Manitoba Health
Public Health Branch
Epidemiology Unit
Perinatal Project Team

Manitoba Perinatal

Surveillance Report

1985-1996

March 1999

MANITOBA PERINATAL SURVEILLANCE REPORT
1985 – 1996

We are happy to release this Provincial Perinatal Surveillance Report, which is the result of work undertaken by the Manitoba Health Epidemiology Unit: Perinatal Project Team.

The priorities of the Perinatal Project Team have been the development and implementation of a provincial perinatal surveillance system and the facilitation of epidemiological perinatal health research in Manitoba.

This surveillance report utilizes a conceptual framework that identifies four key areas influencing perinatal health, that is, maternal health, maternal care, newborn care and infant care. Within that context, various aspects of perinatal health and care practices are described from a provincial perspective for the period from 1985 to 1996.

This report is the first step in a plan to provide routine reporting relevant to perinatal health in Manitoba.

The Perinatal Project Team will continue to work collaboratively with other stakeholders to enhance the available sources of perinatal health data, and to promote important research in this area.

If you have any questions or comments regarding this report, please feel free to contact

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ACKNOWLEDGEMENTS

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We would also like to acknowledge and thank the members of the Perinatal Project Team and the Working Groups for each of the sections for their valuable advice regarding the content and interpretation of the data contained in the report.

GLOSSARY

Abortion *– the complete expulsion or extraction from its mother of a fetus or embryo of less than 20 weeks gestation, whether there is evidence of life or not. This usually corresponds with a weight of less than 500 grams:*

- *spontaneous abortion (miscarriage) – the complete expulsion of a fetus or embryo from its mother that occurred without medical inducement.*
- *induced abortion - the complete expulsion of a fetus or embryo from its mother that was medically induced.*

Analgesia/Anesthesia *– the absence of normal sensation, especially sensitivity to pain, as induced by an anesthetic substance.*

- *general anesthesia – an anesthetic agent given primarily by inhalation or intravenous injection*
- *epidural/spinal – an epidural is the process of achieving regional anesthesia of the pelvic, abdominal, genital, or other area by the injection of a local anesthetic into the epidural space of the spinal column. A spinal is the injection of a local anesthetic into the spinal column.*
- *pudendal block – a procedure whereby the pudendal nerves are anesthetised by the injection of a local anesthetic in the trunk of each nerve as it passes over the sacrospinous ligament, just below the ischial spine.*

Birth *– the delivery of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more:*

- *live birth – the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who after birth, breathes or shows any other evidence of life, such as the beating of the heart, pulsation of the umbilical cord or definite movement of the voluntary muscles.*
- *stillbirth - the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who shows no signs of life after birth. A late stillbirth refers to the birth of a fetus having a gestational age of 34 weeks or greater who shows no signs of life after birth.*
- *total births - all live births and stillbirths.*

Birth Weight *– the weight of a fetus (live or stillborn) recorded after its birth in grams:*

- *very low birth weight – deliveries weighing less than 1500 grams (<3.3 lbs) at birth.*
- *low birth weight – deliveries weighing less than 2500 grams (<5.5 lbs) at birth.*
- *high birth weight – deliveries weighing greater than 3999 grams (>8.8 lbs) at birth.*

Breech *– intrauterine position of the fetus in which the buttocks or feet present at the maternal pelvic inlet.*

Caesarean Section *– the delivery of an infant by surgical incision of the abdominal wall.*

Completed Days *– refers to postnatal age period. The first day of age is Day 0 (not Day 1) since the infant is not 1 day old until the end of day 0. The infant then remains at one completed day of age until the end of Day 1 when the infant reaches 2 completed days. Thus, '0-7 Completed Days' refers to the time block 0 days, 0 hours, 0 minutes to 7 days, 23 hours, and 59 minutes, inclusive.*

Ectopic Pregnancy *– an abnormal pregnancy in which the products of conception implant outside of the uterus.*

Epidural/Spinal Anesthesia/Analgesia *– an epidural is the process of achieving regional anesthesia of the pelvic, abdominal, genital, or other area by the injection of a local anesthetic into the epidural space of the spinal column for the purpose of pain reduction/elimination. A spinal is the injection of a local anesthetic into the spinal column for the purpose of pain reduction/elimination.*

Episiotomy *– a surgical incision at the outlet of the vagina performed at the time of delivery.*

GLOSSARY (continued)

Feto-Infant Mortality *– the number of deaths for infants, weighing 500g or more or having a gestational age of 20 weeks or more, from 20 weeks gestation through the first year of life:*

- *stillbirth rate – the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who shows no signs of life after birth.*

  $$\frac{\text{total number of stillbirths (>= 500g or >= 20 weeks gestation)}}{\text{total number of births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

- *infant mortality rate – the death of a live born infant occurring within 364 full days after birth.*

  $$\frac{\text{total number of infant deaths (>=500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

- *neonatal mortality rate – the death of a live born infant occurring less than 29 full days after birth. An early neonatal death is a death occurring prior to the 7th full day of life. A late neonatal death is a death occurring between the 8th and the 28th full day of life.*

  $$\frac{\text{total number of neonatal deaths (>= 500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

- *post-neonatal mortality rate – the death of a live born infant occurring between the 29th and the 364th full day of life.*

  $$\frac{\text{total number of post-neonatal deaths (>= 500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

General Anesthesia *– an anesthetic agent given primarily by inhalation or intravenous injection for the purpose of pain reduction/elimination.*

Gestational Age *– the duration of gestation measured from the first day of the last normal menstrual period. Gestational age is expressed in completed weeks. If the date of the last menstrual period is uncertain or unknown, an age estimate based on the ultrasound will be recorded as the gestational age:*

- *preterm – births that occurred before the 37th completed week of gestation.*
- *term – births that occurred between 37 and 41 weeks of gestation.*
- *postdate – births that occurred after the 40th completed week of gestation.*

High Birth Weight *– delivery of an infant weighing greater than 3999 grams (>8.8 lbs) at birth.*

Indicated Labour *– a medically induced delivery because of either a maternal or fetal adverse condition.*

Induced Abortion *- the complete expulsion of a fetus or embryo, prior to the 20th week of gestation, from its mother that was medically induced.*

Induction of Labour *– medical inductions undertaken using an oxytocic agent, such as oxytocin and prostaglandin. Inductions using only artificial rupture of membranes are not included.*

Infant Mortality Rate *– the death of a live born infant occurring within 364 full days after birth.*

$$\frac{\text{total number of infant deaths (>= 500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

Labour *– the time and processes that occur during parturition from the beginning of cervical dialation to the delivery of the placenta:*

- *indicated labour - medically induced delivery because of either a maternal or fetal adverse condition.*
- *induction of labour – inductions undertaken using an oxytocic agent, such as oxytocin and prostaglandin. Inductions using only artificial rupture of membranes are not included.*
- *spontaneous labour - delivery preceded by spontaneous labour or rupture of membranes without induction or elective caesarean section for maternal or fetal reasons.*

GLOSSARY (continued)

Laceration *– a third degree laceration refers to a tear involving the anal sphincter and a fourth degree laceration refers to a tear involving the rectal mucosa.*

Live Birth *– the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who after birth, breathes or shows any other evidence of life, such as the beating of the heart, pulsation of the umbilical cord or definite movement of the voluntary muscles.*

Low Birth Weight *– delivery of an infant weighing less than 2500 grams (<5.5 lbs) at birth.*

Molar Pregnancy *– a pregnancy in which a hydatid mole develops from the trophoblastic tissue of the early embryonic stage of development.*

Neonatal Mortality Rate *– the death of a live born infant occurring less than 29 full days after birth. An early neonatal death is a death occurring prior to the 7^{th} full day of life. A late neonatal death is a death occurring between the 8^{th} and the 28^{th} full day of life.*

$$\frac{\text{total number of neonatal deaths (>= 500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

Neonate *- an infant who is less than 29 days old. The data in the Newborn Care section reflects the health outcomes of these neonates.*

Operative Delivery *– refers to caesarean sections and operative vaginal deliveries. Operative vaginal deliveries are those in which forceps or vacuum extractor were used.*

Post-Neonate *- an infant who is 29 days old or older but is less than 1 year old (i.e., 29-364 days old). The health outcomes of infants in the post-neonatal age group are reflected in the Infant Care section of this report.*

Post-Neonatal Mortality Rate *– the death of a live born infant occurring between the 29^{th} and the 364^{th} full day of life.*

$$\frac{\text{total number of post-neonatal deaths (>= 500g or >= 20 weeks gestation)}}{\text{total number of live births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

Postdate *– refers to the birth of an infant that occurred after the 40^{th} completed week of gestation.*

Preterm *– refers to the gestational age of an infant born prior to the 37^{th} completed week of gestation.*

Pudendal Block *– a procedure whereby the pudendal nerves are anesthetised by the injection of a local anesthetic in the trunk of each nerve as it passes over the sacrospinous ligament, just below the ischial spine for the purpose of pain reduction/elimination.*

Spontaneous Abortion (Miscarriage) *– the complete expulsion of a fetus or embryo, prior to the 20^{th} week of gestation, from its mother that occurred without medical involvement.*

Spontaneous Labour *- delivery preceded by the rupture of membranes without induction or elective caesarean section for maternal or fetal reasons.*

Stillbirth *- the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who shows no signs of life after birth. A late stillbirth refers to the birth of a fetus having a gestational age of 34 weeks or greater who shows no signs of life after birth.*

GLOSSARY (continued)

Stillbirth Rate *– the birth of a fetus weighing 500 grams or more or having a gestational age of 20 weeks or more, who shows no signs of life after birth.*

$$\frac{\text{total number of stillbirths (>= 500g or >= 20 weeks gestation)}}{\text{total number of births (>= 500g or >= 20 weeks gestation)}} \times 1000$$

Term *– refers to the birth of an infant that occurred between 37 and 41 weeks of gestation.*

Total Births *- all live births and stillbirths.*

Vaginal Birth After Caesarean (VBAC) *– a vaginal birth for a women who has had at least one previous caesarean delivery.*

Very Low Birth Weight *– delivery of an infant weighing less than 1500 grams (<3.3 lbs) at birth.*

ICD-9 CLASSIFICATION AND PROCEDURE CODES USED IN THE PERINATAL SURVEILLANCE REPORT

Maternal Health

Molar Pregnancy – 630.xx
Ectopic Pregnancy – 633.0x – 633.9x,
Stillbirth – V271, V274, V277
Live Birth – 650.xx – 651.93, V270, V272 V273
Spontaneous Abortion – 631.xx, 632.xx, 634.00 – 634.92, 637.00 – 637.92
Induced Abortion – 635.00 – 636.92, 638.0x – 638.9x
Indicated Labour – 642.xx, 652.xx, c-section indicator, ICD-9 procedure codes 73.0x, 73.1x, 73.4x
Spontaneous Labour – all non-indicated labour, by default

Maternal Care

Low Forceps – ICD-9 procedure codes 72.0x – 72.1x
Mid Forceps – ICD-9 procedure codes 72.21 – 72.29
Vacuum Extraction – ICD-9 procedure codes 72.71 – 72.79
$1^{st}/2^{nd}$ degree tears – 664.0x – 664.1x
$3^{rd}/4^{th}$ degree tears – 664.2x – 664.3x
Episiotomy – ICD-9 procedure codes 72.31, 72.1x, 72.21, 72.71, 73.6x
Medical Induction - ICD-9 procedure codes 73.4x
Fetal Adverse Conditions
- *malposition, malpresentation – 652.xx*
- *obstructed labour – 660.xx*
- *other fetal and placental problems, e.g., fetal distress – 656.xx*

Maternal Adverse Conditions
- *hypertension – 642.xx*
- *antepartum haemorrhaging, abruptio placentae, and placenta previa – 641.xx*
- *other maternal conditions, e.g., diabetes in pregnancy – 648.xx*

Newborn Care

Respiratory Distress Syndrome – 769.xx – 770.xx
Disorders Related to Prematurity – 765.xx
Other Perinatal Conditions – 760.xx – 764.xx, 766.xx – 768.xx, 771.xx – 779.xx, 410.xx – 458.xx
Congenital Anomalies – 740.xx – 759.xx

Infant Care

Congenital Anomalies (excluding heart) – 741.xx – 744.xx, 747.xx – 759.xx
Sudden Infant Death Syndrome and Other Unknown Causes – 798.xx – 799.xx
Respiratory Infections – 460.xx – 519.xx, 078.xx
Heart Diseases and Anomalies – 745.xx – 746.xx, 410.xx – 429.xx
Injuries, Poisoning, and Toxic Effects – 910.xx – 913.xx, 967.xx – 983.xx
Respiratory Conditions of Newborn – 769.xx – 770.xx
Diseases of the Digestive System – 520.xx – 579.xx
Convulsions, Pyrexia, and Other Symptoms – 780.xx – 799.xx
Diseases of the Central Nervous System and Sense Organs – 320.xx – 389.xx
Infections and Parasitic Diseases – 001.xx – 136.xx

ICD-9 CLASSIFICATION AND PROCEDURE CODES USED IN THE PERINATAL SURVEILLANCE REPORT (continued)

Note[1]: ICD-9 diagnoses are 5 digit codes. The fourth and fifth digits are used for more refined diagnosis and were often not needed for the classifications used in this report. These digits have thus been identified only by an 'x'. Similarly, ICD-9 procedure codes are 4 digits, where the fourth digit is used for refinement purposes. This digit is also identified by an 'x'.

Note[2]: Some diagnoses and procedures are already coded on the hospital discharge form as separately identified fields. For these diagnoses and procedures the ICD-9 classification scheme was not needed. These include:

- *type of delivery – vaginal, scheduled caesarean section, or non-scheduled caesarean section*
- *analgesia/anesthesia usage – general anesthesia, epidural/spinal, or pudendal block*
- *breech presentation*
- *method of newborn resuscitation – oxygen through positive pressure mask, oxygen through endotracheal tube/intubation, or cardiac massage*
- *method of newborn feeding – breast feeding, bottle feeding, or breast and bottle feeding*

Chapter One

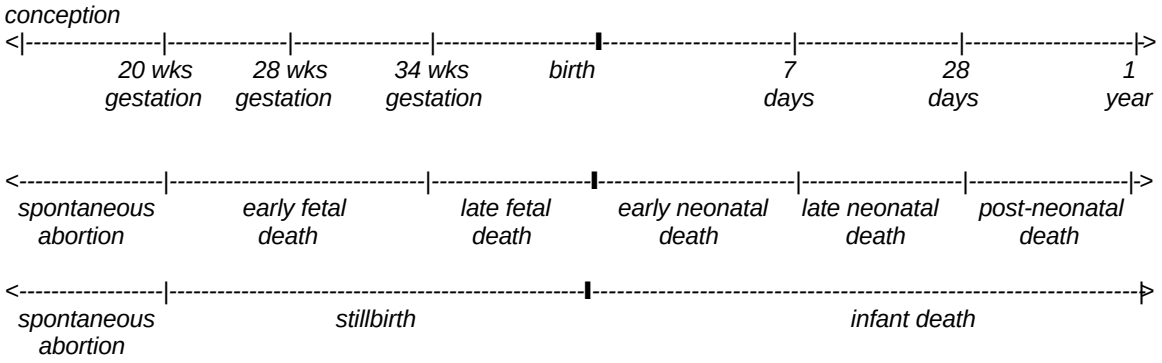
Introduction

In 1996, the Epidemiology Unit of Manitoba Health established a collaborative project team to assess perinatal health in Manitoba. The membership of the Perinatal Project Team is listed in Appendix C.

The first project initiated by this team was the establishment of a Manitoba Perinatal Surveillance System. Epidemiologic surveillance is the collection, analysis, interpretation, and dissemination of information on health-related events in a population. Since it is used for the ongoing monitoring of health-related events, a surveillance system should be adaptable, responsive, cost effective, and simple. Consequently, surveillance systems are generally used to describe what is happening in a population rather than determining the causes of these events.

Although the perinatal period can be defined in various ways, the Perinatal Project Team decided that the scope of perinatal surveillance should include events occurring from conception through the first year of life.

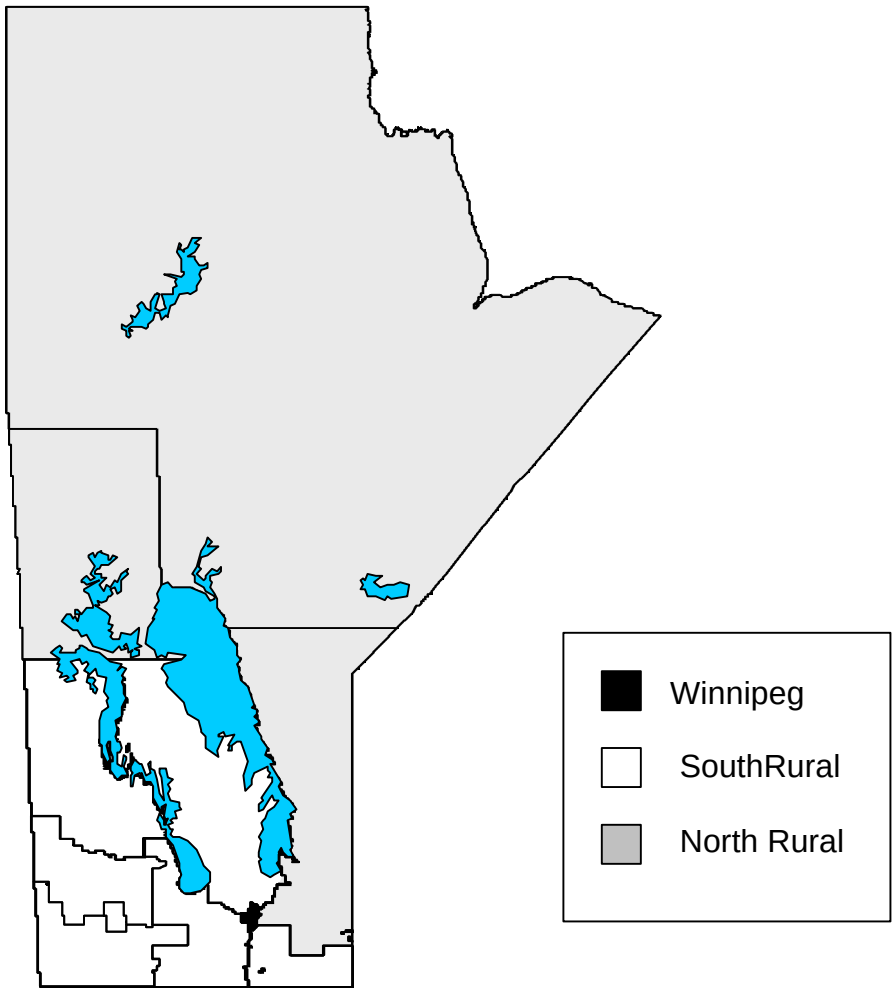
Feto-Infant Time Line



In this first report of the Manitoba Perinatal Surveillance System we present data from 1985 to 1996. All of the data used for this report came from existing Manitoba Health and Manitoba Vital Statistics databases. Consequently, limitations in these data sources have influenced the scope and depth of our analyses. In particular, with respect to pregnancies, this report only identifies those pregnancies that have resulted in a hospital-based outcome. Therefore, home births, spontaneous abortions not requiring hospital admission, and induced abortions occurring in private clinics are excluded. Also, this report only refers to women who are residents of Manitoba and does not include women from other provinces who delivered in Manitoba. More details regarding the data sources and assumptions are provided in Appendix A and B, respectively.

For some analyses, we present regional comparisons. Throughout this report, we have divided Manitoba into 3 broad geographic regions: Winnipeg, South Rural, and North Rural. In all these analyses, we present data according to the mother's area of residence, which may differ from the geographic region of the hospital in which a pregnancy outcome occurred. The geographic definitions of these regions are shown in Figure 1.1. In subsequent reports, we intend to provide finer geographic breakdowns that conform to the Regional Health Authority and other administrative health boundaries in Manitoba.

Figure 1.1 – Regional Health Boundaries



OVERVIEW - PREGNANCY OUTCOMES IN MANITOBA

In Manitoba, each year there are approximately 21,000 pregnancies that result in a hospital-based outcome (Table 1.1). Approximately 75% of these pregnancies result in a live birth. Whereas the total number of pregnancies remained stable between 1985 and 1996, the number of live births declined by 10%. This difference is primarily attributable to a rise in the number of induced abortions. The overall birth rate in Manitoba has declined from 65 per 1,000 women (aged 15-44) in 1985 to 60 per 1,000 women in 1996 (see Figure 1.2).

Each year, more than 100 pregnancies result in stillbirth and there has been little change in the number of stillbirths in the past decade. In recent years, approximately 100 infants died in the first year of life and about two thirds of these deaths occurred in the neonatal period (i.e. <29 days old). Since 1985, there has been a 50% decline in the number of infant deaths with most of the decline occurring in neonatal mortality.

Figure 1.2
Birth Rate Over Time

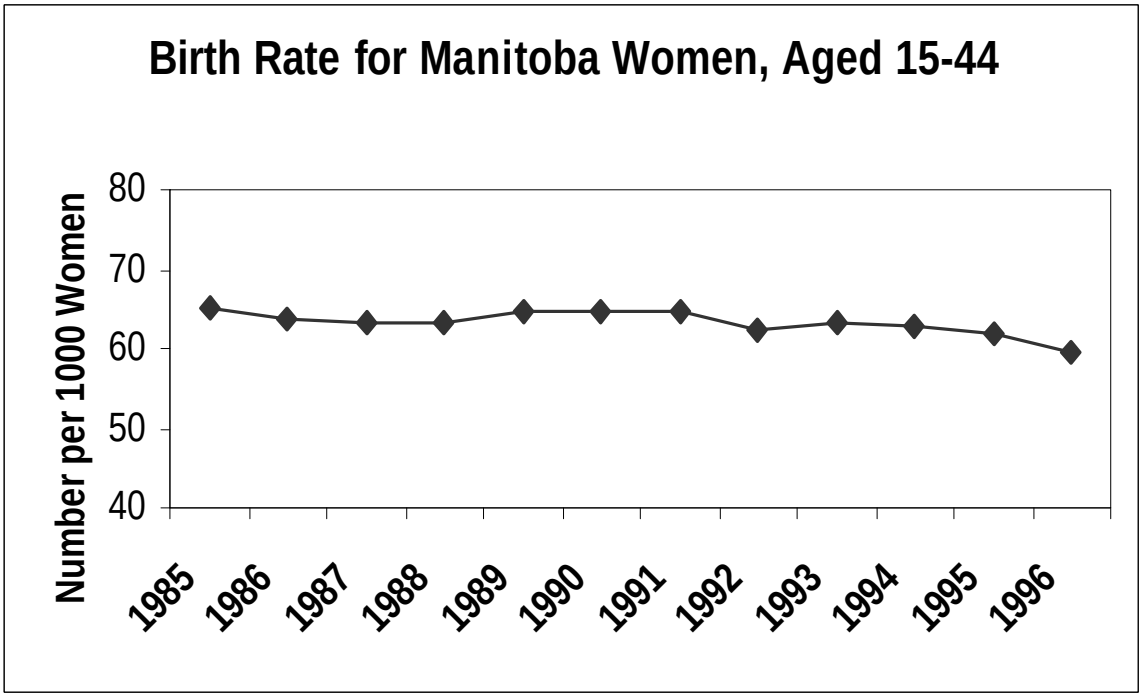


Table 1.1
Pregnancy Outcomes by Year

1985 – 1996

Year	Pregnancy Outcome									
	Molar Pregnancy	Ectopic Pregnancy	Spontaneous Abortion	Induced Abortion	Stillbirths <500g/<20wks	Stillbirths >499g/>19wks	Live Births	Neonatal Deaths	Post-Neonatal Deaths	Total Pregnancies
1985	14	257	1853	2242	14	92	16,810	110	53	21,282
1986	15	273	1802	2534	10	77	16,710	110	50	21,421
1987	12	314	1931	2611	25	88	16,702	96	36	21,683
1988	19	296	1924	2802	24	70	16,784	78	48	21,919
1989	25	375	1939	2752	27	87	17,058	65	51	22,263
1990	28	347	2015	2532	16	88	17,169	93	49	22,195
1991	24	300	1990	2528	23	79	17,000	67	40	21,944
1992	20	311	2019	2556	51	67	16,383	72	35	21,407
1993	22	328	2083	2621	37	91	16,472	84	40	21,654
1994	25	296	1980	2871	38	79	16,259	76	43	21,548
1995	19	339	1918	2846	42	76	15,909	76	35	21,149
1996	30	304	1749	3256	44	66	15,226	64	34	20,675
Total	253	3740	23,203	32,151	351	960	198,482	991	514	259,140

A PERINATAL SURVEILLANCE FRAMEWORK

In this report, we focus on describing various aspects of perinatal health, including fetal and infant mortality and morbidity, and obstetrical, newborn and infant care practices. To put the surveillance data into context, we have adopted a conceptual framework that defines four broad areas that influence perinatal health:

- *Maternal Health.*
- *Maternal Care.*
- *Newborn Care.*
- *Infant Care.*

Maternal Health *is an important determinant of the adequate growth and development of the fetus. It includes factors such as maternal nutrition, education, smoking, alcohol and other drug use, and the presence of specific medical conditions that complicate pregnancy. The availability of high quality* Maternal Care *around the time of labour and delivery is required to ensure the delivery of a healthy infant and to reduce the chance of complications for the mother.* Newborn Care *exerts a strong influence on infant outcomes in the neonatal period; particularly for infants who are born preterm or have serious medical problems.* Infant Care *influences the health of infants after the neonatal period.*

In the first section, we review the trends and distribution of feto-infant mortality in Manitoba. Although feto-infant mortality rates are somewhat broad indicators of perinatal health, they help to summarize the overall perinatal health of a population and to identify areas where further investigation is warranted. In the subsequent sections of this report, we provide more detailed analysis of mortality, morbidity and health care practices relevant to each of the broad perinatal health areas that we have identified: Maternal Health, Maternal Care, Newborn Care, and Infant Care. Future descriptive reports will focus on additional topics such as maternal morbidity associated with the perinatal period. Furthermore, the Perinatal Project Team plans to conduct more in-depth study of topics covered in this surveillance report to discover the determinants of various aspects of perinatal health so that strategies can be developed that will improve the perinatal health of Manitobans.

