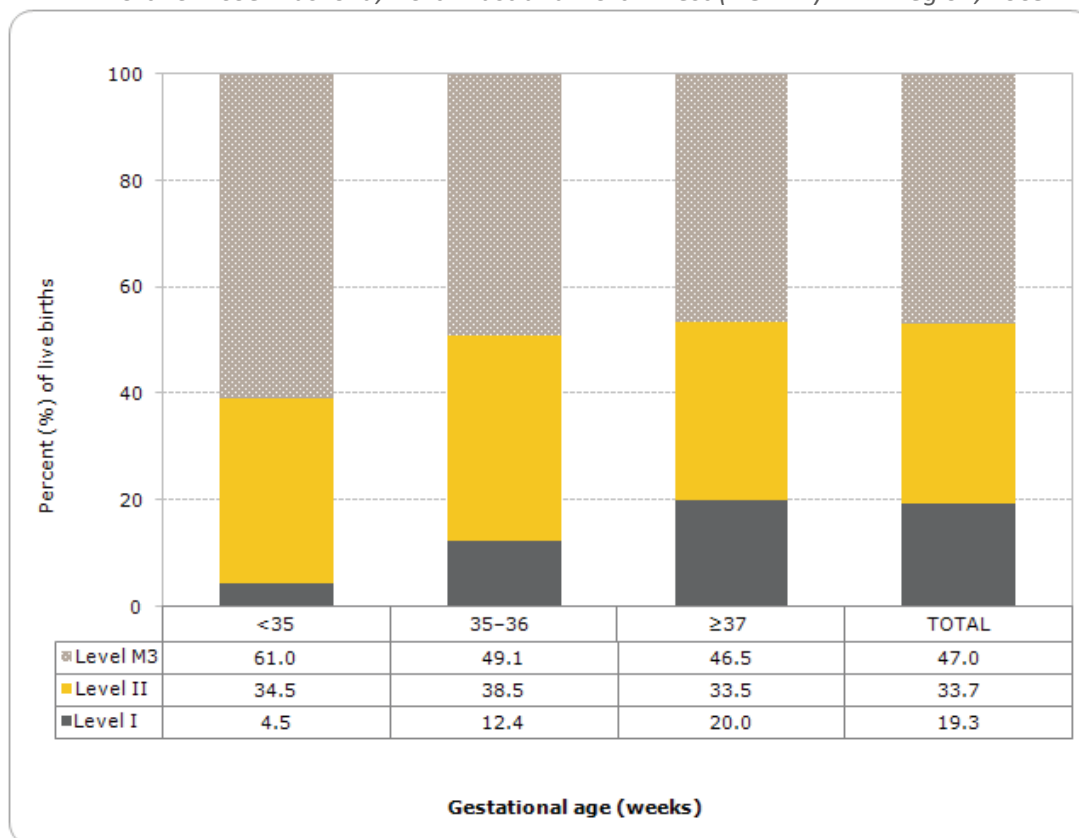
Data source BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The distribution of live births at each level of care (Levels I, II, II+, modified III [M3] and Level III), expressed as a percentage of the total number of live births (in a given place and time).

- Notes:*
1. A complete list of North Simcoe Muskoka, North East and North West LHIN Region hospital sites and their corresponding level of care can be found in APPENDIX F.
 2. Level M3 refers to a Modified Level III. These hospital sites provide care to infants ≥ 29 weeks' gestation.

- Across the North Simcoe Muskoka, North East and North West LHIN Region, 47.0% of live births took place in a modified Level III hospital, followed by 33.7% in a Level II hospital and 19.3% in a Level I hospital.
- The distribution of live births at each level of care was quite different between the three LHINs of this region. In North Simcoe Muskoka LHIN, there are only two levels of care designation, thus 80.4% of live births took place in a Level II hospital and 19.6% in a Level I. In North East LHIN, where there are three levels of care, 75.5% of live births took place in a modified Level III centre, 14.7% in a Level II centre and 9.9% in a Level I centre. In North West LHIN, 62.4% of live births took place in a modified Level II centre and 37.6% in a Level I centre.
- The scope of services for each level of care designation defines the maximum level of acuity and complexity of mothers and infants who can be cared for by that hospital. All hospitals care for mothers and infants who are healthy (low risk) as well as those who are at the maximum level of acuity and complexity according to their hospital's level of care designation.