Chapter Two

Feto-Infant Mortality

To describe feto-infant mortality in Manitoba, we have adapted concepts developed by Dr. Brian McCarthy of the Centers for Disease Control and Prevention in Atlanta, USA. Dr. McCarthy suggests a simple tabular analysis of birthweight by age-at-death to address two key components of perinatal health: "size" and "time". Furthermore, analysis of birthweight distribution and age-at-death can be seen as linking to the four broad programmatic areas in perinatal health: Maternal Health, Maternal Care, Newborn Care, and Infant Care (see Figure 2.1).

Figure 2.1

A Table For Classifying Feto-Infant Mortality by Weight and Age at Death

Age at Death

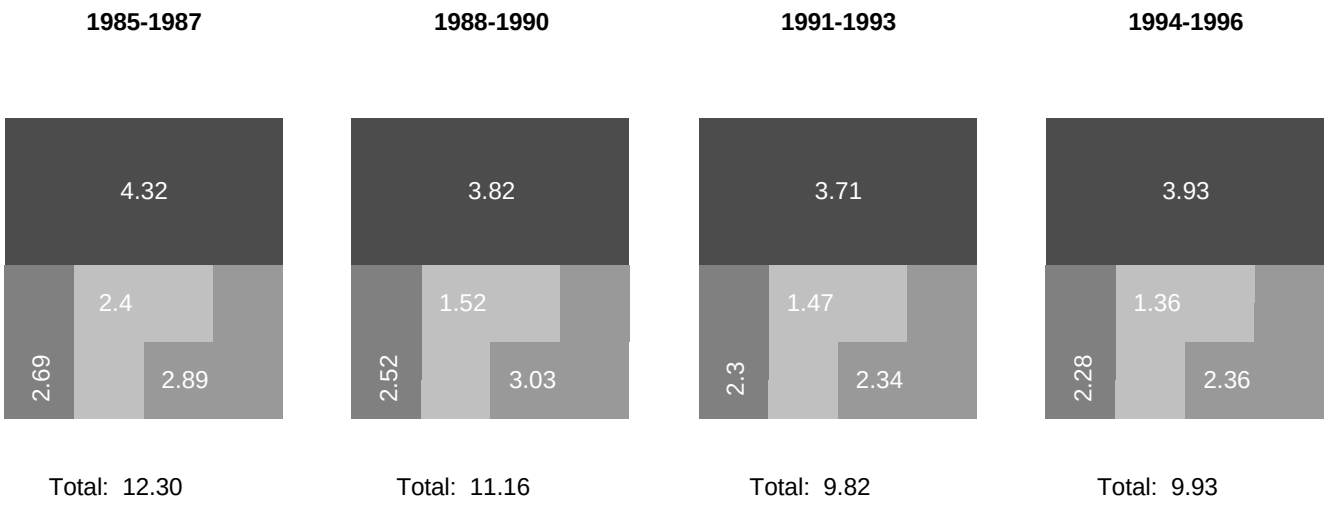
Birthweight (grams)	*Late fetal (28+ weeks)*	*Early Neonatal (0-7 days)*	*Late Neonatal (8-28 days)*	*Post-neonatal (29-364 days)*
<1000				
1,000-1,499		***MATERNAL***	***HEALTH***	
1,500-2,499	*MATERNAL*	*NEWBORN*	*CARE*	*INFANT*
2,500+	*CARE*			*CARE*

Although categories are not seen as mutually exclusive, this classification scheme attributes fetal and infant deaths (at >28 weeks) occurring in low birth weight categories (i.e. <1500 grams) to Maternal Health issues. Among intermediate and normal birth weight groupings (i.e. >1500 grams), late fetal deaths are attributed to Maternal Care issues. Issues of Newborn Care are related to early and late neonatal mortality in intermediate birth weights (i.e. 1500-2499 grams) and early neonatal mortality in normal birth weight (>2499 grams) categories. Finally, the majority of Infant Care issues are implicated by post-neonatal mortality in intermediate and normal birth weight categories and late neonatal and post-neonatal mortality in normal birth weight infants. Although the boundaries of these designations may overlap, analysis of this table may provide information relevant to the identification of potential problems specific to particular programmatic areas.

TIME TRENDS

Between 1985-87 and 1994-96, there was a 19% reduction in feto-infant mortality (from 12.3 to 9.93 deaths per 1,000 births) (Figure 2.2). Most of this decline was in the Newborn Care category. By 1994-96, approximately 40% of the feto-infant mortality (3.93 per 1,000) occurred in the low birthweight (Maternal Health) category, 24% in the Infant Care category (2.36 per 1,000), 23% in the Maternal Care category (2.28 per 1,000), and 14% in the Newborn Care category (1.36 per 1,000).

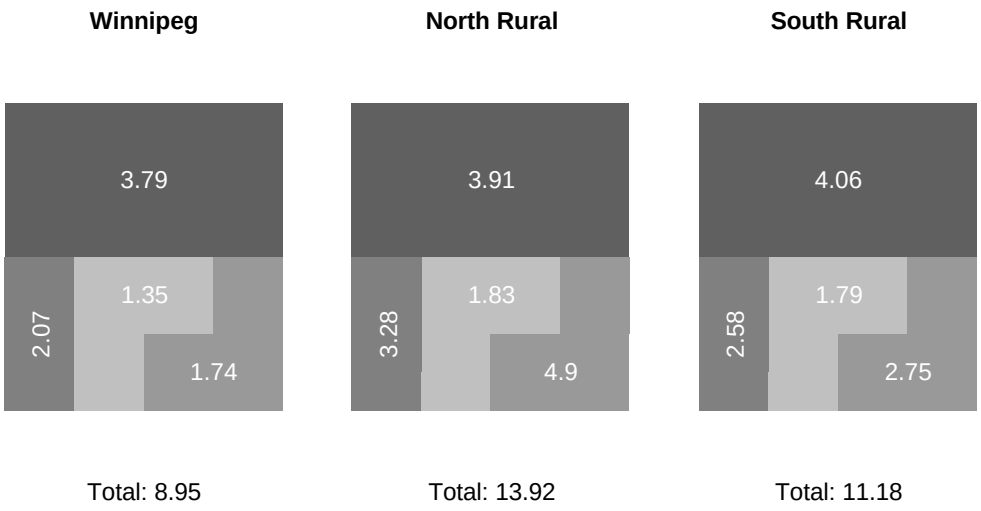
Figure 2.2
Time Trends in Provincial Feto-Infant Mortality per 1,000 Births



REGIONAL VARIATIONS

There are substantial regional variations in the feto-infant mortality rates. The highest overall rates are in the North Rural region of the province (Figure 2.3). The greatest regional differences in feto-infant mortality are in the Infant Care category where the North Rural region has 2.9-fold higher mortality rate than Winnipeg (4.90 versus 1.74 per 1,000).

Figure 2.3
Regional Feto-Infant Mortality per 1,000 Births

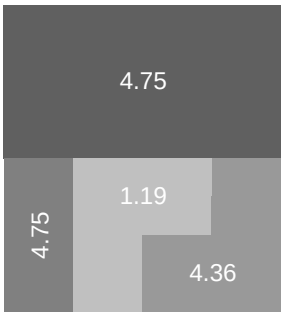


AGE AND INCOME VARIATIONS

On a population basis, factors that influence feto-infant mortality rates include the socio-economic status of the population and the age distribution of mothers. This is demonstrated by the following analysis based on women living in Winnipeg in which we used median household income as an indicator of the socio-economic status of residential areas (Figure 2.4). In each age group, women living in areas of the city with a median annual household income greater than $42,674 (i.e. the upper one-third) had lower feto-infant mortality rates than women living in areas with a median household income less than $35,772 (i.e. the lower one-third). Furthermore, within each income stratum, women aged 20-34 years had lower feto-infant mortality rates than women aged less than 20 years or greater than 34 years.

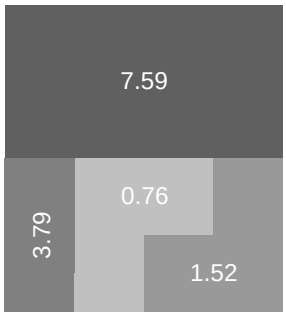
Figure 2.4
Feto-Infant Mortalilty by Age and Median Household Income

< 20 years, low $



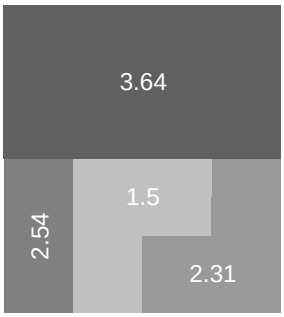
Total: 15.05

<20 years, high $



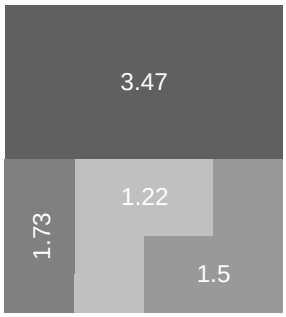
Total: 13.66

20-34 years, low $



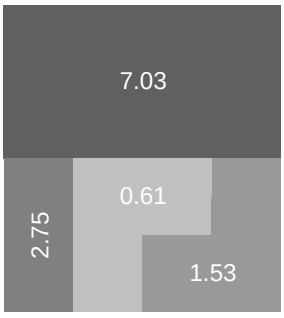
Total: 9.99

20-34 years, high $



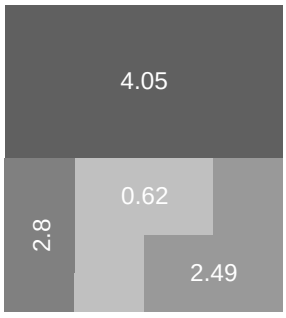
Total: 7.92

>34 years, low $



Total: 11.92

>34 years, high $



Total: 9.96

EXCESSIVE FETO-INFANT MORTALITY

The variations in feto-infant mortality rates by age group and region of residence shown in the previous section indicate that there are disparities in the perinatal health of different sub-populations in Manitoba. These differences point out that there are opportunities for improvement in perinatal health. These "opportunity gaps" can be summarized by comparing the feto-infant mortality rates in one population to those achieved by a "benchmark" population which has relatively low feto-infant mortality rates. By comparing various populations to this benchmark population, an assessment of the opportunity gaps can be made by determining the excess feto-infant mortality rates in the four broad programmatic areas.

To make these comparisons, we have chosen as a benchmark population women aged 20-34 years of age who live in Winnipeg residential areas with a high median household income (greater than $43,457). This population was chosen as a benchmark since previous analyses showed that feto-infant mortality rates were lowest among women living in high income Winnipeg areas and among women aged 20-34 years.

The overall feto-infant mortality rate in the benchmark population for 1985-1996 was 7.49 per 1,000 compared to an overall provincial feto-infant mortality rate (1994-1996) of 9.93 per 1,000 (see Figure 2.5). The difference between these two rates, or the excess feto-infant mortality is 2.44 per 1,000. In other words, if all of Manitoba was able to achieve the feto-infant mortality rates achieved by the benchmark population, the feto-infant mortality rate would decline by 2.44 per 1,000 or 25%. This represents an opportunity gap in perinatal health. There is excess feto-infant mortality in all programmatic areas (Figure 2.6). The greatest excess feto-infant mortality is in the Infant Care (1.04 per 1,000) and the Maternal Health (0.93 per 1,000) areas. The smallest opportunity gap is in the area of Newborn Care where the excess feto-infant mortality is only 0.15 per 1,000.

Figure 2.5
"Benchmark" and 1994 – 1996 Feto-Infant Mortality

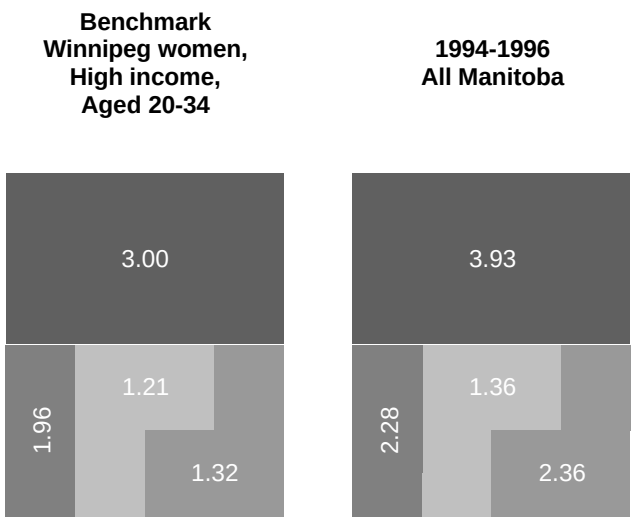
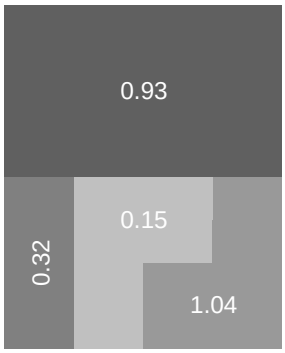
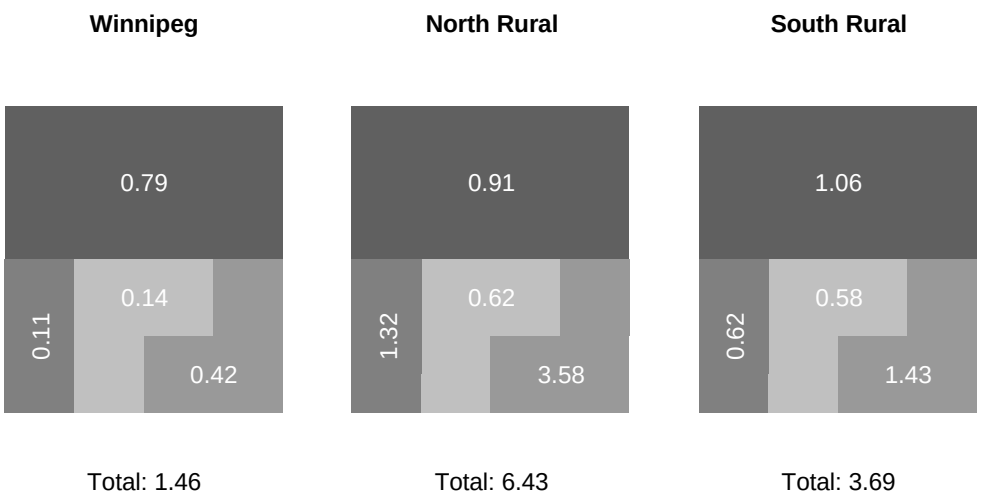


Figure 2.6
Excessive Feto-Infant Mortality for 1994-1996



Analysis of regional differences shows that compared to the benchmark population, the North Rural area of Manitoba has the greatest excess feto-infant mortality (see Figure 2.7). The overall excess feto-infant mortality for the North Rural area is 6.43 per 1,000. Most of the opportunity gap in the North Rural area is in the area of Infant Care where 55% (3.58 per 1,000) of the excess feto-infant mortality occurs. A further 21% (1.32 per 1,000) of the excess feto-infant mortality in the North Rural area occurs in the Maternal Care area. In the South Rural area, the overall excess feto-infant mortality is 3.69 per 1,000 with 39% (1.43 per 1,000) occurring in the Infant Care area and 29% (1.06 per 1,000) occurring in the Maternal Health area. The overall excess feto-infant mortality in the Winnipeg area is 1.46 per 1,000 with 54% (0.79 per 1,000) occurring in the Maternal Health area.

Figure 2.7
Regional Excessive Feto-Infant Mortality per 1,000 Births



DISCUSSION

Feto-infant mortality rates can help identify areas of progress and areas where opportunities for further improvements exist. Feto-infant mortality rates are influenced by Maternal Health, Maternal Care, Newborn Care and Infant Care factors. The data in this report show that other important determinants of feto-infant mortality rates in a population include the age distribution and socio-economic status of pregnant women.

There are encouraging trends in the feto-infant mortality rates in Manitoba, with an overall reduction of 19% between 1985-1987 and 1994-1996. There were declines in the feto-infant rates in all birthweight and age categories. However, most of this decline was due to a reduction in neonatal mortality rates which are influenced by Newborn Care factors.

There are also opportunities for improvement. Between 1985-1987 and 1994-1996, there were only modest decreases in feto-infant mortality rates in low birth weight categories, indicating that there are opportunities for improving Maternal Health throughout the province. There are regional disparities in feto-infant mortality rates with higher mortality in the North Rural and South Rural areas. In particular, there appear to be opportunities for improvement in the rural areas in the post-neonatal mortality rates, which are influenced by Infant Care. The North Rural region also has higher rates of late stilbirths, suggesting that there may be room for improvement in the area of Maternal Care. In the subsequent chapters of this report, we present more detailed analyses of data relevant to Maternal Health, Maternal Care, Newborn Care and Infant Care..

Chapter Three

Maternal Health

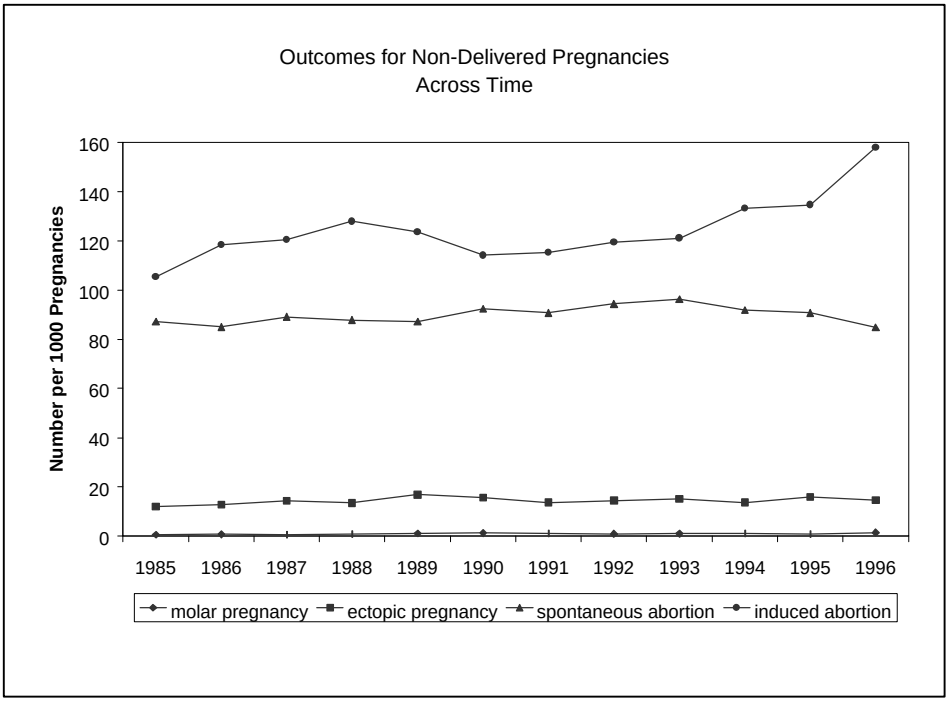
Maternal Age — *Figure 3.1*

The majority of births occur to women between 20 and 34 years of age. This percentage has seen a moderate decrease in recent years with corresponding increases in all other age categories. In particular, there has been a 47% increase in births occurring to women older than 34 years old from 1985 to 1996. As a proportion of all births, 10% of births between 1994 and 1996 occurred to women older than 34 years of age compared to 6.4% in the 1985-1987 time period.

Age Group	1985-1987 Percent of Total Births (Number of Births)	1994-1996 Percent of Total Births (Number of Births)
<17 years	3.42 (1710)	4.01 (1886)
18-19 years	5.74 (2867)	6.23 (2933)
20-34 years	84.43 (42195)	79.74 (37550)
35-39 years	5.67 (2833)	8.71 (4100)
>39 years	0.74 (371)	1.32 (621)

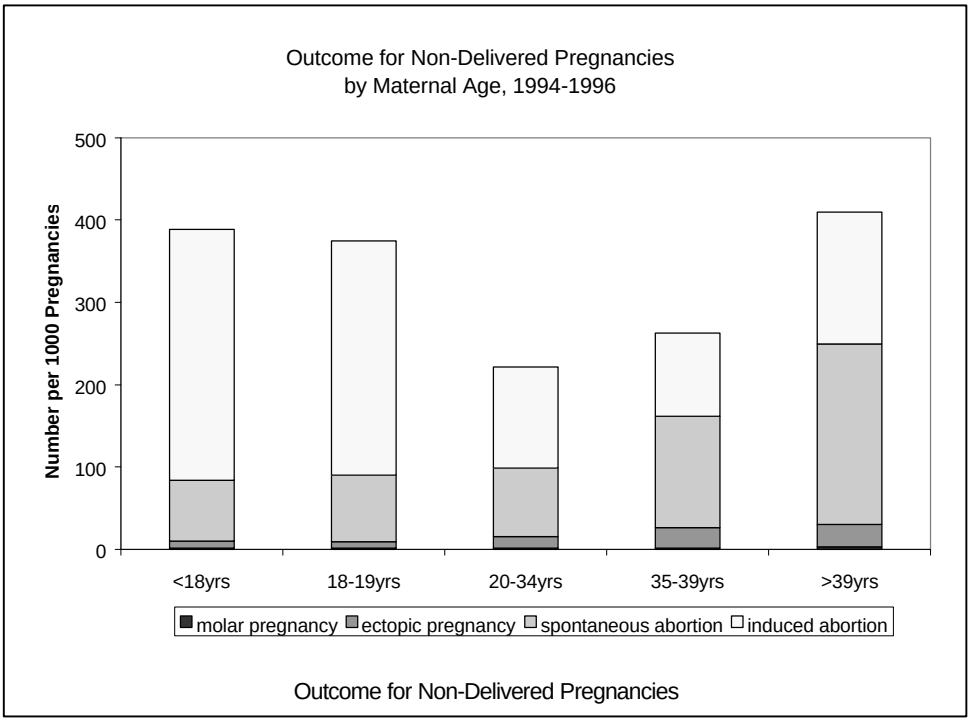
Non-Delivered Pregnancies — *Figure 3.2*

A substantial proportion of pregnancies do not result in a birth. For example, analysis of data for pregnancies that resulted in a hospital-based outcome reveals that at least 26% of all pregnancies in 1996 did not result in delivery of a livebirth or a stillbirth. Almost 16% of the women pregnant in that year seen in hospital had an induced abortion, 8.5% had a spontaneous abortion (miscarriage), and an additional 1.5% of pregnancies resulted in either an ectopic pregnancy. The induced abortion rates have seen an increase over time. In addition to these, there may be other pregnancies ending in spontaneous or induced abortions that are not seen in hospital.



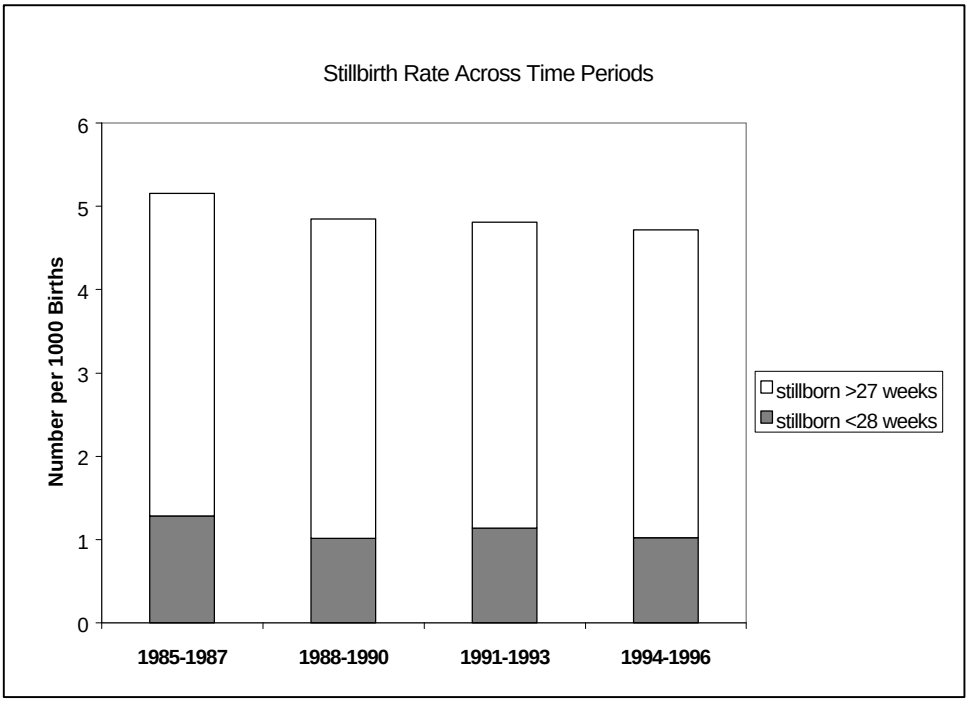
Non-Delivered Pregnancies ***Figure 3.3***

With the exception of induced abortions, which are highest in the youngest age groups, the risk of having a pregnancy that does not result in a birth appears to increase with age. Specifically, compared to their younger counterparts, women over the age of 35 years have the highest rates of ectopic pregnancies, and spontaneous abortions. The risk of having a molar pregnancy does not appear to increase with age.



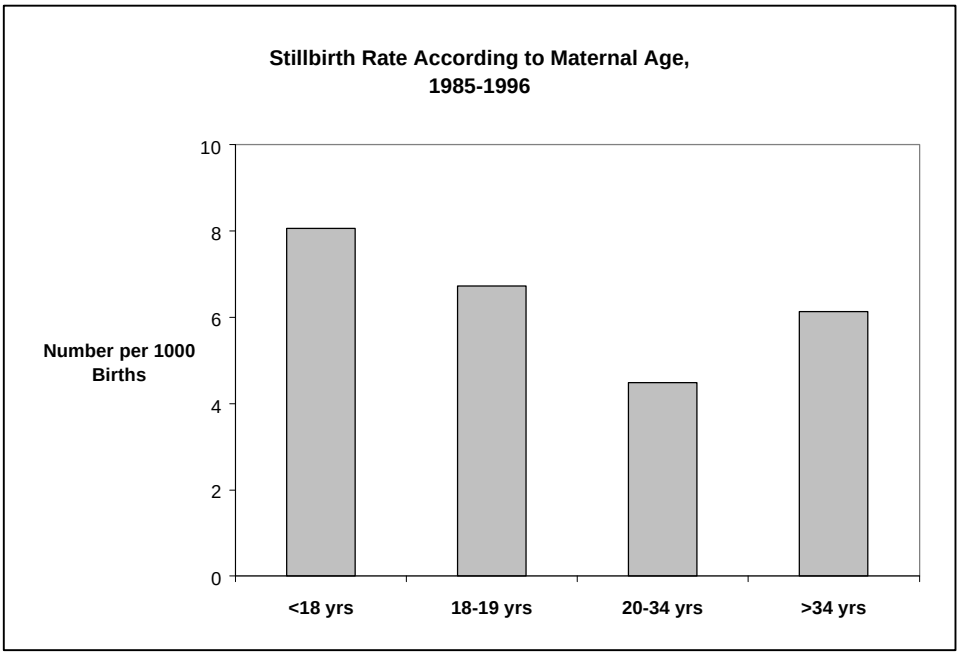
Stillbirths ***Figure 3.4***

In 1996, 0.47% (4.7 per 1000) of all births were stillbirths. This rate has declined only slightly over time, and most of the decline is for babies born at less than 28 weeks of gestation.



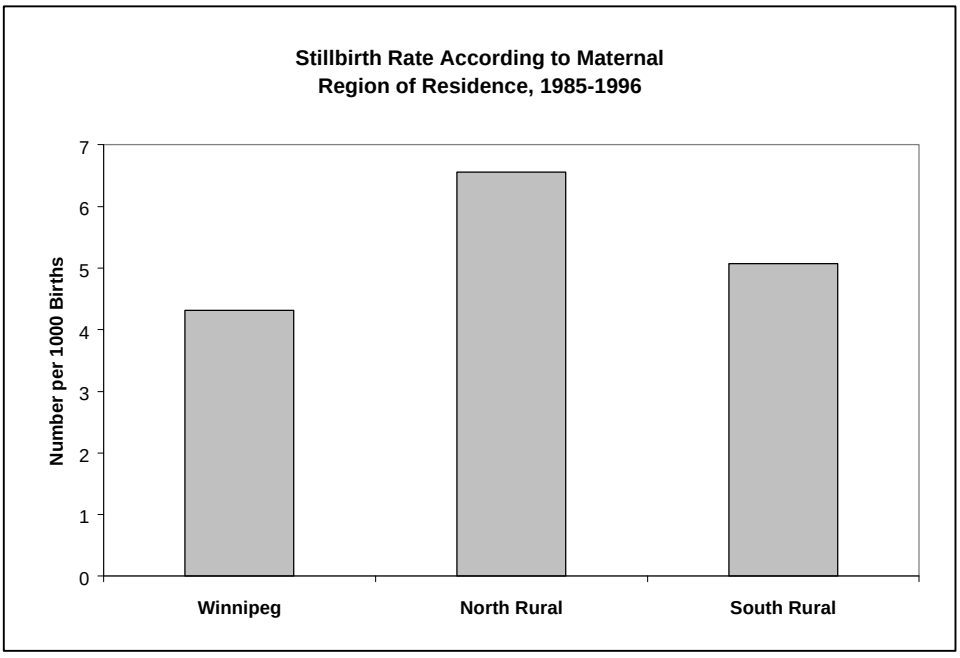
Stillbirths ***Figure 3.5***

The observation that about 5 per 1000 deliveries are stillbirths is true only for women aged 20-34 years, who account for the majority of births. Both women younger than 20 and older than 34 years of age have significantly higher rates of stillbirths, with very young women (<18 years old) having the highest rate (0.8%).

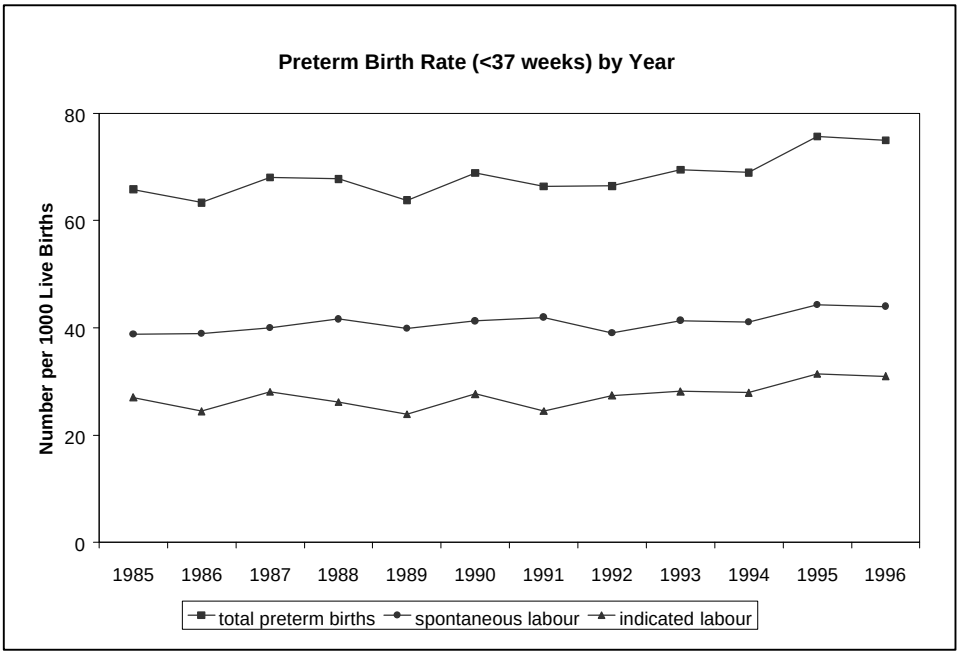


Stillbirths ***Figure 3.6***

According to region of residence, women living in the North Rural region of the province have a higher rate of stillbirths (6.6 stillbirths per 1000 births) compared to women living in either Winnipeg (4.3/1000), or in the South Rural region (5.1/1000).

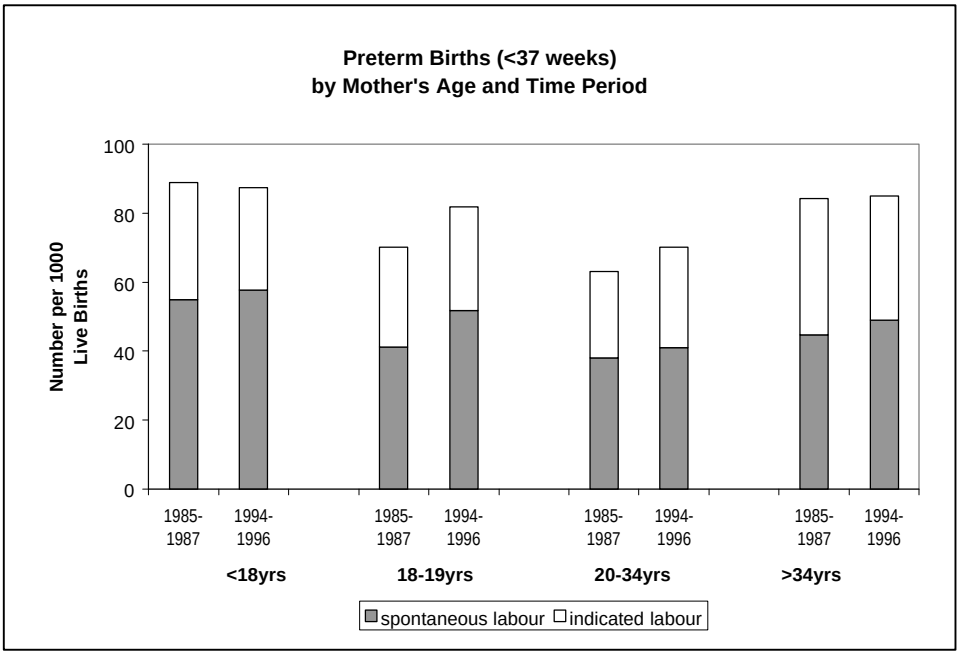


Between 6.5% and 7% of all live births are pre-term (born prior to 37 weeks gestation). About two-thirds of these preterm births have a spontaneous labour. The rate of preterm births has shown a modest increase over the last couple of years in both spontaneous and indicated preterm labours. This increase is mostly apparent for the 34-36 week gestational period (see Newborn Care section). This trend in late preterm births is likely driven by an increase in births to women younger than 20 and older than 34 years of age, both of whom have higher preterm birth rates (see Figure 3.8). The trend may also be due in part to better dating methods, such that babies who may have previously been assessed at term are now being more accurately dated at late preterm.



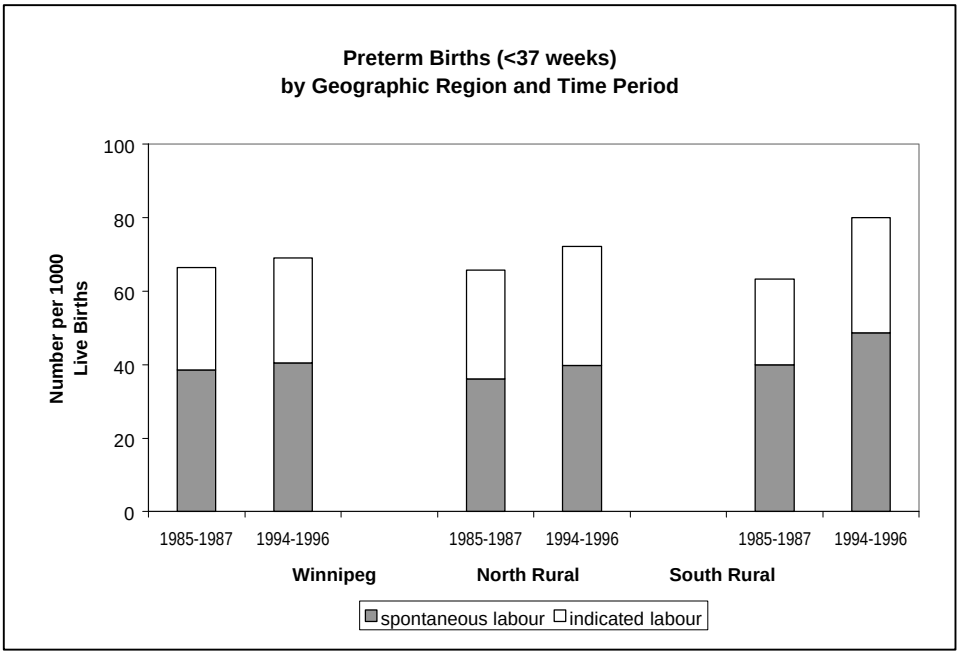
Preterm Births ***Figure 3.8***

Examining differences in the preterm birth rate according to mother's age reveals not only a disparity in the rate, but also differences in the rate of change for each age group. The younger (<18 years old) and the older (>34 years old) mothers have the highest proportion of preterm births – about 9% of all live births. Time trends however indicate that this disparity is diminishing, as the 18-19 and 20-34 year age groups have shown an increase over time while the other two groups have remained stable. As previously mentioned, about two-thirds of the preterm births have a spontaneous labour. This distribution seems to be true for each of the age categories and for both time periods shown.



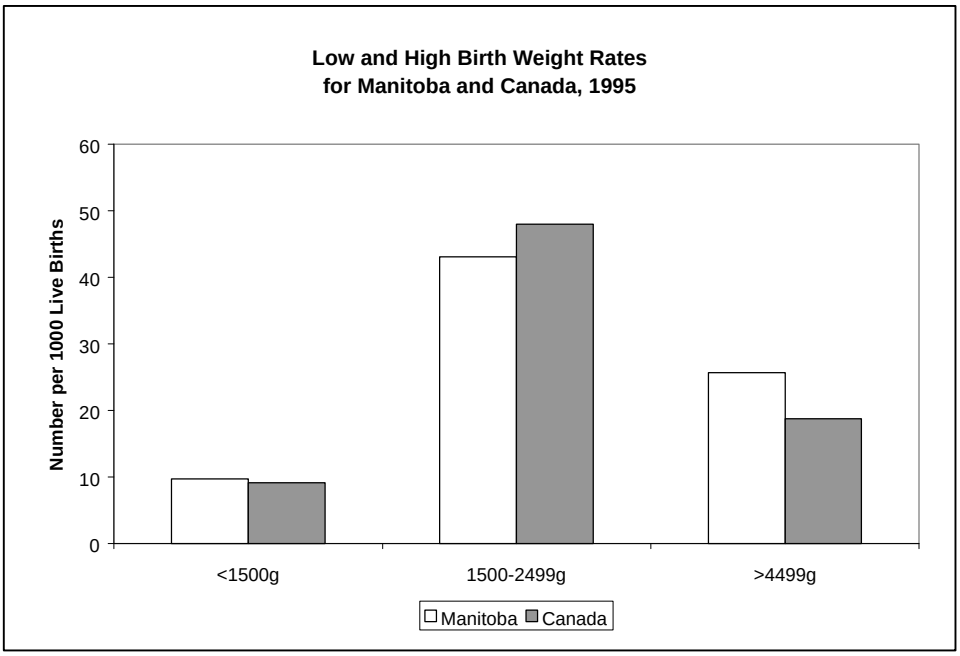
Preterm Births ***Figure 3.9***

Regionally, the preterm birth rate seems fairly evenly distributed across the three geographic regions. However, over time the increase in preterm birth rate was greater in the South Rural region (from 6.3% to 8%) than in the Winnipeg or North Rural regions.



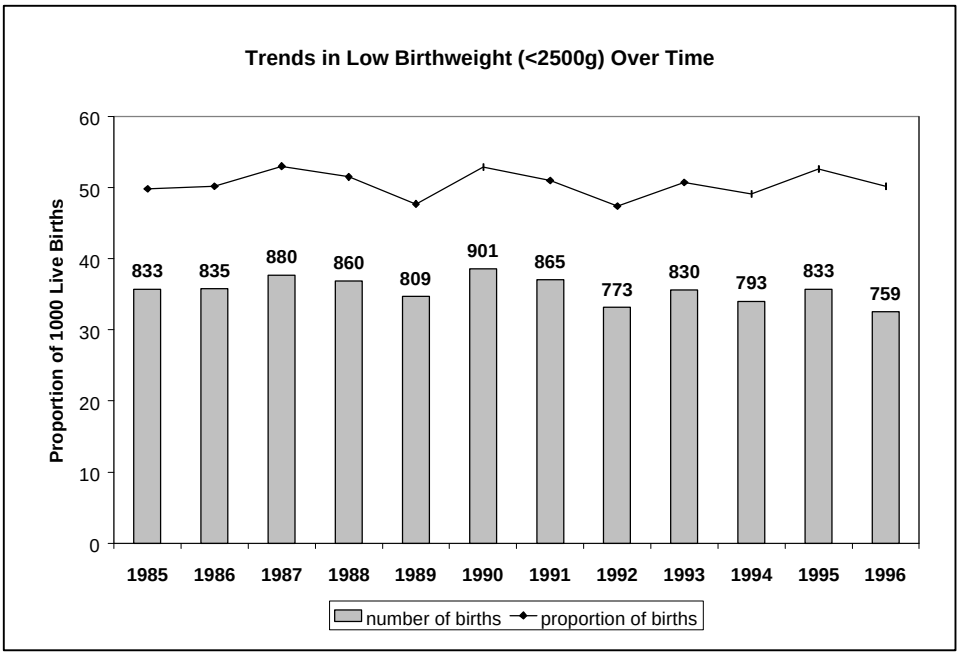
Low and High Birth Weight ***Figure 3.10***

Both low and high birth weight babies have higher infant and maternal complications. Compared to the Canadian average, Manitoba tends to have a greater proportion of high birth weight babies. (Note: The Canadian statistics represented in Figure 3.10 exclude Ontario).



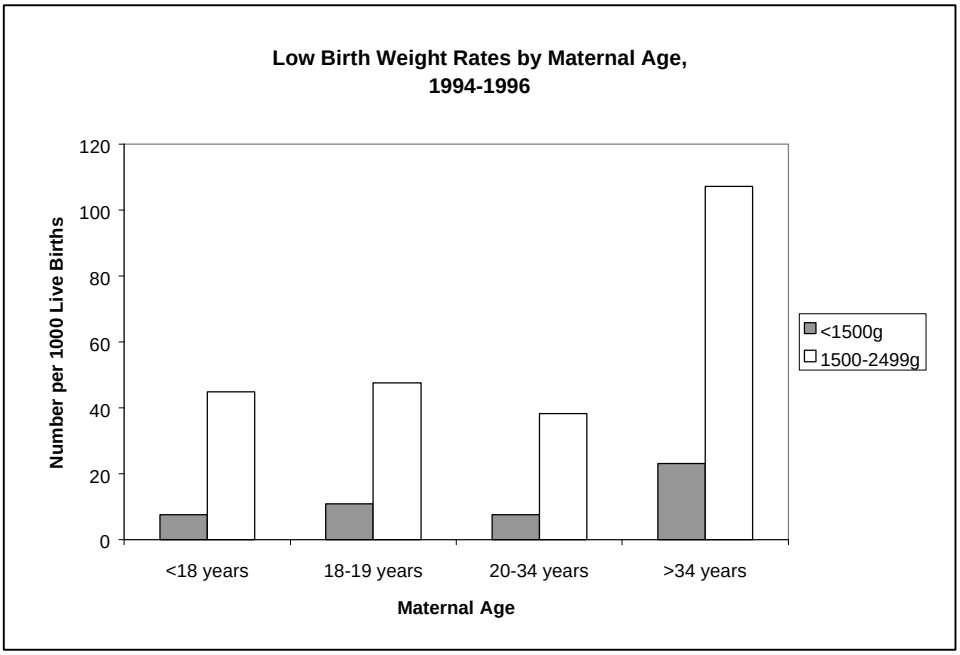
Low and High Birth Weight ***Figure 3.11***

About 5% of all live births in Manitoba have a low birth weight (less than 2500g). This rate remained relatively stable between 1985 and 1996. Between 1994 and 1996 there was an average of approximately 800 low birth weight babies born annually.