Figure 3.2 Distribution of live births at each level of care, by gestational age at birth
North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



Data source *BORN Ontario (Niday Perinatal Database), 2009–2010
 Local Health Integration Network (LHIN) based on hospital of birth*

Definition of indicator *The distribution of live births at each level of care (Levels I, II and modified III [M3]), expressed as a percentage of the total number of live births (in a given place and time).*

Notes: 1. *Due to small numbers, a more detailed breakdown of gestational age groups cannot be presented in this report. However, individual hospitals may access their own data for more in-depth examination of gestational age in their live birth population.*

- In the North Simcoe Muskoka, North East and North West LHIN Region in 2009–2010, the proportion of live births that took place in a modified Level III hospital was highest among those infants born at <35 weeks of gestational age (61.0%) and decreased with increasing gestational age at birth to 46.5% in term live births (≥37 weeks).
- There were a total of 267 live births <35 weeks — 60.0% of live births ≤27 weeks’ gestation (9 out of 15 live births) and 69.8% of live births 28–31 weeks (30 out of 43 live births) were born in a modified Level III hospital. Among live births at 32–34 weeks’ gestation, 59.3% (124 out of 209 live births) were born in a modified Level III hospital (data not shown in figure).

Figure 3.3 Distribution of live births 24–36 weeks at each level of care, by gestational age at birth and fiscal year

North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2007–2008 to 2009–2010

Fiscal year	Level of care	Gestational age	
		24–34 weeks (n=239)	35–36 weeks (n=465)
2007–08	M3	71.1	60.0
	II	26.4	33.5
	I	2.5	6.5
2008–09	M3	59.2	51.7
	II	37.1	37.9
	I	3.7	10.3
2009–10	M3	61.0	49.1
	II	34.5	38.5
	I	4.5	12.4

Data source BORN Ontario (Niday Perinatal Database), 2007–2008 to 2009–2010
Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The distribution of live births at each level of care (Levels I, II and modified Level III), expressed as a percentage of the total number of live births (in a given place and time).

- Notes:*
1. Due to small numbers, a more detailed breakdown of gestational age groups cannot be presented in this report. However, individual hospitals may request their own data for more in-depth examination of gestational age in their live birth population.
 2. Only 2007–2008 to 2009–2010 live births are presented, since the number of births captured by the database in 2005–2006 and 2006–2007 was incomplete for the region and the number of births was insufficient to permit meaningful breakdown for this table.

- The proportion of live births between 24–31 weeks of gestational age that were born in a modified Level III hospital, which is the optimal level of care for this gestational age decreased marginally between 2007–2008 and 2009–2010 from 71.4% (95% CI: 56.7–83.4) to 68.6% (95% CI: 54.1–80.9) (data not shown in table – see Note 1 above).
- Among infants between 32–33 weeks of gestational age, the optimal level of care is Level II or higher. Between 2007–2008 and 2009–2010, the majority of infants at this gestational age were born in a Level II or higher level hospital (consistently >90%) (data not shown in table – see Note 1 above).

Maternal Inter-hospital Transfers

Maternal transfers between hospitals occur for both clinical reasons and reasons related to the availability of hospital resources. Maternal transfers to a hospital that provides a higher level of care are usually driven by concerns about maternal condition or the anticipated gestational age or condition of the newborn at birth.⁵ Transfers in the opposite direction, from a hospital with a higher level of care designation to one with a lower level, include transfers back to the original hospital of care once a high risk situation has resolved as well as transfers of low-risk mothers in order to make beds available within a high-risk centre for high risk mothers.⁵ The availability of beds and human resources are often the reason for maternal transfers between hospitals with similar levels of care.⁵