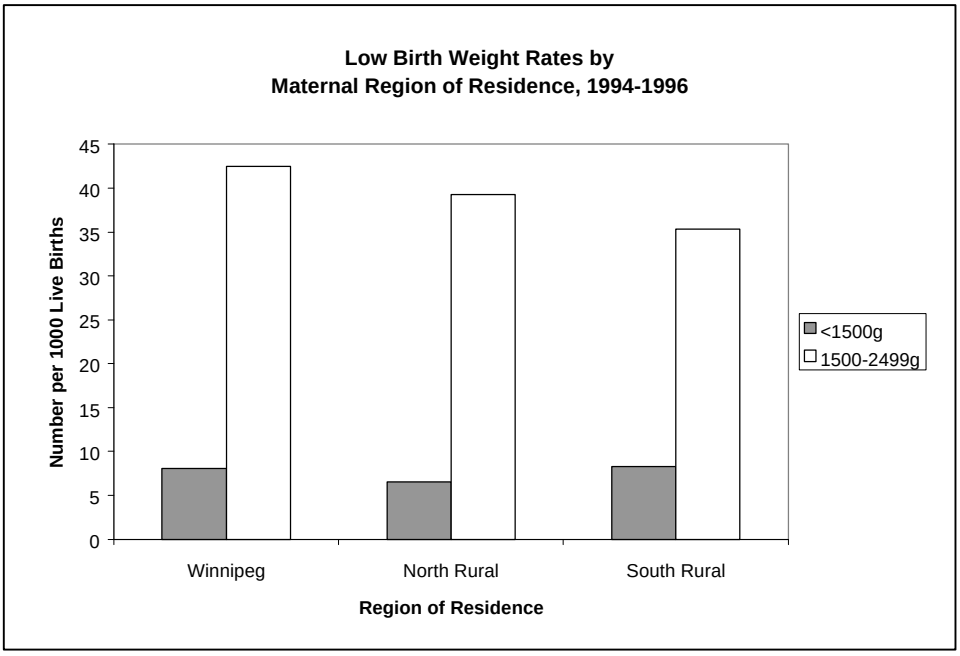
Low and High Birth Weight ***Figure 3.12***

Women aged 35 years and older have a significantly higher proportion of low birth weight babies than younger women. While approximately 5% of babies born to mothers younger than 35 years old have a birth weight less than 2500g, 13% of babies born to older mothers weigh less than 2500g.



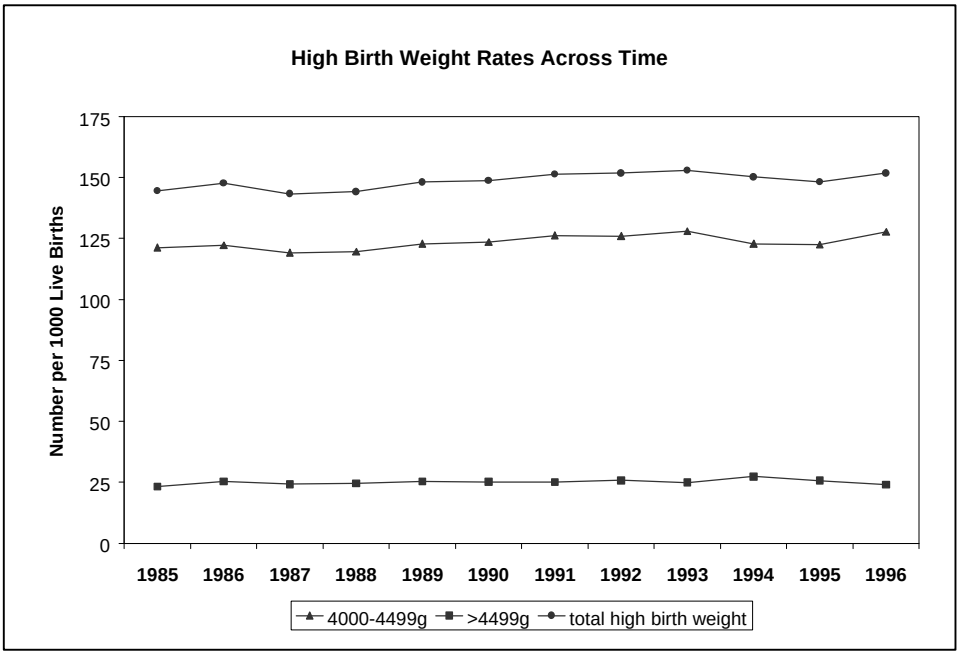
Low and High Birth Weight ***Figure 3.13***

Regional comparisons show that women living in Winnipeg have a greater proportion of low birth weight babies (about 5% of all live births) than women living in either the North Rural (4.6%) or South Rural (4.2%) regions of the province.



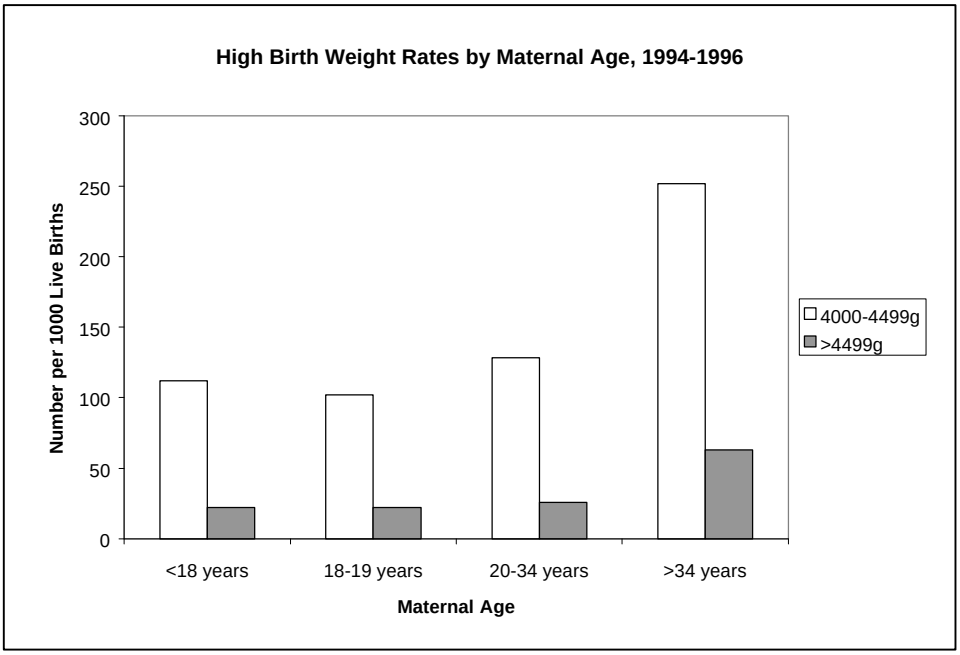
Low and High Birth Weight ***Figure 3.14***

About 15% of all live births in Manitoba in 1996 weighed 4000g or more. The data show a modest but consistent increase in the proportion of high birth weights across time.



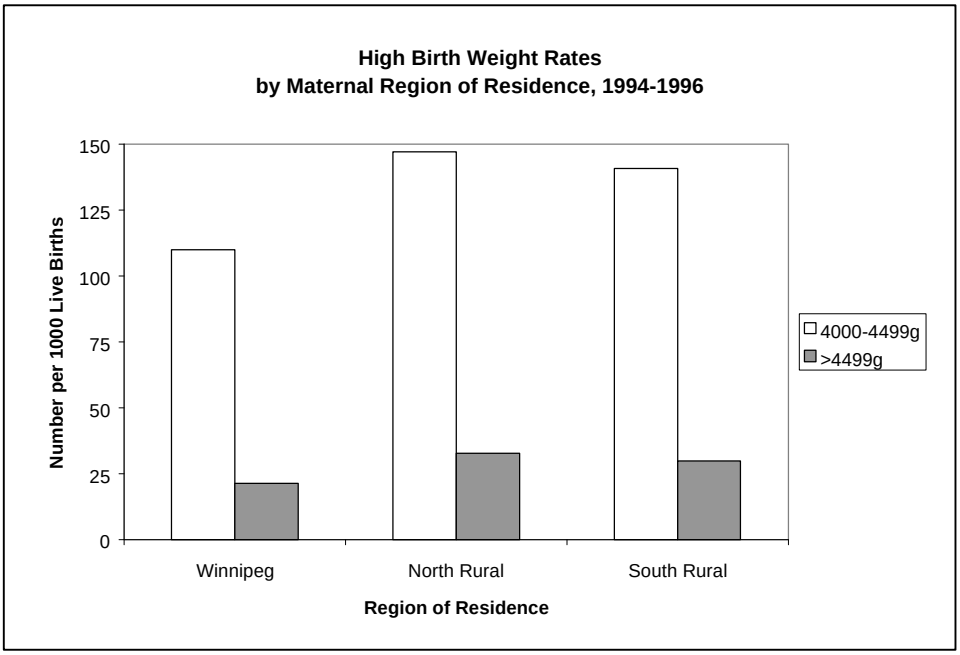
Low and High Birth Weight ***Figure 3.15***

Similar to the data for low birth weight, women older than 34 years are considerably more likely to have babies with a birth weight of 4000g or greater. About 4% of all babies born to women younger than 35 years of age weigh 4000g or greater, compared to about one-third of all babies born to women 35 years of age or older.



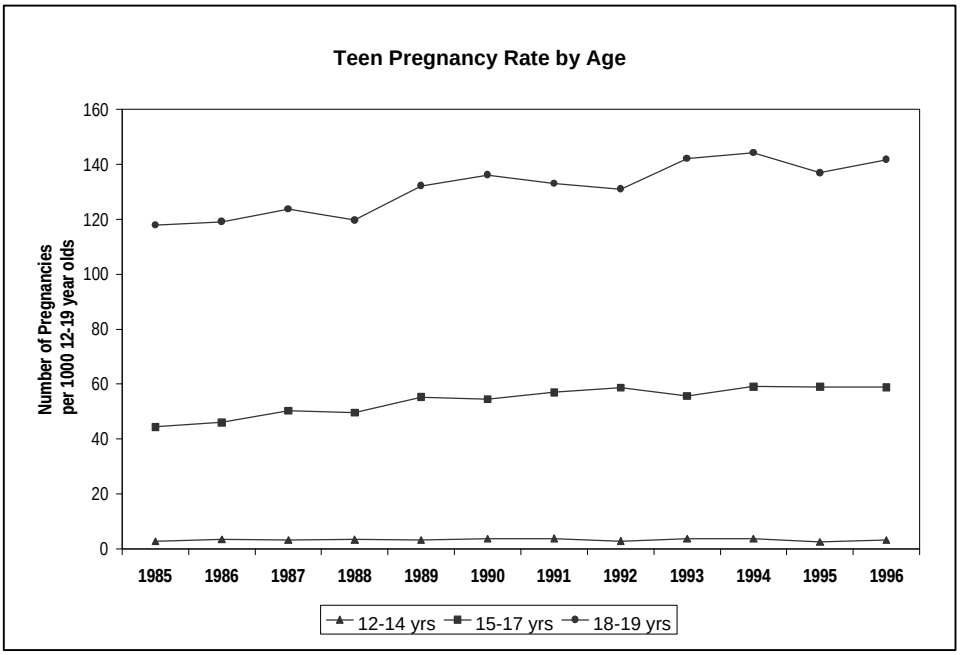
Low and High Birth Weight — *Figure 3.16*

In contrast to the regional dispersion of low birth weight babies, women living in Winnipeg have the lowest rate of high birth weight babies (about 13% of all live births) compared to women in both the North and South Rural areas, who have rates of approximately 18% and 16%, respectively.



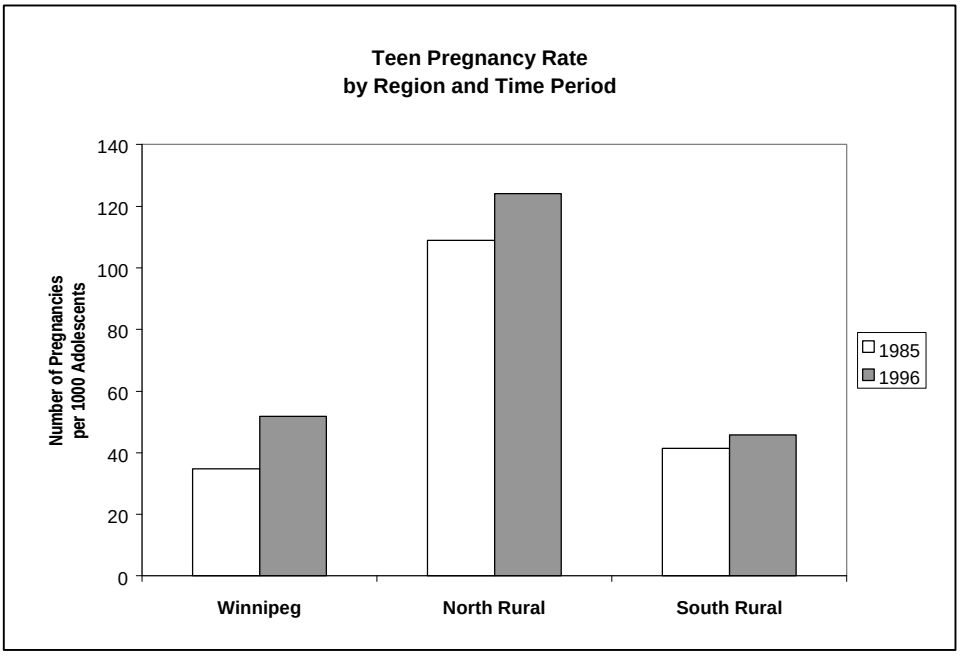
Teen Pregnancies — *Figure 3.17*

In 1996, 5.2% of Manitoba teenaged girls (12-19 years old) had a pregnancy. This is likely a conservative figure as pregnancies that end in an early spontaneous abortion or in an induced abortion performed at a private clinic may not be captured by our data systems. Furthermore, there is an upward trend in the pregnancy rate for both the 18-19 and 15-17 year age categories. Additionally, about half (46.1%) of the pregnant 18-19 year olds have already had a previous pregnancy.



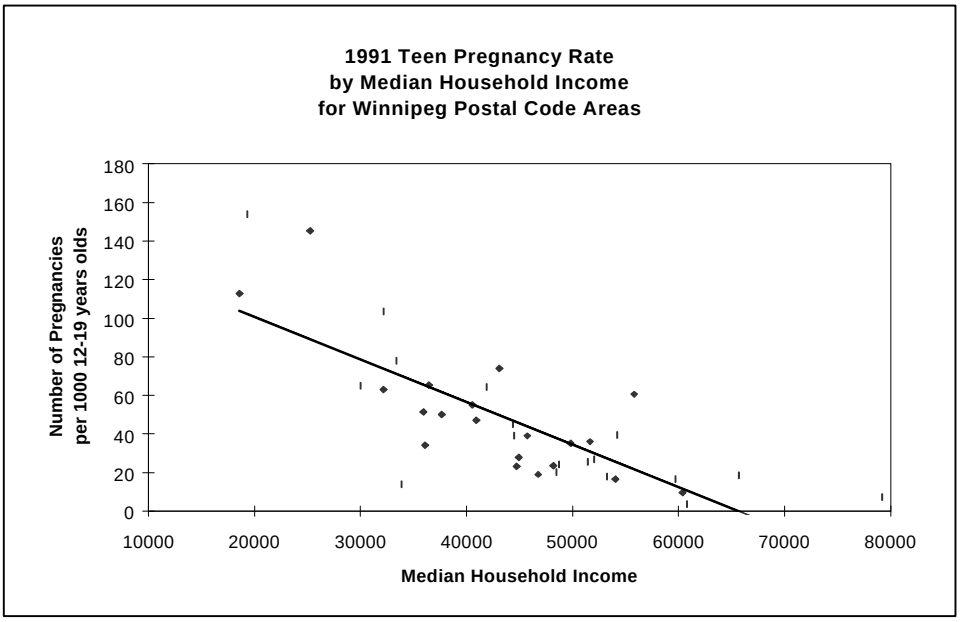
Teen Pregnancies ***Figure 3.18***

Time and regional comparisons show some important differences. The upward trend in the provincial teen pregnancy rate is evident mostly for the Winnipeg and North Rural regions; the South Rural region has remained stable at approximately 4.5%. While the overall teen pregnancy rate for 1996 for the province was about 5.2%, this rate is not evenly distributed across regions. While about 4.5% and 5% of adolescents in the South Rural and Winnipeg regions, respectively, reported a pregnancy in 1996, these rates are doubled for the North Rural region. To put it another way, the North Rural area of the province is home to about 12% of all teenage girls in Manitoba, yet it accounts for 25% of all teen pregnancies in the province.

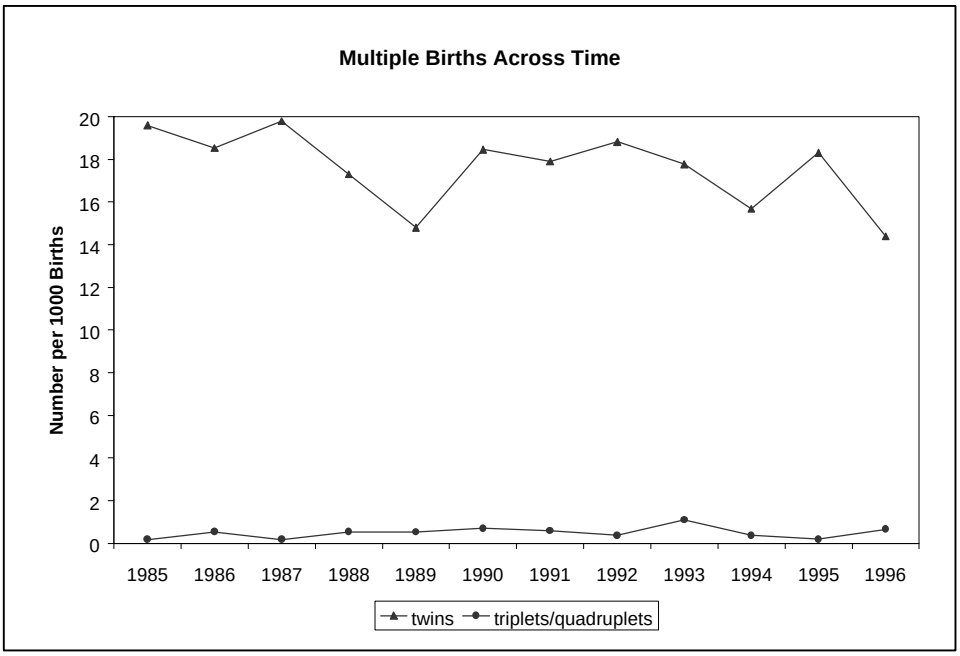


Teen Pregnancies ***Figure 3.19***

While many factors contribute to teen pregnancies, household income may be indicative of some of the social conditions common to many pregnant teenagers. In Winnipeg there is a strong (R^2 = .60) and significant (p<.0001) relationship between income and the teen pregnancy rate. While the overall rate for Winnipeg is about 4.5%, the rates are highest in areas with the lowest median household income and are lowest in areas with the highest incomes.



The multiple birth rate has declined somewhat over the past 12 years. In 1996 about 15 per 1000 births was a multiple birth, a decrease from 20 per 1000 in 1985. This decline is mostly accounted for by a decline in the number of twin births (from 19.6/1000 in 1985 to 14.4/1000 in 1996). The rate of triplet or quadruplet births has increased from 0.18 per 1000 births in 1985 to 0.66/1000 births in 1996.



DISCUSSION

Maternal health is a key component of the overall perinatal health of a population. Factors influencing maternal health include the presence of medical conditions, nutritional status, the adequacy of prenatal care and personal practices such as smoking, alcohol, and other drug use during pregnancy. Poor maternal health is reflected in high rates of preterm birth and low birth weight, with the high infant morbidity and mortality that accompanies these pregnancy outcomes. In Manitoba, in 1994 – 1996, approximately 3.9 of every 1,000 pregnancies that reach 28 weeks gestation result in fetal or infant death where the birth weight is less than 1,500 grams. This represents approximately 40% of the feto-infant mortality that occurs in pregnancies that reach 28 weeks gestation (see Chapter 2, Figure 2.2).

The data in this report show that there was little change in the incidence of low birth weight (<2500 grams) in Manitoba between 1985 and 1996. Furthermore, over that time period there was an increase in the rate of preterm birth rate from 6.6% to 7.5%. The largest increase in the rate of preterm birth has occurred in the South Rural area of the province. Over time, there has also been an increase in the rate of stillbirth at less than 28 weeks gestation. These findings indicate a need to better understand the determinants of preterm birth and low birth weight in Manitoba so that effective preventive strategies can be developed and implemented. In this regard, expanding the scope of information that is routinely collected and analyzed through perinatal surveillance to include maternal factors such as socioeconomic variables (e.g., income and education), smoking, alcohol, and other drug use during pregnancy and prenatal nutrition would be of great benefit.

In addition to low birth weight, maternal health can influence the rate of high birth weight deliveries. High birth weight can result in greater maternal and infant morbidity. Manitoba has a higher rate of high birth weight births (i.e. >4499 grams) than the rest of Canada and the rate of high birth weight deliveries has been gradually increasing. Factors that are likely to influence these trends such as the incidence of gestational diabetes should be further investigated.

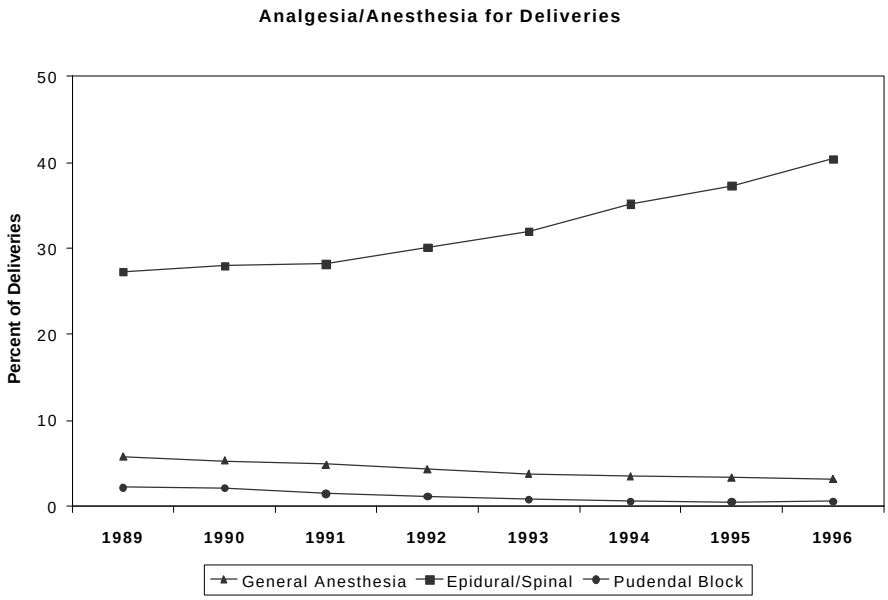
When assessing maternal health issues in Manitoba it is important to recognize the changing demographics of pregnant women. Between 1985-87 and 1994-96, there was an increase in the proportion of births to women at the lower and upper ends of the reproductive age span. The proportion of births to women aged 35 and older is increasing. Since the data show that older women in Manitoba have higher rates of ectopic pregnancy, molar pregnancy, and low and high birth weight births, this trend may have an important impact on the overall perinatal health. The pregnancy rate among teenagers (i.e. <20 years old) in Manitoba also increased steadily between 1985 and 1996. It is likely that many teen pregnancies are unplanned since close to 30% result in an induced abortion. The highest rates of teen pregnancy are found in the North Rural areas of the province. Strategies to address the issue of teen pregnancy must recognize the underlying determinants of health such as socioeconomic status. For example, the data show that in Winnipeg, the rate of teen pregnancy is highly correlated with area of residence, with poorer areas of the city having the highest teenage pregnancy rates.

Chapter Four

Maternal Care

Analgesia/Anesthesia ***Figure 4.1***

Rates of analgesia/ anesthesia for deliveries have risen considerably, from about 35% in 1989 to about 44% in 1996. The increase is entirely due to an increase in epidurals/spinals, with the rates of both general anesthesia and pudendal block slightly decreasing.



Analgesia/Anesthesia ***Figure 4.2***

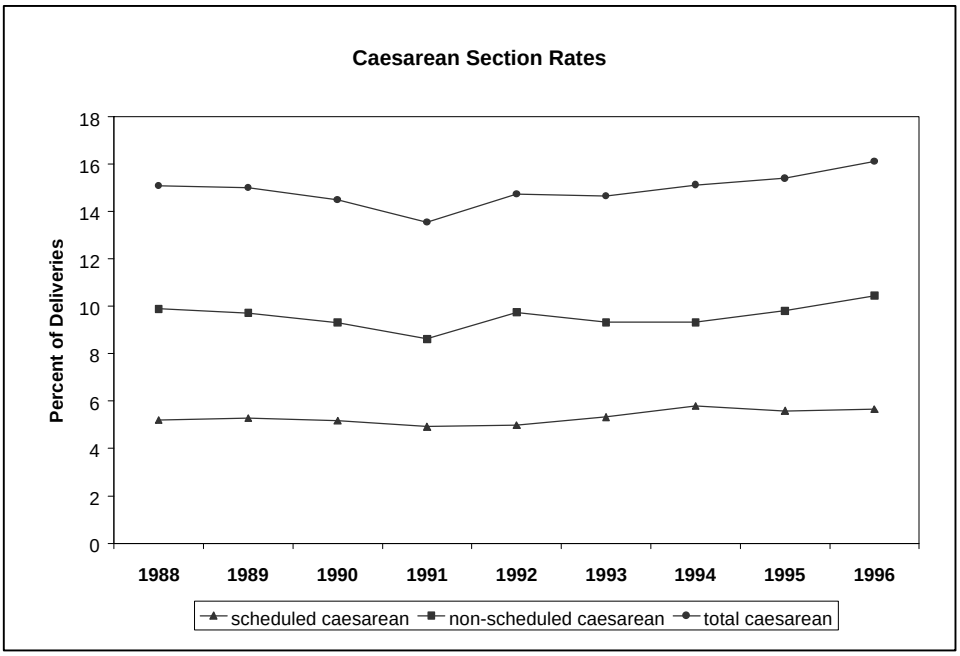
While the rates of epidurals/spinals in the province's largest hospitals are by far the highest, the greatest increase in the proportion of epidurals/spinals for deliveries is for hospitals with less than 3000 deliveries per year. Specifically, in 1989 the percent of deliveries with an epidural/spinal was 13.3% for hospitals with 1000-2999 deliveries per year and 4.3% for hospitals with 25-99 annual deliveries. In 1996, the epidural/spinal rate for hospitals with 1000-2999 deliveries per year had increased to 35.9%, and hospitals with 25-99 deliveries annually had increased to 20.2%. Rates of general anaesthesia and pudendal block during labour have decreased in all hospitals except those with less than 25 deliveries per year.

Analgesia/Anesthesia for Deliveries by Number of Deliveries per Hospital, 1989 and 1996

Number of Deliveries per Hospital	Epidural/ Spinal		General Anesthesia		Pudendal Block		Total Analgesia/ Anesthesia	
	1989	1996	1989	1996	1989	1996	1989	1996
	% of deliveries	% of deliveries	% of deliveries	% of deliveries	% of deliveries	% of deliveries	% of deliveries	% of deliveries
>3000	41.6	52.8	3.2	2.1	0.8	0.2	45.6	55.1
1000-2999	13.3	35.9	8.2	2.4	2.2	0.5	23.7	38.8
500-999	26.2	35.6	4.0	1.2	2.0	1.0	32.2	37.8
100-499	8.3	12.8	9.2	6.0	8.7	0.8	26.2	19.5
25-99	4.3	20.2	13.2	12.4	0.3	1.1	17.9	33.7
<25	0.0	0.0	4.6	1.2	18.5	25.9	23.1	27.1
Total	27.3	40.4	5.8	3.2	2.2	0.6	35.3	44.2

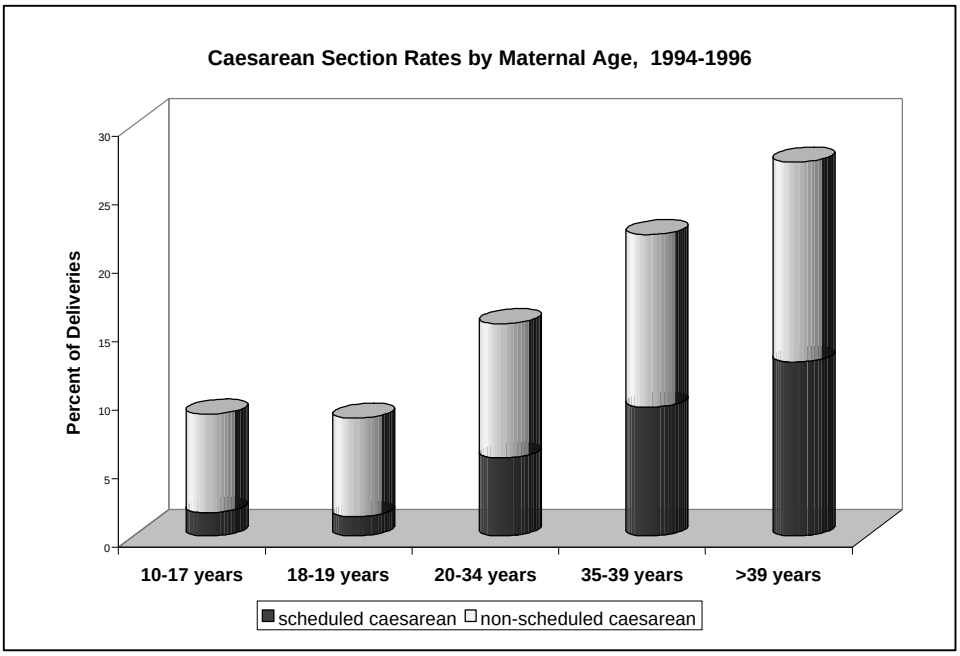
Caesarean Deliveries ***Figure 4.3***

The percent of births that were delivered by caesarean section has remained at about 15% of all deliveries between 1985 and 1996, with the last few years showing a slow but steady increase (from 15.1% in 1988 to 16.1% in 1996). This increase is mostly accounted for by an upward trend in non-scheduled caesarean deliveries.



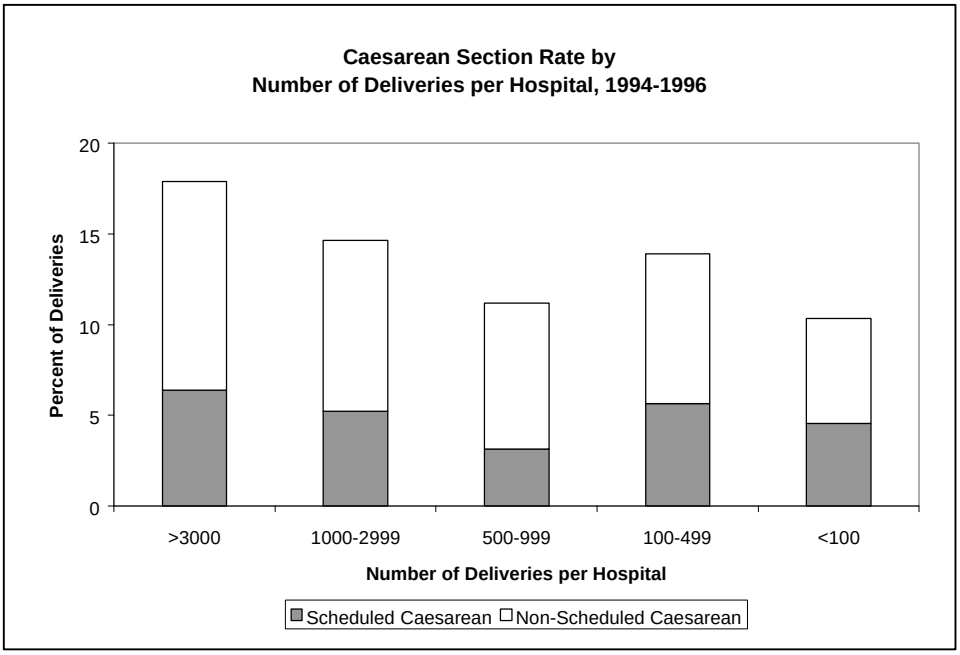
Caesarean Deliveries ***Figure 4.4***

The proportion of births which are delivered by caesarean section steadily increases with age, such that while 10% of babies born to teenaged mothers are delivered by caesarean section, almost one in four deliveries in mothers 35 years and older are delivered by caesarean section.



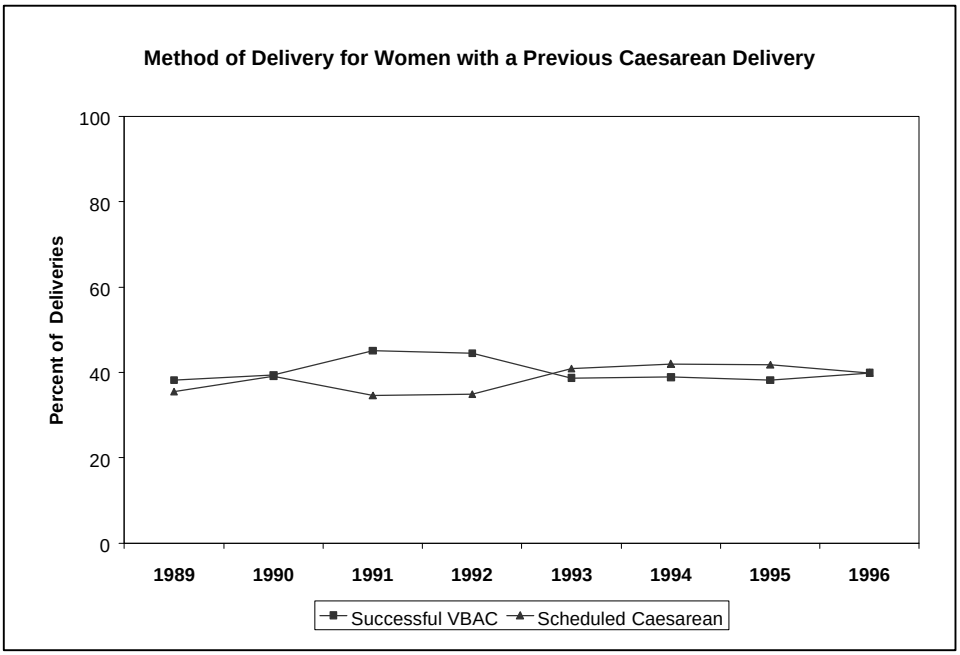
Caesarean Deliveries ***Figure 4.5***

The proportion of babies delivered through caesarean section varies greatly by health care facility. Generally, hospitals that perform fewer deliveries per year also perform a lower proportion of caesarean sections. The exception however is facilities that perform between 100 and 499 deliveries annually. About 15% of births at these hospitals are caesarean deliveries – a rate comparable to the larger hospitals (i.e., hospitals with more than 1000 deliveries per year).



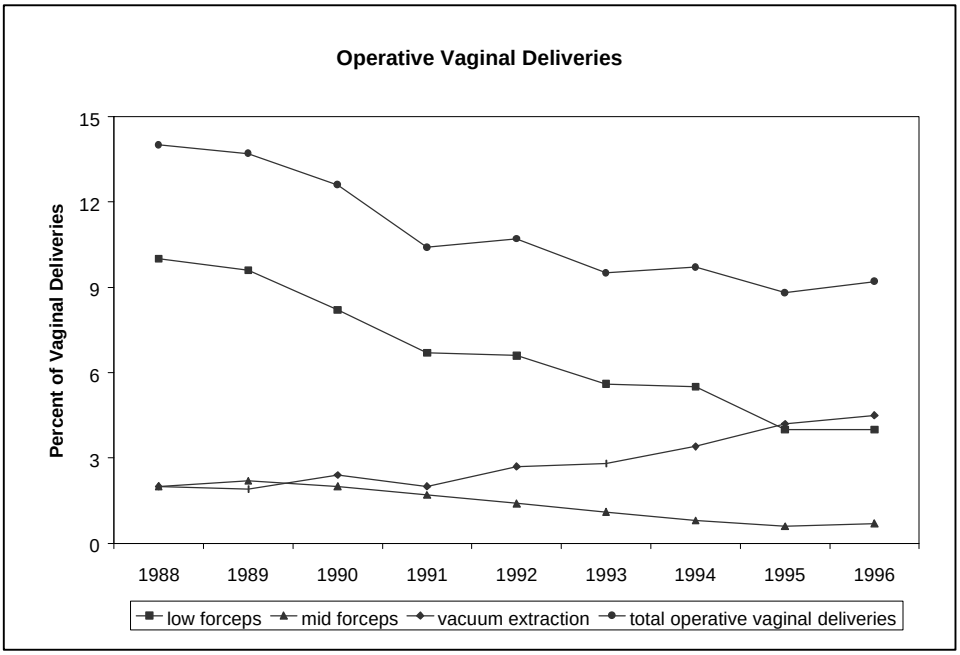
Caesarean Deliveries ***Figure 4.6***

One determinant of the overall caesarean section rate is the practice of vaginal birth after a previous caesarean delivery (VBAC). Among women for whom the entire obstetrical record was available and who had a previous caesarean delivery, approximately 40% of subsequent deliveries were vaginal (VBAC) and 40% were scheduled caesarean deliveries. The rate of VBAC among these women changed little between 1989 and 1996.



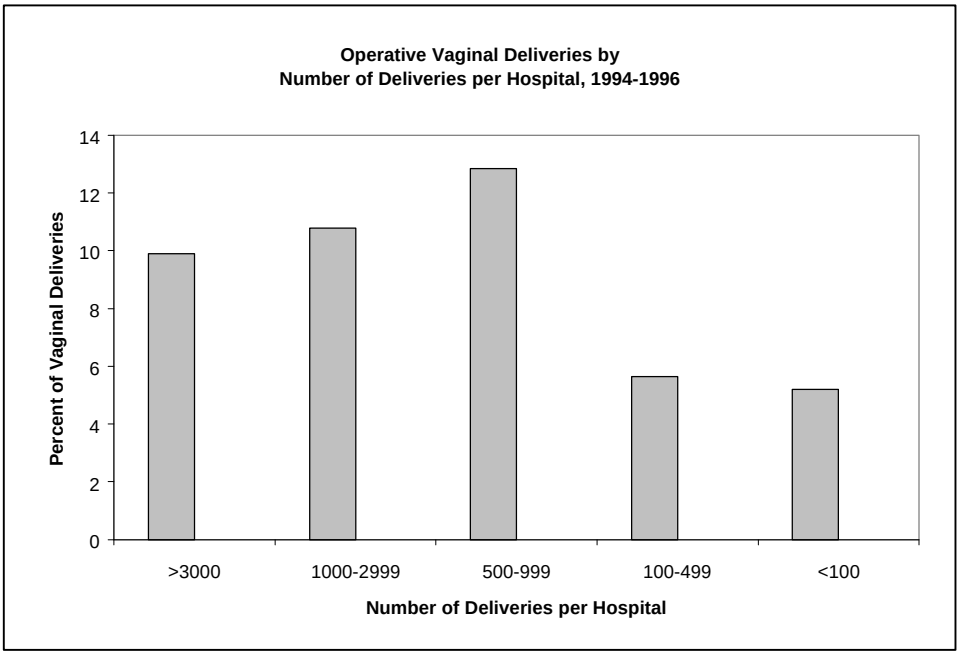
Operative Deliveries ***Figure 4.7***

About 85% of all deliveries in Manitoba are vaginal. The proportion of vaginal deliveries in which forceps were used declined from 12% in 1988 to 4.7% in 1996. In contrast, there was an increase in the proportion of vaginal deliveries in which vacuum extraction was used, from 2% in 1988 to 4.5% in 1996. Overall, the proportion of vaginal deliveries assisted by either forceps or vacuum extraction declined from 14% in 1988 to 9.2% in 1996.



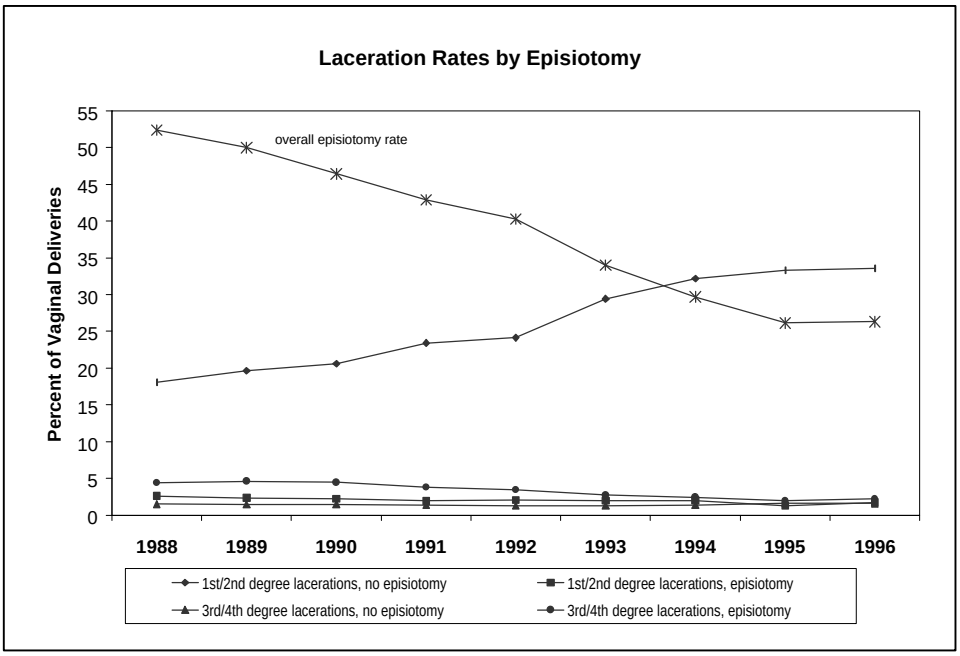
Operative Deliveries ***Figure 4.8***

The proportion of vaginal deliveries assisted by either forceps or vacuum extraction differs by hospital according to the number of deliveries performed annually. Hospitals with 500-999 deliveries per year have the highest operative vaginal delivery rate (12.8%), while hospitals with less than 100 deliveries per year have the lowest rate (5.2%).



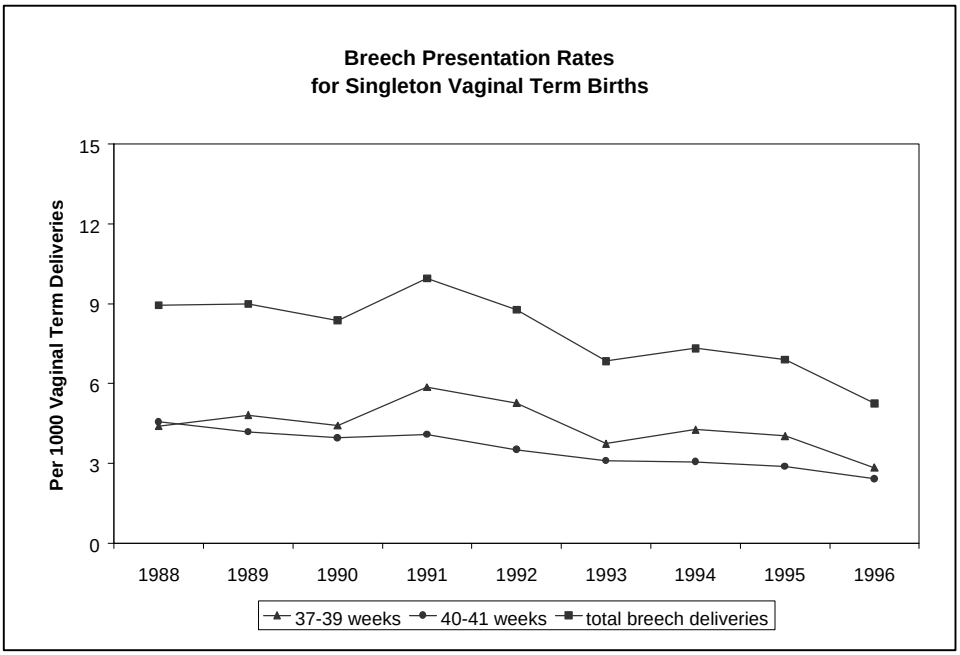
Episiotomies and Lacerations — *Figure 4.9*

The episiotomy rate has shown a substantial decrease from 53% in 1988 to 27% in 1996. Although this change in obstetrical practice has been accompanied by an increase in the rate of first and second degree lacerations, there has been no increase in the rate of third and fourth degree lacerations. In fact, the overall rate of third and fourth degree lacerations declined from 5.9% of vaginal deliveries in 1988 to 3.8% in 1996.



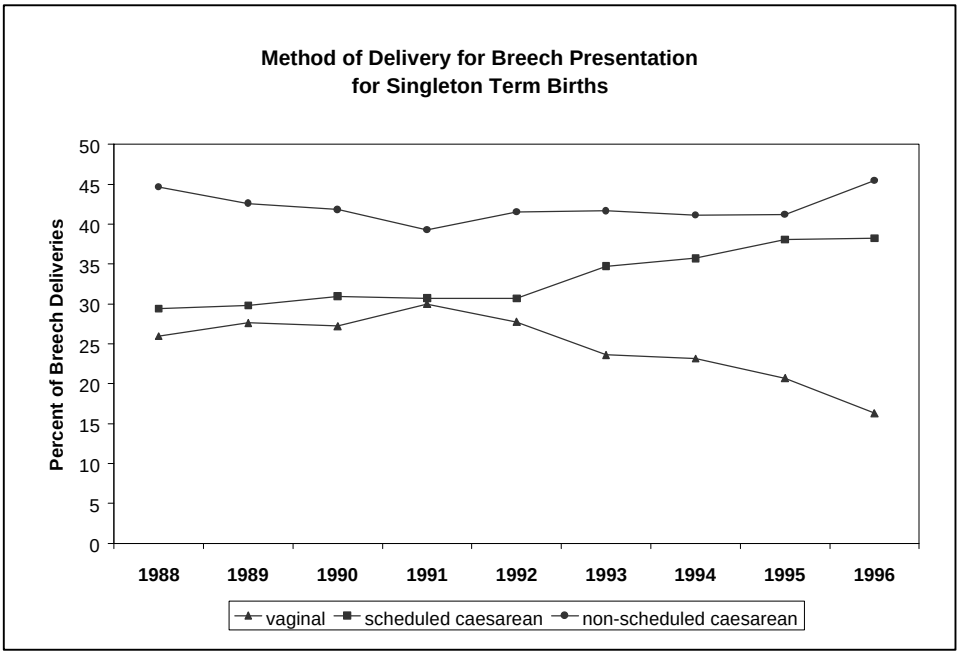
Breech Deliveries — *Figure 4.10*

The breech presentation rate for vaginal term births has been on a steady decline, both for babies born at 37-39 weeks and at 40-41 weeks gestation.