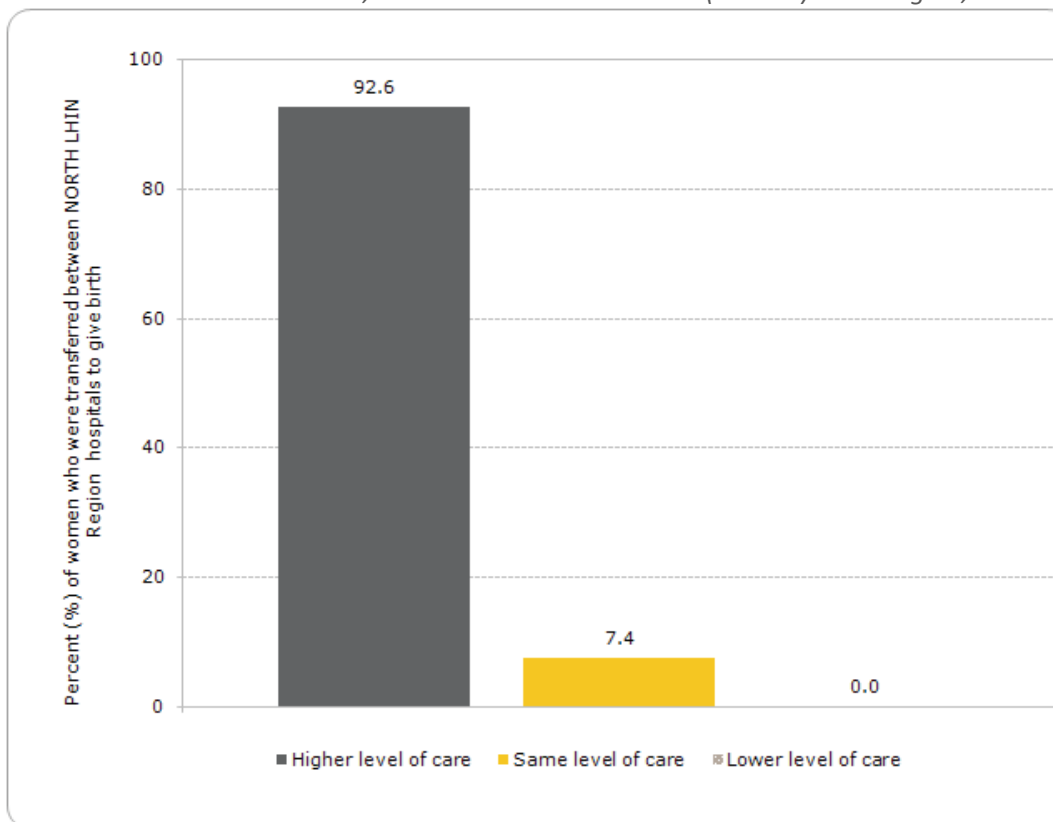
Decisions to transfer involve consideration of the clinical issues, the expertise and resources available at both hospitals and travel conditions.⁶ The availability of skilled accompaniment during transfer may also influence this decision.⁵ Given the evidence of improved outcomes for preterm babies born before 30-32 weeks when their mothers are transferred to a Level III hospital prenatally,² it has been suggested that in utero transfer should be a primary goal whenever the benefits of transfer outweigh the risks.⁷

Even when the clinical benefits of maternal transfer appear obvious, women may be hesitant to be transferred to what is often a larger, unfamiliar hospital. This reluctance may be due to anxiety about increased travel time, fear of invasive technology, and the potential family disruption and financial burden.⁸ The availability of affordable accommodation for parents anticipating a prolonged stay away from their home community may address some of these concerns.² It has also been noted that care providers should be attentive to the emotional needs of women who require maternal transfer.⁷



Figure 3.4 Proportion of maternal inter-hospital transfers to a higher, equivalent or lower level of care

North Simcoe Muskoka, North East and North West (NORTH) LHIN Region, 2009–2010



Data source BORN Ontario (Niday Perinatal Database), 2009–2010
Local Health Integration Network (LHIN) based on hospital of birth

Definition of indicator The number of maternal inter-hospital transfers to a higher, equivalent or lower level of care, expressed as a percentage of the total number of women who were transferred to another hospital to give birth (in a given place and time).

- Notes:*
1. Hospitals with no obstetrical services (NOS) do not have a level of care assigned. Fewer than 5 women were transferred from a NOS hospital in 2009–2010. These records are excluded from this analysis.
 2. Women who were transferred from a hospital from outside the NORTH Region are excluded since the information on level of care for the transferring hospital is not consistently available in the database.
 3. Planned home births are excluded from this figure.

- There were a total of **176 maternal inter-hospital** transfers resulting in a delivery that occurred in a North Simcoe Muskoka, North East and North West LHIN Region hospital in 2009–2010, of which 59 (33.5%) were from a hospital outside of the NORTH LHIN Region and 9 (5.1%) were from a hospital with no obstetrical services. The remaining 108 maternal transfers (61.4%) were between NORTH LHIN Region hospital sites.
- Among the 108 maternal inter-hospital transfers between hospital sites in the North Simcoe Muskoka, North East and North West LHIN Region, 92.6% were transferred to a hospital with a higher level of care.

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