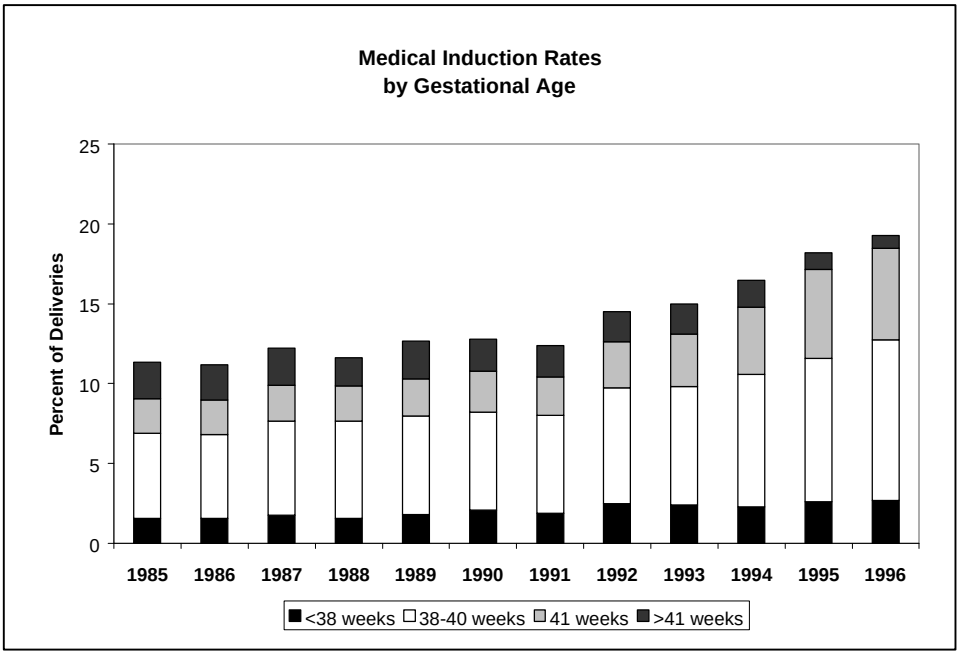
Breech Deliveries — *Figure 4.11*

For babies presenting breech there is a recent trend toward opting for a caesarean as opposed to a vaginal delivery. The proportion of singleton births with a breech presentation that were delivered vaginally versus by scheduled caesarean was about equivalent, at 27%, until 1991. Since 1991, the vaginal breech delivery rate has been steadily dropping, such that by 1996 it was down to about 17% of all breech deliveries. An equivalent and opposite trend has occurred for scheduled caesarean deliveries, such that the 1996 rate was up to 40%. The non-scheduled caesarean rate has remained stable, with an increase in 1996.



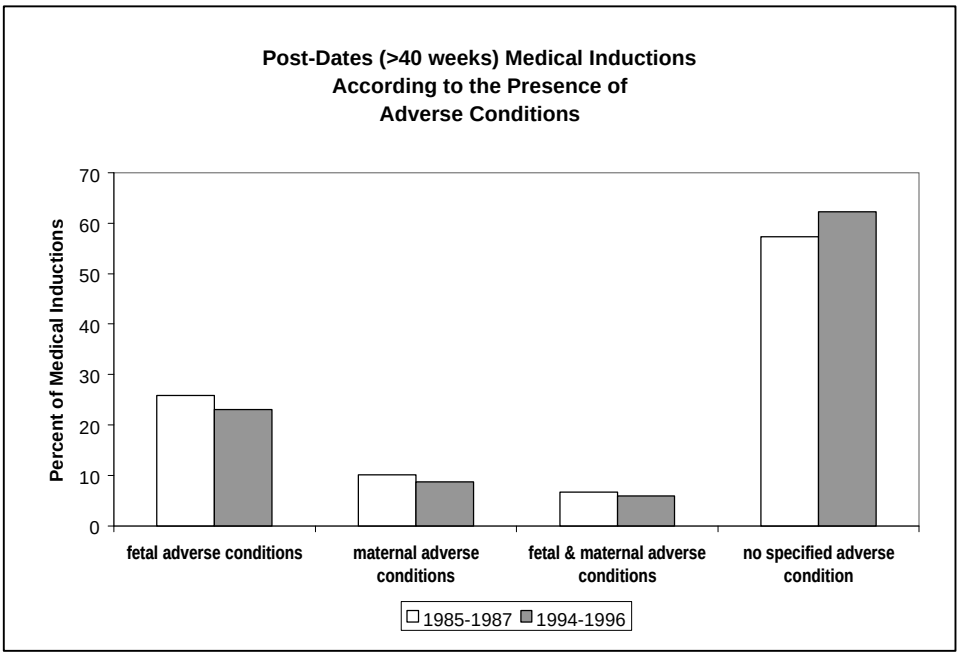
Medical Inductions — *Figure 4.12*

Although the medical induction rate shows some fluctuation over time, it has generally been increasing, such that the rate has almost doubled from 11.3% in 1985 to 19.3% in 1996. The greatest increase has been for the 38-40 week and 41 week gestation periods. Only the gestation period greater than 41 weeks has shown a decrease, although this decrease is likely due to the increase in earlier inductions.



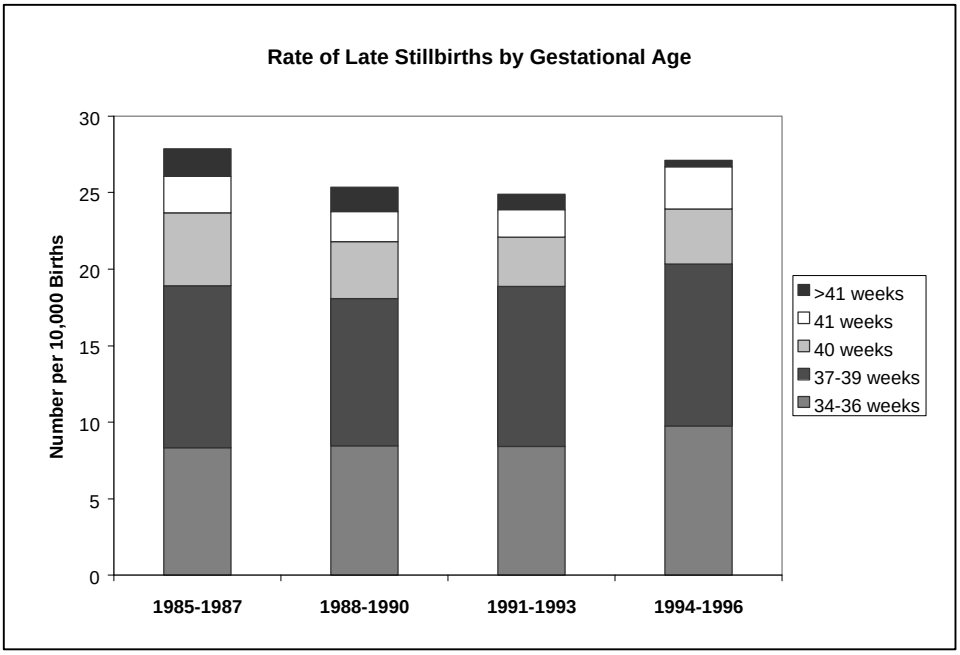
Medical Inductions — *Figure 4.13*

About one-third of post-date deliveries (i.e., >40 weeks) that are medically induced are associated with a recorded adverse condition. Most of these adverse conditions are related to the fetus, specifically malposition and malpresentation, obstructed labour, and other fetal and placental problems. Other conditions related to a post-dates induction include hypertension, other maternal conditions affecting the fetus, and placenta previa/hypertension.



Late Stillbirths — *Figure 4.14*

Following a decline in the late 1980s, the rate of late stillbirths (occurring at 34 weeks gestation or greater) increased between 1991-1993 and 1994-1996. Much of this increase was during the 34-36 week and 41 week gestational periods with a decline in the rate of stillbirths at greater than 41 weeks.



DISCUSSION

The availability and quality of maternal care for labour and delivery is another important component of perinatal health. The quality of maternal care is highly dependent on the availability of well-trained health care personnel and on adequate education and preparation of pregnant women for labour and delivery. One indicator that reflects, in part, the quality of maternal care is the rate of late stillbirths (i.e. where the weight has reached at least 1,500 grams). In Manitoba, in 1994-1996, late stillbirths were responsible for approximately 2.3 deaths per 1,000 pregnancies that reached at least 28 weeks gestation. This represents approximately 23% of the feto-infant mortality that occurs after 28 weeks gestation (see Chapter 2, Figure 2.2). Since 1985, there has been little decline in the rate of late stillbirths in Manitoba. The extent to which maternal care is responsible for the rate of late stillbirths is not fully known and this assessment is hampered by a decline in the autopsy rate for stillbirths. This has led to a recommendation by the College of Physicians and Surgeons of Manitoba to increase the number of autopsies to better understand the causes of stillbirths and to develop strategies to reduce the stillbirth rate.

There have been notable changes in various aspects of obstetrical care in the past decade. The rate of operative vaginal deliveries has declined substantially. In particular, there has been a decline in forceps-assisted deliveries. This decline in the rate of operative vaginal deliveries may have been influenced by a more liberal approach to the duration of the second stage of labour. The rate of episiotomy has also declined dramatically without an increase in the rate of 3rd and 4th degree tears. Another important trend is the rising rate of the use of epidural/spinal analgesia/anesthesia for deliveries which is now widespread in the province and is the predominant method of anesthesia/analgesia. To better characterize these trends and to assess training needs, the collection of data to distinguish epidural from spinal methods is recommended.

The rate of caesarean section delivery in Manitoba has changed little in the past decade. After a decline in the late 1980s, there has been a modest increase in the caesarean section rate in the past several years. Interpretation of this trend is hampered by a lack of specific data regarding the reasons for caesarean section. An important determinant of the overall caesarean section rate is the practice of vaginal birth after caesarean delivery (VBAC). Since it appears that there has been little change in the VBAC rate in recent years, continued efforts to support this practice are recommended. Furthermore, the collection of more specific data with regard to trial of labour among women with previous caesarean delivery would help to interpret VBAC rates and to identify opportunities for improvement.

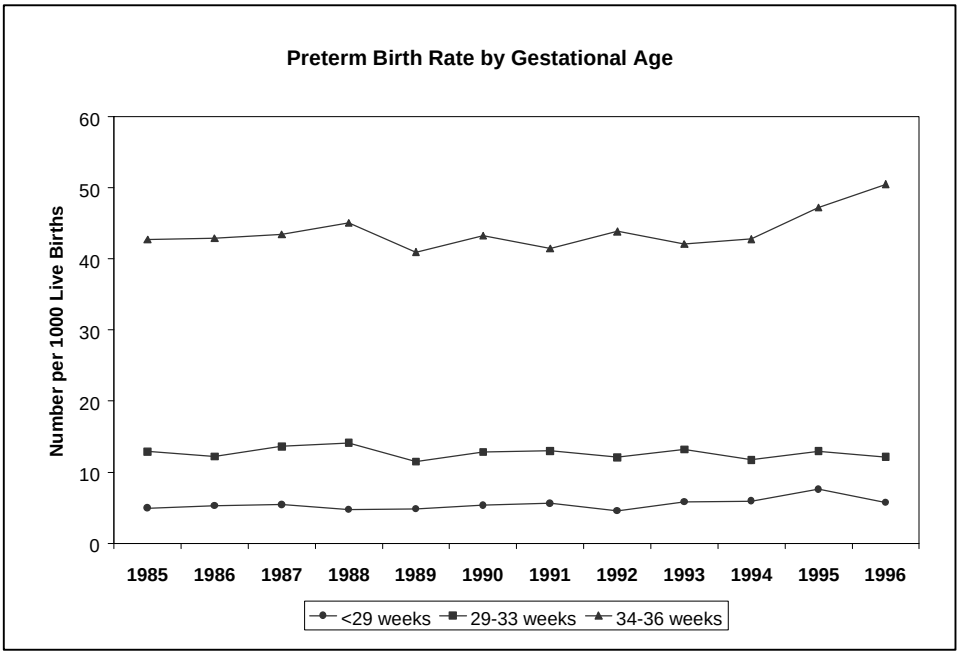
The rate of medical inductions doubled between 1985 and 1996. Part of this trend is attributable to an increase in inductions at greater than 40 weeks gestation. There has also been a rise in the rate of medical inductions performed between 38 and 40 weeks gestation. More detailed investigation is required to determine other reasons for this trend.

Chapter Five

Newborn Care

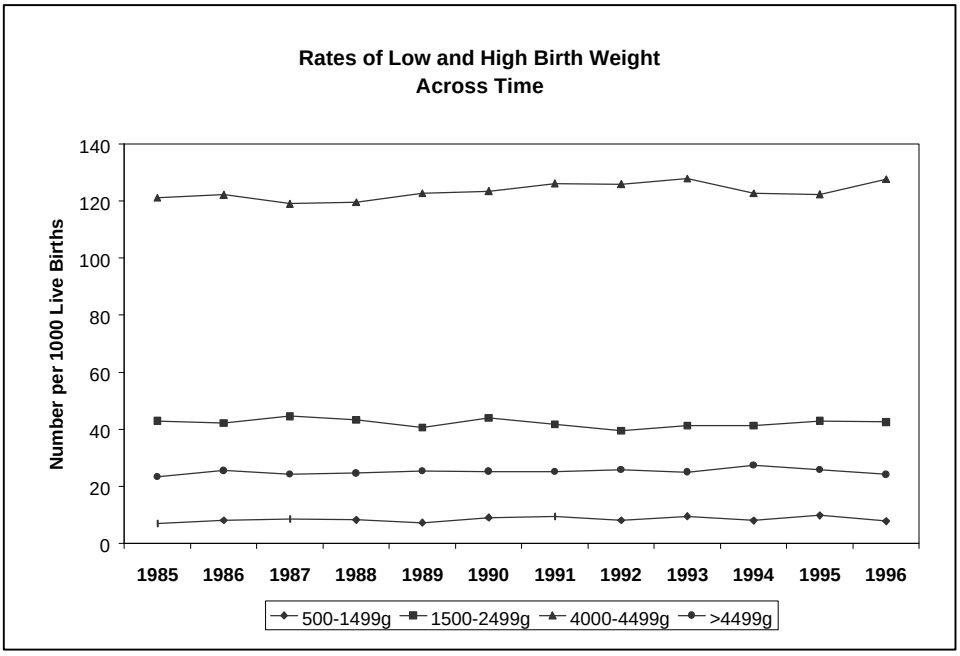
Gestational Age Distribution — *Figure 5.1*

The overall rate of preterm births (i.e., births prior to 37 weeks gestation) has increased over the last couple of years, representing between 6.5% - 7% of all live births. This increase is apparent only for the 34-36 week gestational period.



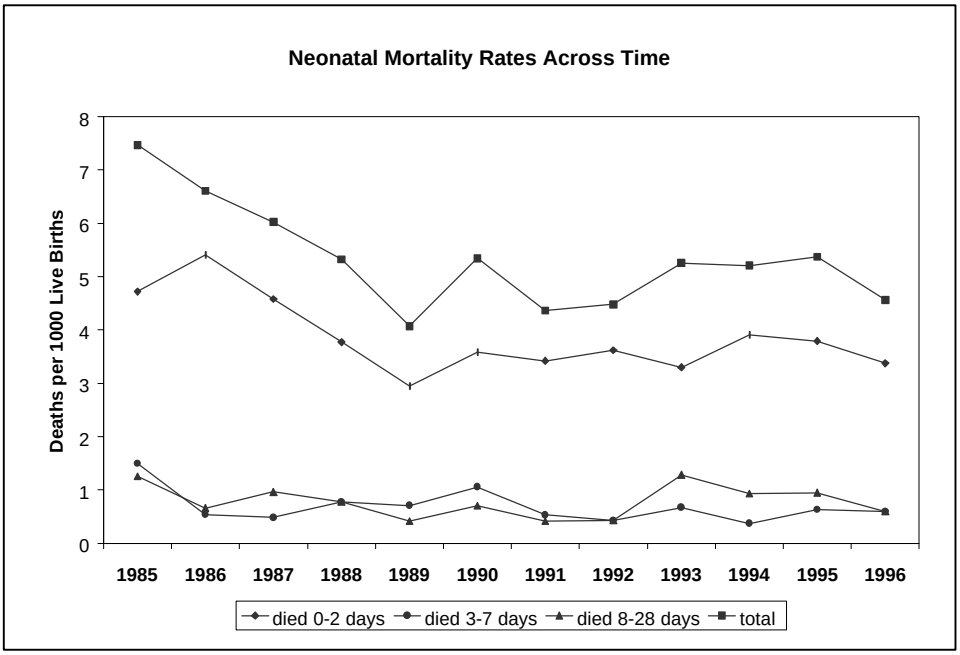
Birth Weight Distribution — *Figure 5.2*

Over time, there has been a gradual change in births greater than 4000g. About 15% of all live births are 4000g or more, and about 5% are less than 2500g.



Neonatal Mortality ***Figure 5.3***

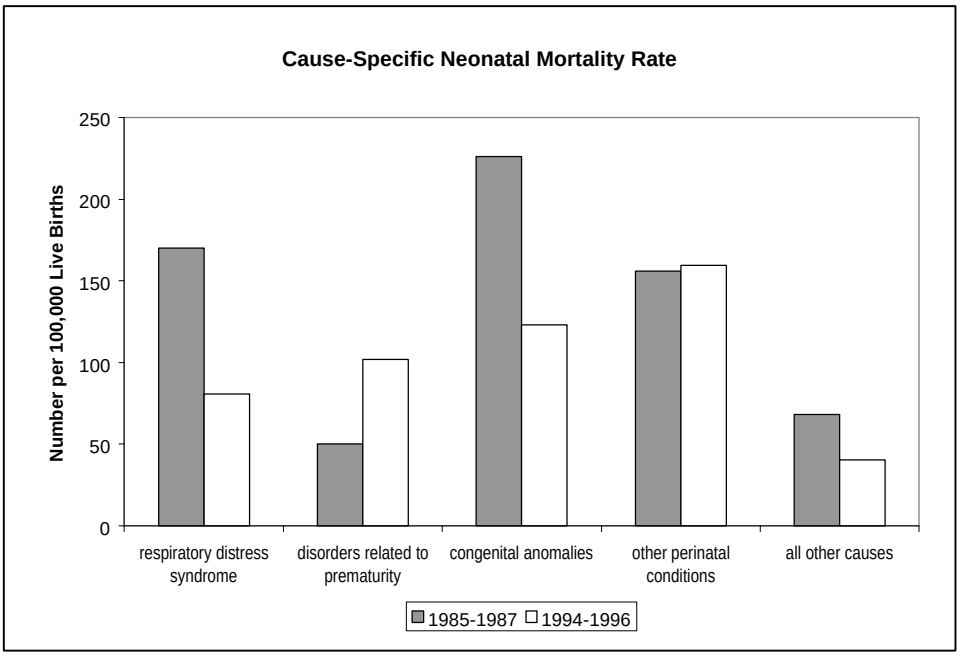
The majority of deaths occurred within the first 28 days of life. The overall neonatal mortality rate has been declining over the last 10 years, and shows some signs of levelling off at about 4.6 deaths/1,000 live births.



Neonatal Mortality ***Figure 5.4***

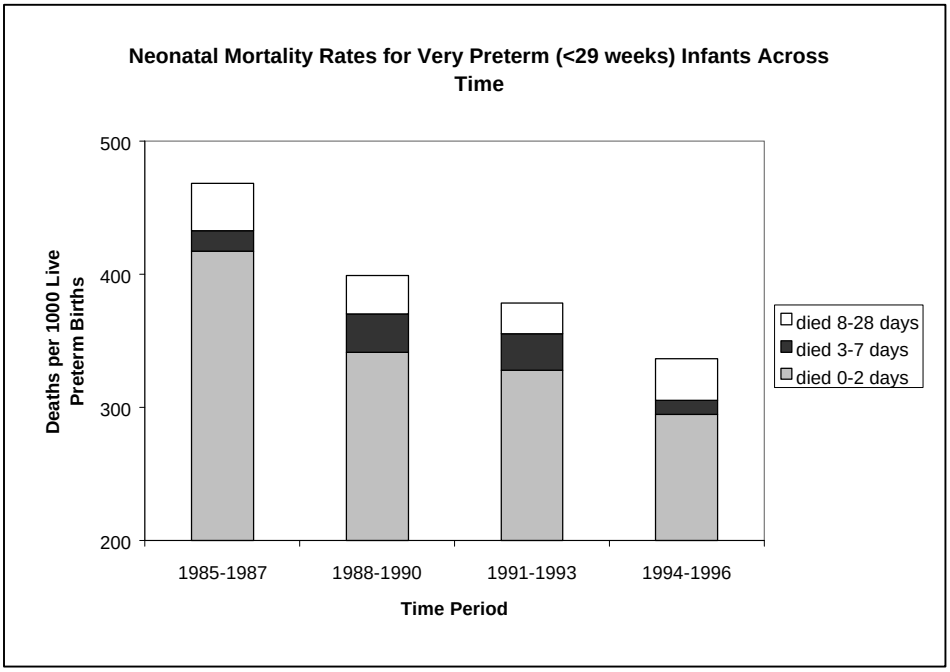
The main causes of death among neonates are respiratory distress syndrome, disorders related to prematurity, congenital anomalies, and other specific perinatal conditions. The overall decline in the neonatal mortality rate is driven by a substantial decline in deaths due to congenital anomalies, the main cause of neonatal death, and respiratory distress syndrome.

Neonatal mortality due to disorders related to prematurity have been on the increase over time, from 50.0 deaths/100,000 neonates in 1985-1987 to 133.8 deaths/100,000 neonates in 1994-1996.



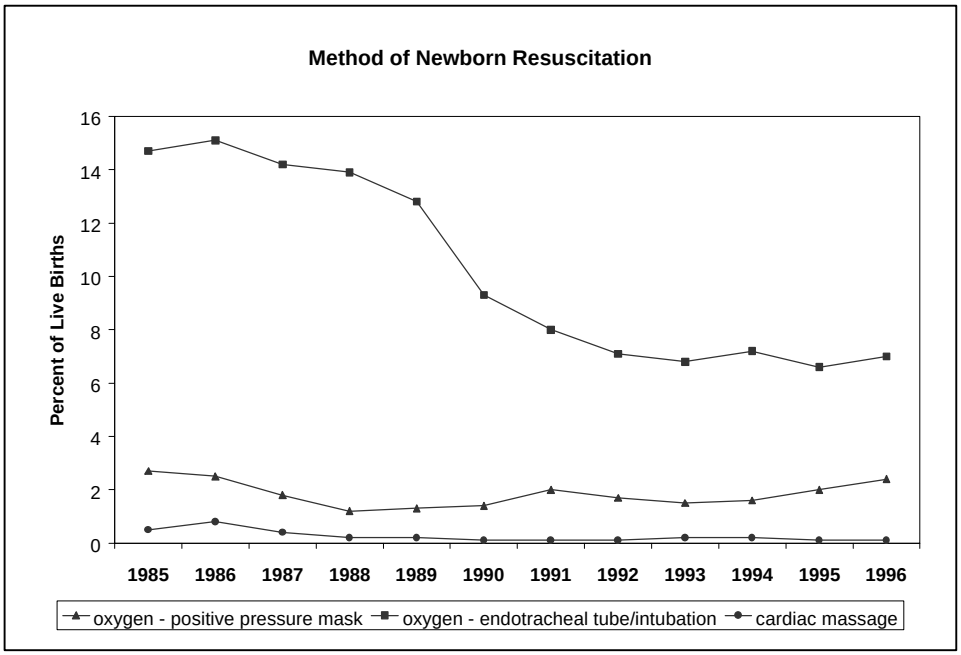
Neonatal Mortality — *Figure 5.5*

Infants born prematurely have a significantly higher mortality rate than infants born at term. Between 1994 and 1996, more than one-third of babies born at less than 29 weeks gestation died, most within the first 2 days of life. By 29-32 weeks, this figure drops to less than 5%. The neonatal mortality rate for these very preterm infants declined substantially between 1985-1987 and 1994-1996. This improvement is seen for babies born prior to 27 weeks (60% mortality in 1985-1987, 42% mortality in 1994-1996) as well as for those born between 27 and 28 weeks of gestation (12% mortality in 1985-1987, 5% mortality in 1994-1996).



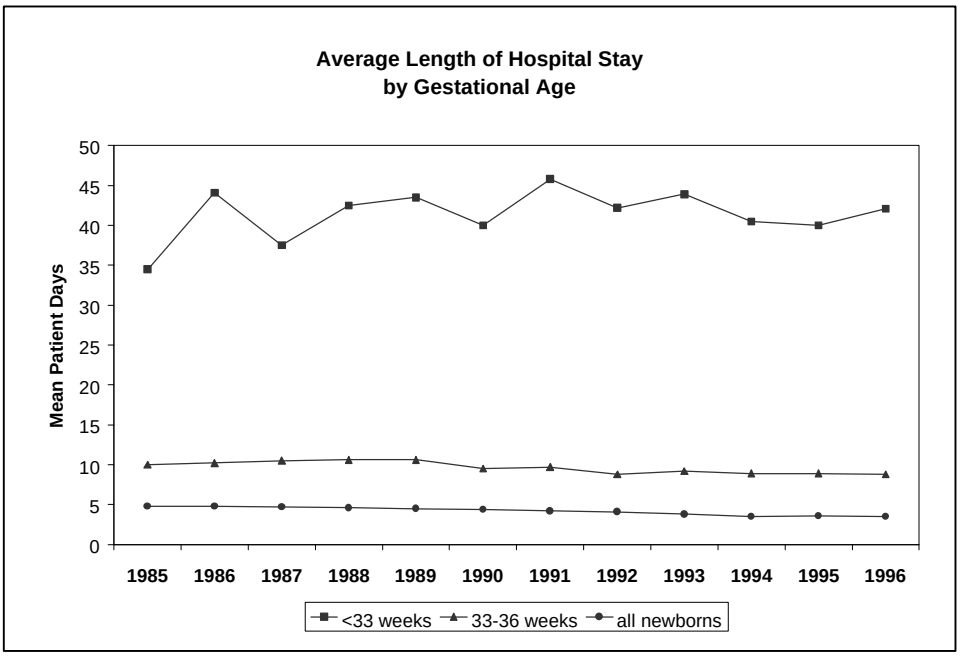
Newborn Resuscitation — *Figure 5.6*

The rate of application of newborn resuscitation efforts declined substantially between 1985 and 1996. This decline was due to a decline in endotracheal intubation beginning in the late 1980s which corresponds with a policy change of reduced use of intubation for meconium aspiration. There has been little change over time in the rate of application of oxygen by positive pressure mask and cardiac massage.



Patient Days ***Figure 5.7***

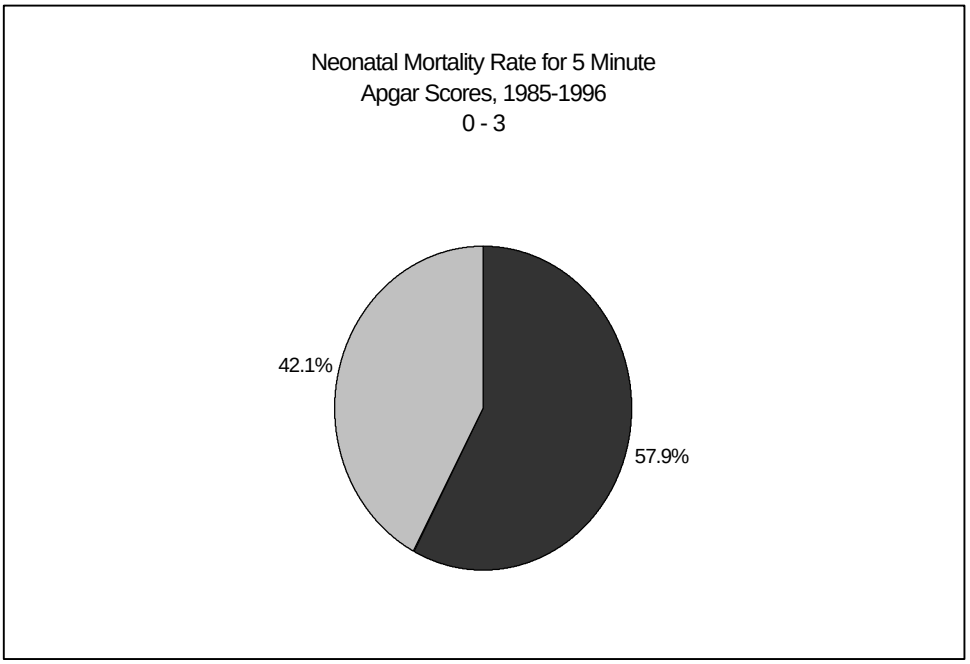
The average length of time spent in hospital by newborns is approximately 4 days, with a small but consistent decline across time. This stability is true both for infants born at 33-36 weeks and infants born at less than 33 weeks gestation. Infants born prematurely have substantially higher average lengths of stay. The average length of stay for infants born at <33 weeks gestation is more than 40 days.

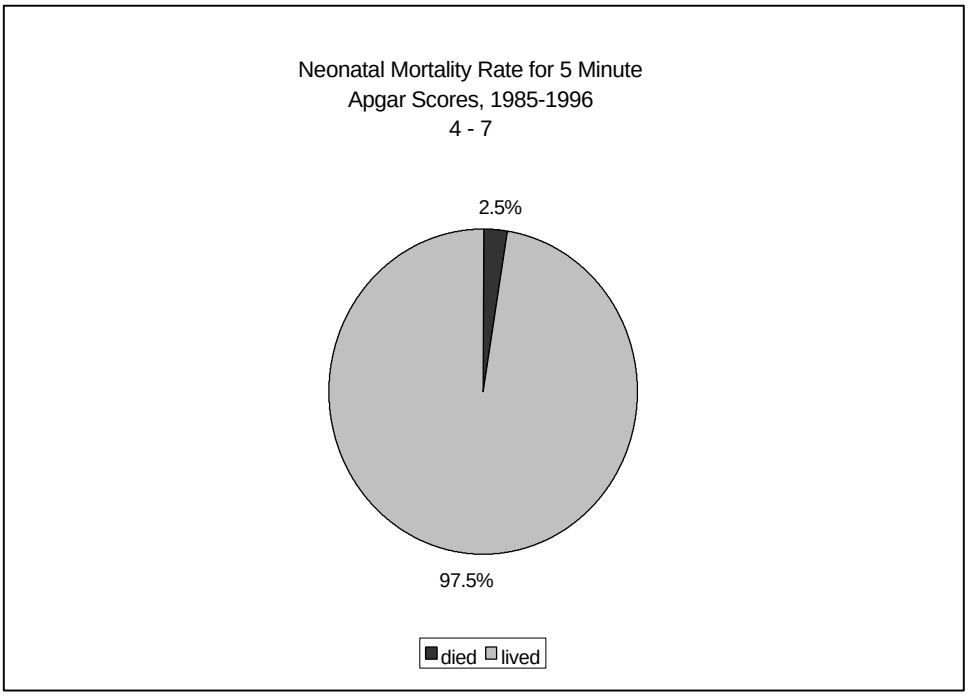


Apgar Scores ***Figure 5.8***

The graphic depicting outcomes associated with apgar scores indicates that babies with low apgars have a much poorer chance of survival than their counterparts with high apgars. Indeed, more than half of the babies with an apgar score of 3 or less at 5 minutes died, most within the first 2 days of life. The chance of survival increases dramatically for babies with a 5-minute apgar of greater than 3 (almost 100% survival).

One indication of the success of resuscitation efforts on newborns is the proportion with low 1 minute apgar scores (0-7) who have higher 5 minute apgars (8-10). About 86% of all newborns with low 1 minute apgars have 5 minute apgar scores in the 8-10 range. This figure has remained stable across time (data not shown).





DISCUSSION

High quality newborn care is an important contributor to perinatal health; particularly for preterm and low birth weight infants. One indicator of newborn care is the neonatal mortality rate; particularly early (i.e. 0 to 7 days) neonatal mortality rates for intermediate birth weight infants (i.e. 1500g to 2499g), and total (i.e. <29 days) neonatal mortality rates for normal birth weight infants (i.e. >2499g) (see Chapter 2, Figure 2.1). Neonatal deaths in these categories contribute approximately 14% (1.36 per 1,000) of the total feto-infant mortality in pregnancies reaching at least 28 weeks gestation (see Chapter 2, Figure 2.2). This mortality rate declined by approximately 43% between 1985-87 and 1994-96. Reduced neonatal mortality rates were observed for all gestational age groupings but were particularly impressive for infants born at less than 29 weeks gestation.

Much of the decline in neonatal mortality rate was due to a decline in mortality caused by respiratory distress syndrome and congenital anomalies. The decline in neonatal mortality from respiratory distress syndrome likely reflects improvements in overall neonatal care and the addition of new therapeutic options. The decline in neonatal mortality due to congenital anomalies may also reflect improved neonatal care, but increased antenatal detection of lethal congenital anomalies is another plausible explanation.

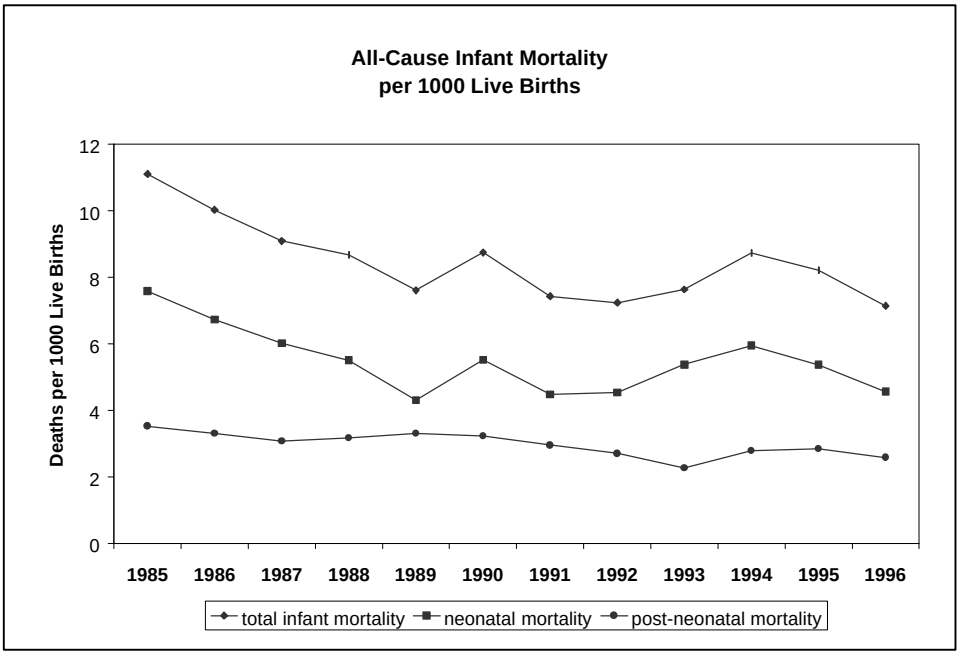
The decline in neonatal mortality among premature infants has important implications for the health care system. Infants born preterm require substantially more health care resources than term infants. The average length of hospital stay for an infant born prior to 33 weeks gestation is more than 40 days. Much of this in-hospital care is highly specialized and requires extensive resources. Furthermore, infants born preterm are more likely to require long-term support for their medical and developmental needs. Therefore, in addition to the provision of high quality neonatal care and longer term support services, attention should be focused on determining the causes of preterm birth and developing effective prevention strategies.

Chapter Six

Infant Care

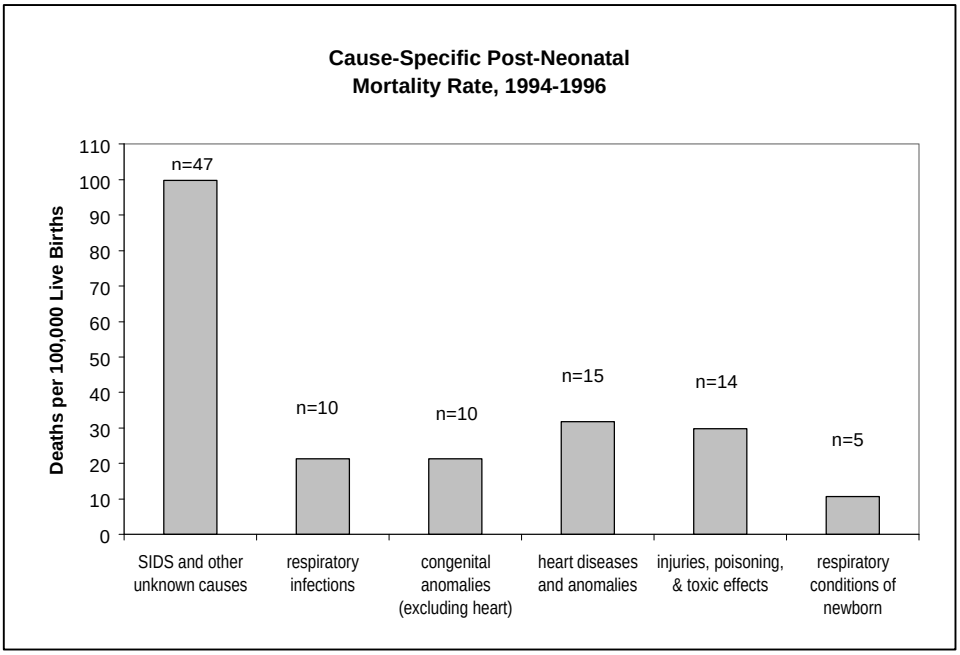
Post-Neonatal Mortality ***Figure 6.1***

In Manitoba, the overall infant mortality rate has declined over the past 12 years from 11.1/1000 in 1985 to 7.1/1000 in 1996. Most of this decline is due to a decline in the neonatal mortality rate (from 7.6/1000 in 1985 to 4.6/1000 in 1996). The post-neonatal mortality rate has seen only a modest decline, from 3.5/1000 in 1985 to 2.6/1000 in 1996. In Manitoba there are approximately 45 post-neonatal deaths per year.



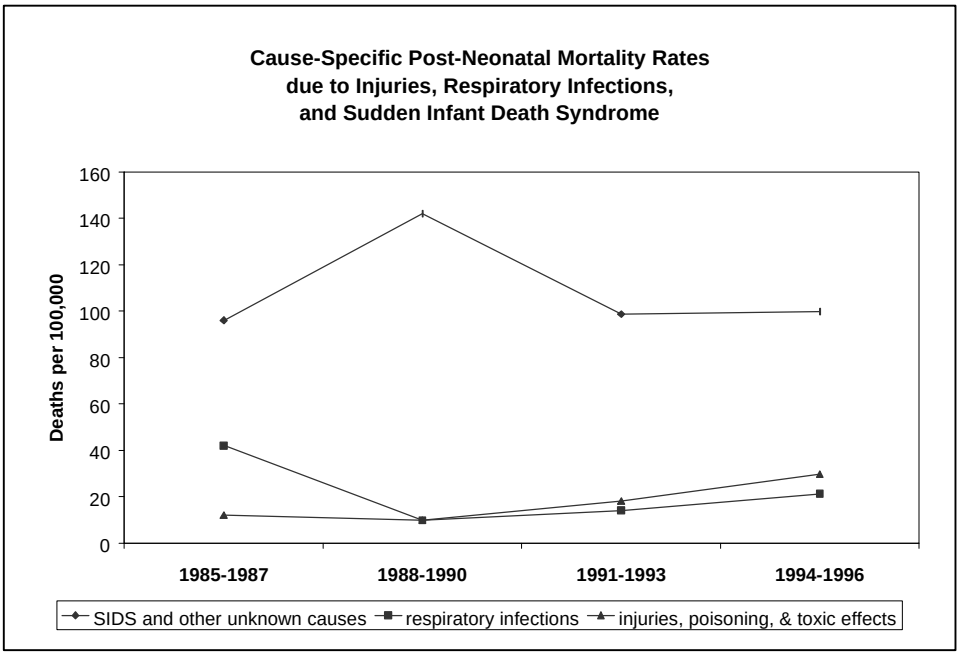
Post-Neonatal Mortality ***Figure 6.2***

The causes of post-neonatal mortality have been grouped into 6 broad categories. Sudden infant death syndrome (SIDS) accounts for the greatest proportion of post-neonatal deaths, followed by heart diseases and injuries. (Note: Numbers on top of bars indicate the actual number of deaths). The modest decline in post-neonatal mortality (noted in Figure 6.1) is mostly due to a decline in deaths from congenital anomalies and heart diseases and heart anomalies.



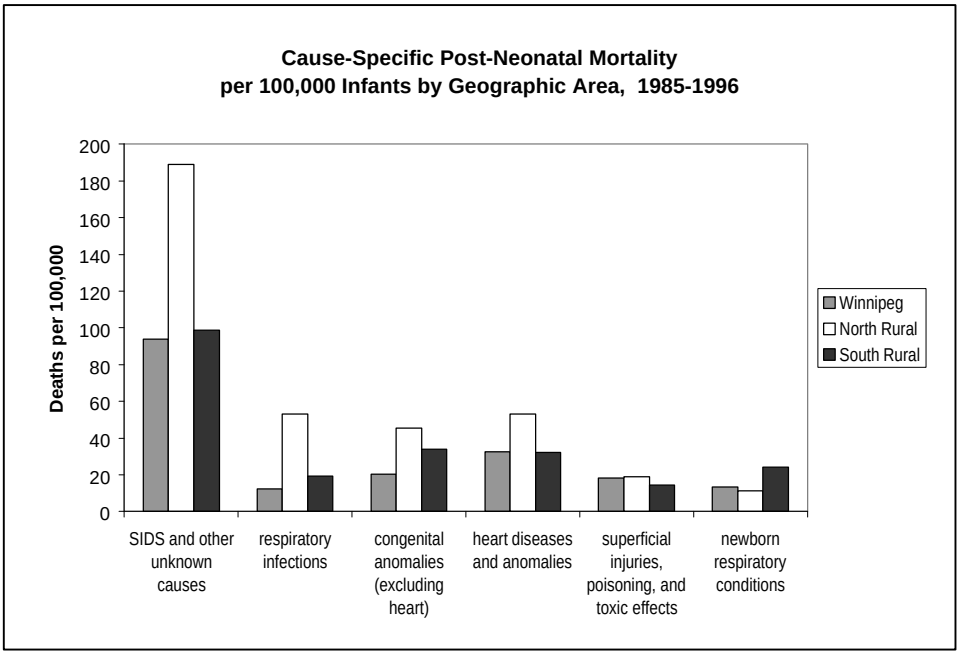
Post-Neonatal Mortality ***Figure 6.3***

While the overall post-neonatal mortality rate is slightly declining, this trend is not reflected in the rates of sudden infant death syndrome(SIDS), respiratory infections, or injuries, all of which have modifiable risk factors. For the 1994-1996 time period, the mortality rate due to these three causes was 151/100,000, and they accounted for 55% of all post-neonatal deaths. After a substantial decline in deaths due to SIDS from the mid-1970s to the mid-1980s, the rate has levelled off. The rate of deaths due to respiratory infections and injuries appear to be increasing with deaths due to injuries now surpassing those attributed to respiratory infections. However, the small number of post-neonatal deaths make it difficult to draw conclusions about these trends.



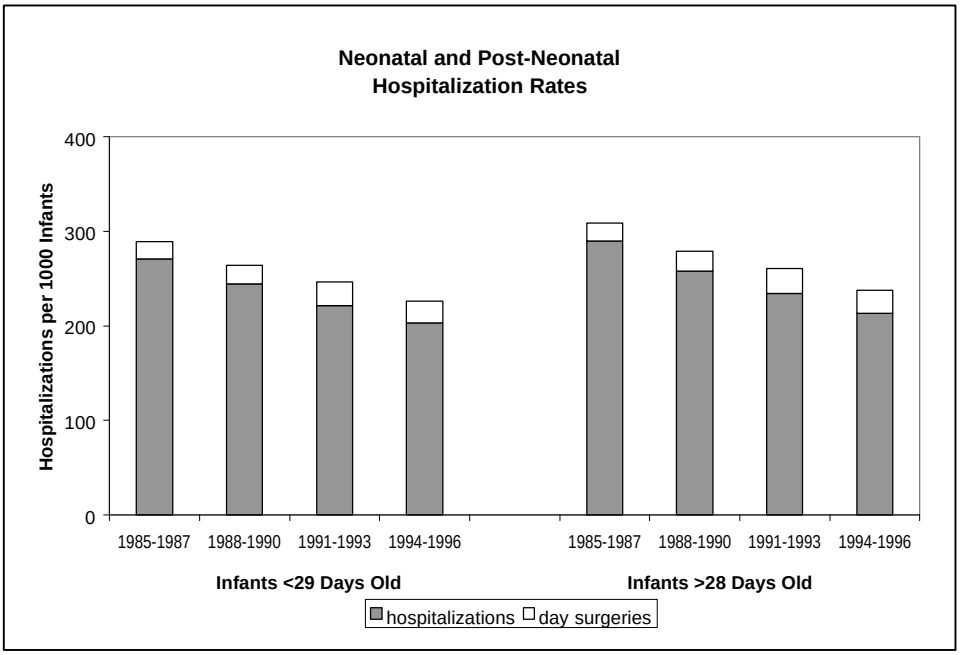
Post-Neonatal Mortality ***Figure 6.4***

Examining post-neonatal mortality by geographic area reveals substantial regional disparity. The North Rural area of the province has the highest rates of post-neonatal mortality for all causes except for newborn respiratory conditions. The mortality rates due to SIDS and respiratory infections are almost twice as high in the North Rural area compared to the other two geographic regions.



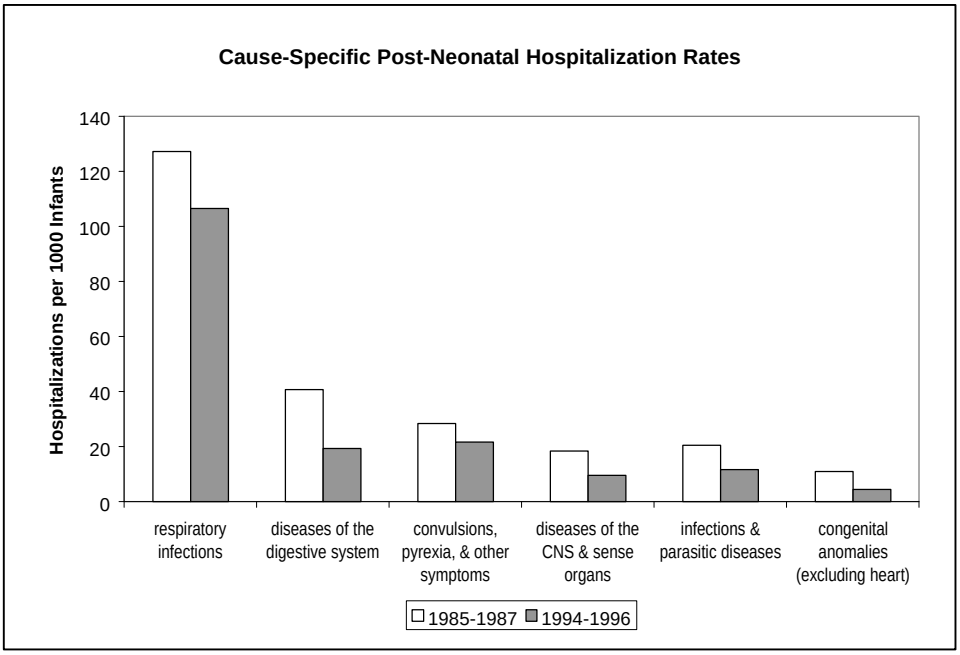
Hospitalizations ***Figure 6.5***

While day surgeries for both infants less than a month old and those greater than a month old increased slightly between 1985-1987 and 1994-1996, the hospitalization rate (after first discharge) for both neonates and post-neonates declined steadily, particularly for infants greater than a month old.

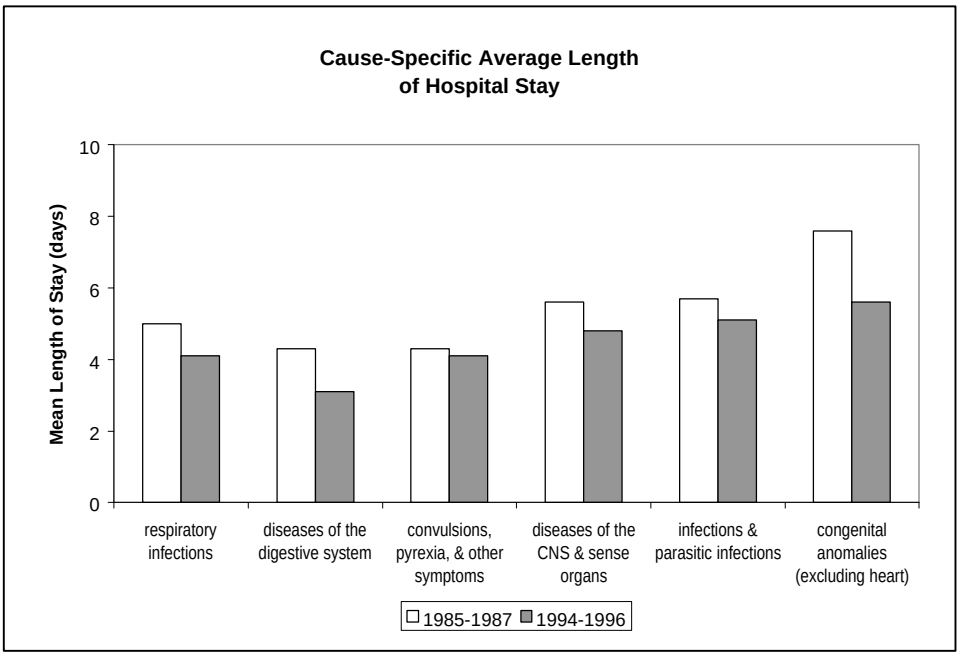


Hospitalizations ***Figure 6.6***

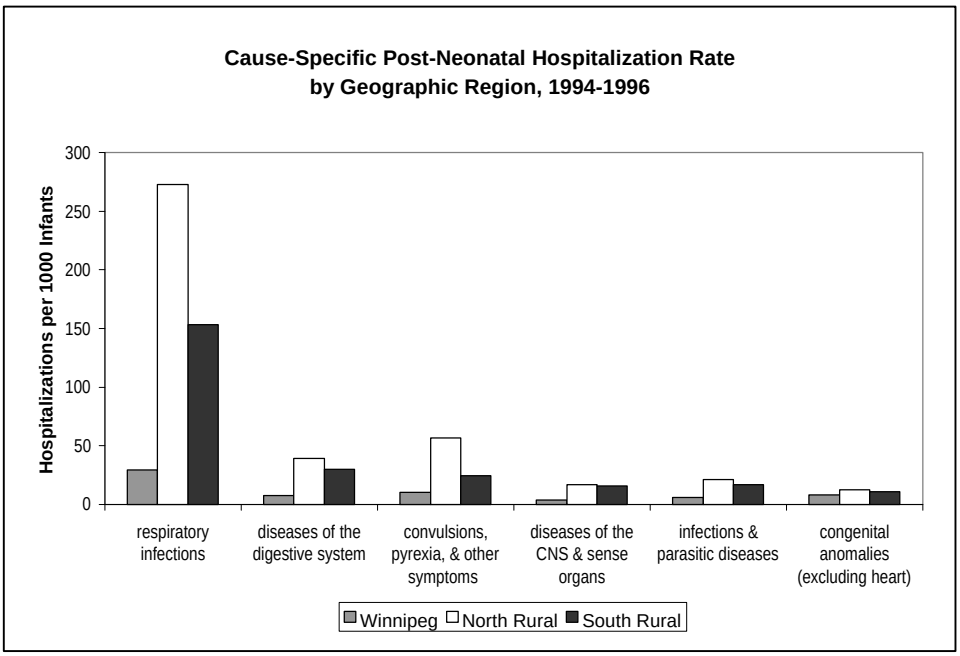
The decline in the post-neonatal hospitalization rate is apparent for each of the six main causes of hospitalization. More than half of the post-neonatal hospitalizations are for respiratory infections.



Infants who are hospitalized are staying in hospital for shorter lengths of time. The average length of stay in hospital has gone down by about a day between the two time periods analysed. This decrease is true to varying degrees for each of the causes of hospitalization analysed.

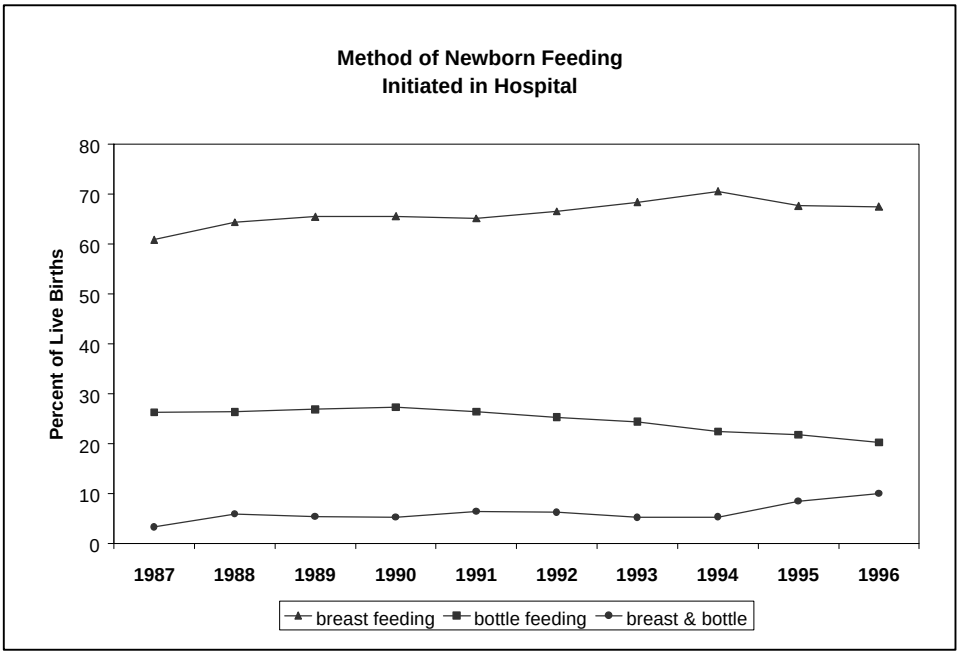


There are large regional disparities in the annual post-neonatal hospitalization rates, particularly for respiratory infections, diseases of the digestive system (mostly gastroenteritis and colitis) and convulsions and pyrexia. The overall hospitalization rate for the province is 213 per 1000 infants, or about 1 in 5 infants. For Winnipeg this rate is considerably lower, with about 1 in12 infants being hospitalized (87 per 1000 infants). The rate for South Rural is slightly higher than the overall provincial rate - 1 in 4 infants were hospitalized from 1994 to 1996 (292 per 1000 infants). By comparison, almost half of all infants living in the North Rural area of the province were hospitalized in their first year of life between 1994 and 1996 (482 per 1000 infants).



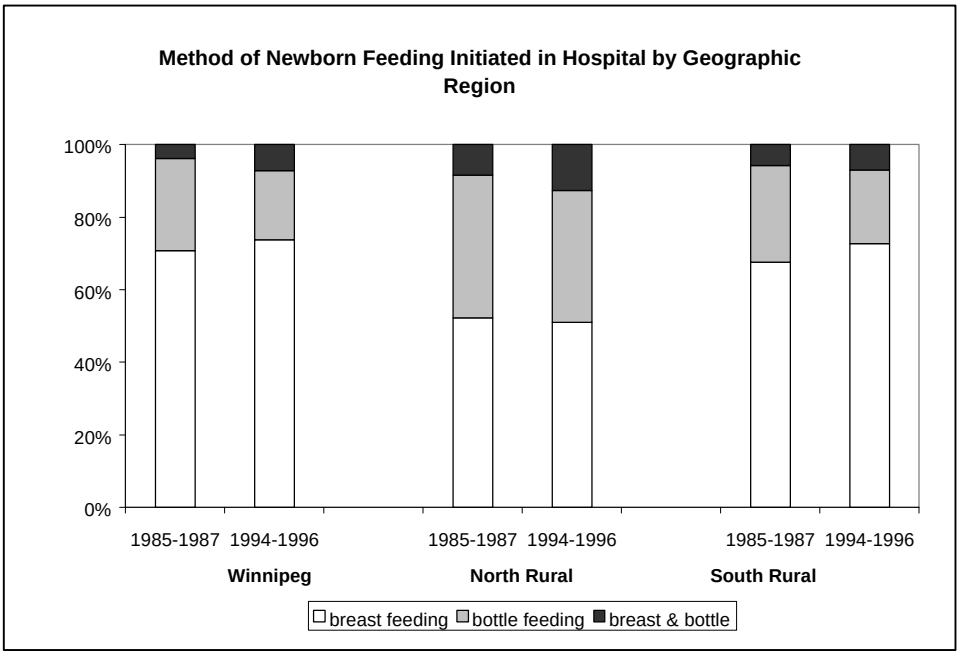
Breast Feeding ***Figure 6.9***

In hospital about 65% of mothers initiate breast feeding exclusively, with the rate increasing slightly over the last five or so years. There has been a slight decrease in bottle feeding-only initiation rates, with a corresponding increase in the proportion of mothers who supplement breast milk with formula while in hospital.



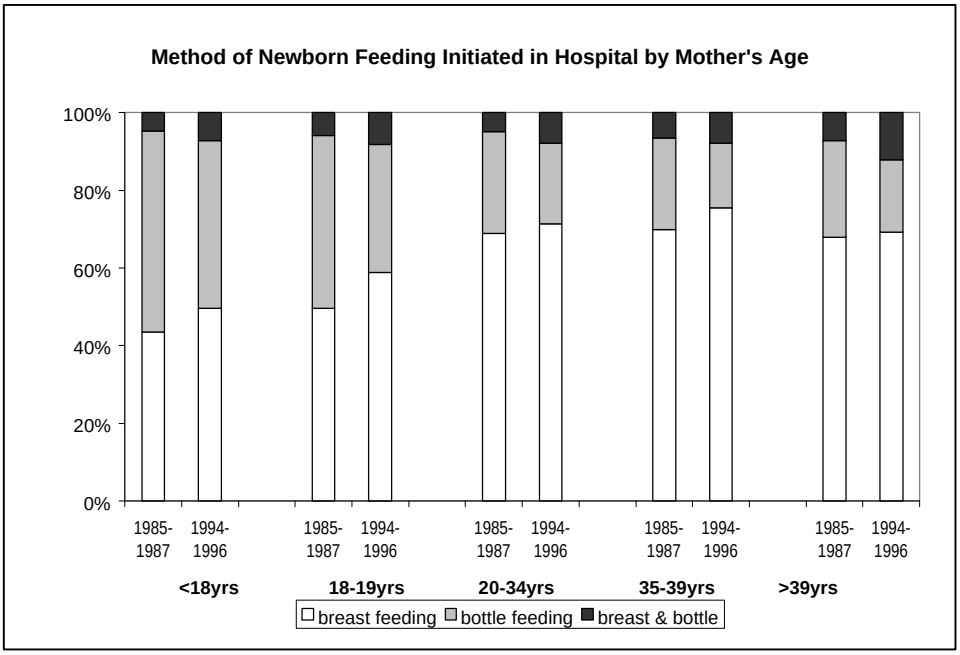
Breast Feeding ***Figure 6.10***

There is a regional disparity in the rate of breast feeding initiation in hospital. For both Winnipeg and the South Rural area, close to 70% of mothers initiate breast feeding-only in hospital, and this figure is increasing slightly. For mothers in the North Rural region, this figure is 50% and is not showing any increase across time.



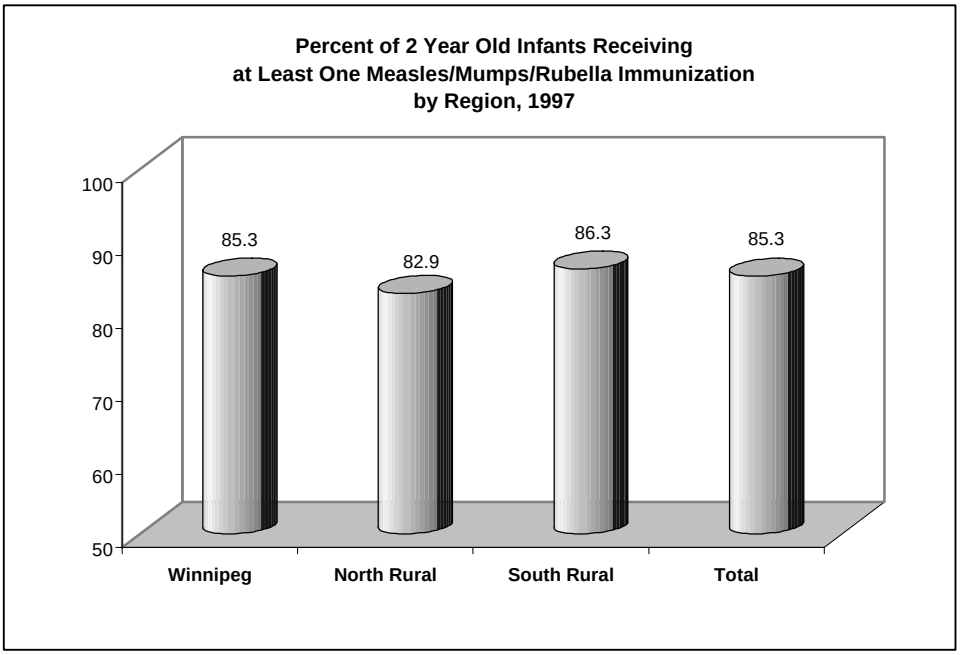
Breast Feeding — *Figure 6.11*

The rate of breast feeding initiation in hospital also varies according to mother's age. For mothers 20 years and older, around 70% initiate breast feeding only in hospital, compared to 50% and 60% for mothers less than 18 and between 18-19 years old, respectively. There is an encouraging upward trend across time in all age categories.

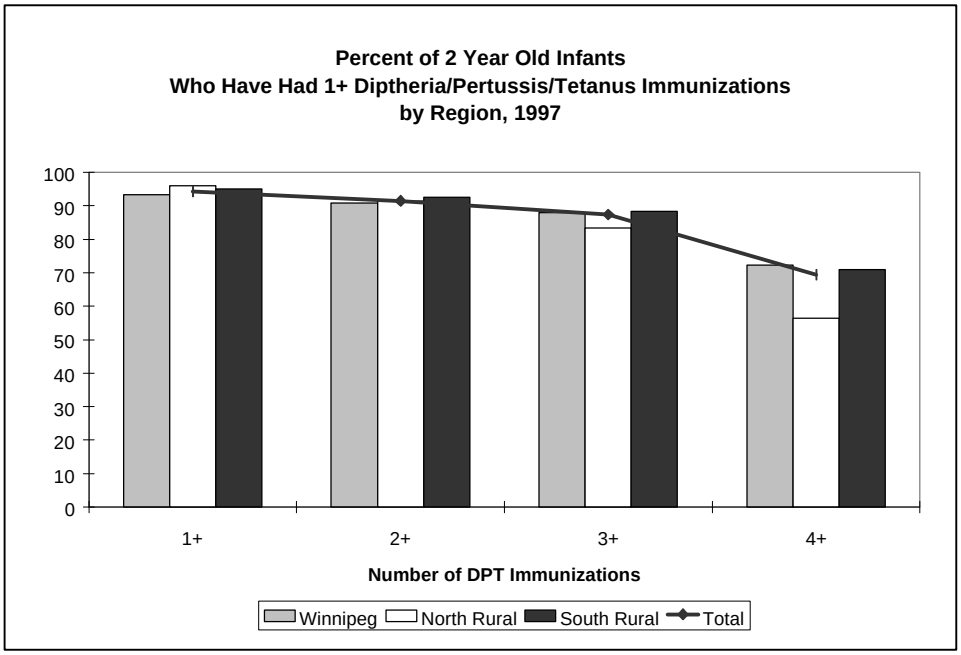


Immunizations — *Figure 6.12*

Immunizations are an important factor in maintaining the health of small children. By 24 months of age, children should have received at least one mumps-measles-rubella (MMR) immunization and 4 diptheria-pertussis-tetanus (DPT) immunizations. 85% of the province's children who turned 2 years old in 1997 had received at least one mumps, measles, and rubella immunizations. This immunization rate is fairly consistent across regions, with the North Rural area of the province having a slightly lower rate.



For children turning 2 years old in 1997, 69% had received at least 4 of each of diptheria, pertussis, and tetanus immunizations by the second birthday. The rate for 2 year olds living in the North Rural region of the province is only 56%, compared to 71% and 72% for children in Winnipeg and the South Rural region, respectively.



DISCUSSION

Infant care can have a substantial influence on the morbidity and mortality in the post-neonatal period. The health of an infant is also strongly influenced by factors such as socio-economic status, household environment, early childhood nutrition, family care practices and the availability of health care services.

One global indicator of Infant Care is the post-neonatal infant mortality rate. In 1994-1996, post-neonatal mortality accounted for approximately 24% of the overall feto-infant mortality for pregnancies that achieved 28 weeks gestation (see Chapter 2, Figure 2.2). The post-neonatal mortality rate in Manitoba declined by approximately 26% between 1985 and 1996. Sudden infant death syndrome (SIDS) and other unknown causes still account for the majority of post-neonatal mortality. After substantial declines in SIDS rates between the mid-1970's and mid-1980's, there has been less change in the most recent decade.

There are noteworthy regional variations in post-neonatal mortality rates. The North Rural area of the province has substantially higher post-neonatal mortality rates; particularly for deaths due to SIDS and respiratory infections. While these conditions are multifactoral in origin, they both have modifiable risk factors. Therefore, investigation into their causes and more intensive promotion of known preventive practices (e.g., non-prone sleeping position, decrease smoke exposure in home) is warranted. In addition, underlying determinants of these outcomes such as low socio-economic status, nutritional status and environmental conditions should be addressed.

Hospitalization rates for infants have declined substantially in the past several years. This likely reflects a change in medical practice with less use of hospital care in favour of more out-patient care. However, there are large geographic variations in post-neonatal hospitalization rates with higher rates in the rural areas. While some of this may be attributable to a greater burden of illness, it also likely reflects differences in practice patterns. These practice patterns may be influenced by the greater availability of in-patient pediatric beds and the difficulty of providing a continuity of out-patient services in some rural areas.

Breast feeding promotes the health of infants in many ways. Only 65% of new mothers initiate exclusive breast feeding in hospital and the rate of breast feeding initiation in hospital has risen slowly in the past decade in Manitoba. Only 50% of new mothers living in the North Rural region of the province initiate exclusive breast feeding in hospital. Teenage mothers are the least likely to initiate breast feeding in hospital. Strategies to increase breast feeding rates should be developed. These may include improved antenatal and post-natal education on breast feeding, hospital policies that promote the initiation of breast feeding, and community support mechanisms for breast feeding mothers. To better assess the duration of breast feeding once initiated, additional data regarding the continuity of breast feeding is necessary.

Infant immunization is another important component of maintaining infant health. Data from the Manitoba Immunization Monitoring System suggest that immunization rates can be improved. By two years of age 85% of children had received the recommended dose of MMR but only 69% had received four doses of DPT. At five years of age, this had increased to 91% for MMR and 83% for DPT (data not shown). This indicates that particular attention should be paid to reducing the delay in immunization since vaccine-preventable diseases generally cause the most severe illnesses in the very young.

Appendices

Appendix A
Data Sources

The data for this Perinatal Surveillance Report came from a number of sources. The bulk of the data was obtained by linking obstetrical hospital records and newborn hospital records dated April 1, 1984 to March 31, 1997. The Manitoba Health Hospital records were searched for obstetrical (mother) or newborn admissions. The obstetrical and newborn records were linked together by hospital of admission, mother's hospital record number, newborn's hospital record number, Manitoba Health Family Registration number and surname. Extensive verification of the linkage was conducted in the cases where mother's surname was not the same as the newborn's surname. Most data lines contain both mother and newborn information. Those mother records that did not link to a newborn record were retained only if one of the mother's diagnoses included a stillborn v-code (V271, V274, V277) assuming that a newborn record was not created for these births. All newborn records were retained because a newborn record represented a birth regardless if a link could be made with a maternal record. Manitoba Health Medical Coverage data was merged with the linked records by newborn's personal health identification number (PHIN) to add cancel codes and dates to this Database.

The linked obstetrical-newborn database only identifies pregnancies that resulted in a live birth or a stillbirth. To capture pregnancies which did not result in a birth, the Manitoba Health Hospital records were again searched, and all obstetrical admissions regardless of outcome were summarised into a pregnancy database. Using this pregnancy database it was possible to calculate rates of reported ectopic pregnancies, molar pregnancies, spontaneous abortions (miscarriages), and induced abortions, in addition to stillbirths and live births. Only pregnancies that resulted in a hospital-based outcome are captured in this database. Therefore, pregnancies resulting in a home birth, an induced abortion at a private clinic, or an unreported spontaneous abortion are not captured in this database.

Since the hospital admission records do not identify cause of death, the Vital Statistics "Deaths" dataset was utilised to calculate the rates of neonatal and post-neonatal deaths according to diagnosis. This dataset does not contain PHINs, therefore it was not linked to the obstetrical-newborn database.

The hospital admission records do not identify income levels. To obtain this information for the applicable graphs, we used the Federal Census 1991 data to identify median household income for each of the forward sortation areas (first 3 digit postal codes) in Winnipeg, and then linked these median incomes to the women living in the appropriate forward sortation areas. The income data therefore is not a reflection of a woman's actual annual income, but rather is a reflection of the median household income for the area in the city in which she resides.

Finally, to ascertain information on provincial and regional immunization rates, the Manitoba Immunization Monitoring System (MIMS) database was used. MIMS is a centralised computer registry that records immunizations given to children residing in the province.

Appendix B
Assumptions

The birth weight of the newborn is entered in both the maternal and the newborn hospital record. In 6,409 (3.2%) cases, the birth weight on the newborn record was not equal to the birth weight on the maternal record. The correlation between the two birth weights is .99. In the case of a discrepancy the larger of the two weights was retained for analyses.

The gestational age of the newborn is also available in both the maternal and the newborn hospital record. In 15,004 (7.5%) cases the gestational age on the newborn record was not equal to the gestational age recorded on the maternal record. The correlation between the two ages is .63. Where a discrepancy existed, the gestational age on the newborn record was retained for analyses.

For much of the analysis specific to the four sections (Maternal Health, Maternal Care, Newborn Care, and Infant Care), there was additional inclusion criteria. Newborns had to either have a recorded birth weight of 500 grams or greater, or have a gestational age of 20 weeks or greater.

Analysis was also restricted to those newborns whose mother had a valid Manitoba PHIN, who currently resided in Manitoba, and who gave birth in Manitoba. These criteria apply only to the hospital databases. Province of death is the only criterion for inclusion in the data received from Vital Statistics. Therefore, if an infant whose mother was not a Manitoba resident died in Manitoba, she or he was included in the provincial rates for death by diagnosis.

Appendix C
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