



Health and Wellness

PRINCE EDWARD ISLAND Reproductive Care Program Perinatal Database Report 2011



Prince Edward Island Reproductive Care Program
Perinatal Database Report 2011

Acknowledgements

The PEI Reproductive Care Program is a joint initiative that operates under the direction of a multidisciplinary planning committee representing the PEI Medical Society, Department of Health and Wellness and Health PEI, as well as lay members. As one component of its mandate, the Program has been responsible for the development of standardized assessment tools, and of a Provincial Perinatal Database. The PEI Perinatal Database is a product of the efforts of an early advocate of the Program, Dr. Douglas Cudmore and the diligent work and dedication of past Board members and coordinators as well as current Joint Planning Committee members. The PEI Reproductive Care Program is pleased to present the PEI Perinatal Database Report for 2011 and wishes to thank all previous and current board members for their dedication and support.

The Laboratory Centre for Disease Control's Bureau of Reproductive and Child Health, under the Action Plan for Health and the Environment, provided funding for the initial development of the database and this support is also greatly appreciated. Data for the Perinatal Database is collected from medical records in the Prince County Hospital and Queen Elizabeth Hospital. The PEI Reproductive Care Program gratefully acknowledges the assistance of these medical records departments. Physicians and nurses who collect the data and enter it on the records are key to the success of the database and are thanked for their assistance.

PEI Reproductive Care Program

July 2013

Background

This report contains an analysis of the data collected about pregnant women and their newborns during the period from January 1 to December 31, 2011.

The PEI Reproductive Care Program recognizes that pregnancy outcomes are influenced by events that occur in the perinatal period, which includes the pre-conception, prenatal, intra-partum and postnatal periods. The perinatal periods lay the foundation for a child's development and impacts on health and well-being throughout life.

The PEI Perinatal Database is intended to be used by health care professionals, government, consumers and other organizations and individuals to help assess and improve the delivery of maternal & newborn care, education and support on PEI. To aid in this, the database holds information regarding a variety of variables including maternal demographics and lifestyle behaviors, prenatal status and interventions, intra-partum and postnatal status and interventions, births, and perinatal morbidity and mortality statistics.

Analysis of the data from the Perinatal Database provides a basis to inform providers and decision makers about the outcomes of the care provided; promotes ongoing improvement in perinatal outcomes through enhanced knowledge; and has the potential to form the basis for initiating changes in maternal/newborn care throughout the Province of Prince Edward Island. The information collected is also used to complement other Provincial databases, including the Public Health Nursing and Nutrition databases. The level of inquiry in this report is primarily descriptive.

The PEI Reproductive Care Program ensures the integrity, security and confidentiality of all data deposited in the database. Rigorous data quality checks are applied to the data to ensure a high level of data integrity and data consistency.

Executive Summary

The 2011 Perinatal Database Report is a document that summarizes key maternal and infant health data which is collected exclusively from the Prince Edward Island Reproductive Care Program. The current report is presented in three sections: Maternal Demographics, Prenatal Risks and Prenatal Care, Labour & Delivery and Maternal Health Outcomes, and Newborn Health Outcomes. New in 2011 is the PEI Reproductive Care Program Perinatal Surveillance Report.

Key findings within the report:

- In PEI, as in Canada and other developed countries, the average maternal age at time of delivery has been increasing over time. The average maternal age at delivery for all PEI mothers in 2011 was 29.2 years. While the overall trend shows increasing maternal age over time, this varies by region.
- Advanced maternal age for nulliparous women continues to increase.
- Teenage pregnancies account for 5.8% of all pregnancies on PEI, which is similar to 2008.
- In 2011, 64% of mothers <25 years of age were single compared to 11% of mothers 25 years of age and older.
- PEI mothers are more likely to be overweight or obese (47.2%) than Canadian mothers (33%) prior to pregnancy. Women with a higher body mass index (BMI) are more likely to have poor health and poor pregnancy outcomes. For instance, women with a high BMI are more likely to develop gestational diabetes mellitus and have a Caesarean birth.
- In PEI in 2011, the incidence of gestational diabetes was 0.9% in normal weight women and 9.1% in women who were obese. The rates of gestational hypertension varied from 5.2% of women within the normal weight category to 15.3% in women who were obese.
- Smoking during pregnancy and exposure to second hand smoke have declined over the past 10 years. However, cigarette smoking and exposure to second hand smoke continues to be a prenatal risk factor for women under 25 years of age in particular.
- Self-reported alcohol use is decreased, however results of the PEI Meconium Study (2010-2011) demonstrated that at least 3.1% of babies were exposed to heavy or binge prenatal alcohol consumption while in utero. Self-reported alcohol use during pregnancy is a greater risk factor for mothers >40 years of age.
- Self reported drug abuse has increased significantly in younger expecting mothers since 2008, and increased in all age groups.
- In 2011, vaginal births were most common, followed by Caesarean births then assisted vaginal births. The percentage of births by Caesarean has increased since 1998, though decreased slightly since 2008.
- The rate of episiotomies has decreased significantly over time from 33.1% in 1998 to 7.5% in 2011. Despite decreases in the episiotomy rate there has not been any increase in the rates of third or fourth degree tears.

- The overall Caesarean birth rate has decreased since 2008 from 30.1% to 28.5%; this decrease is attributed to fewer nulliparous women who present in spontaneous labour with a normal presentation singleton at full term and deliver via Caesarean birth.
- Maternal hospital length of stay is impacted by type of delivery and maternal conditions such as diabetes and hypertension and the incidence of severe maternal morbidity.
- Babies born on PEI tend to weigh more than babies born in Canada. In term singleton births, as the maternal pre-pregnancy BMI increased so did the likelihood the baby would be either high birth weight or macrosomic.
- In PEI, in 2011, approximately 73% of all mothers were breastfeeding their newborns at discharge from hospital which has been steadily increasing over time. Unfortunately this rate is still lower than the national average. Age continues to have an impact on breastfeeding rates in PEI. Younger mothers in 2011 were less likely to choose to initiate breastfeeding than those in 2008.

PEI REPRODUCTIVE CARE PROGRAM PERINATAL SURVEILLANCE REPORT

	1998	2003	2008	2011
Maternal Health Indicators				
Deliveries (Mothers)	1493	1404	1434	1403
Average maternal age at delivery (in years)	28.0	28.1	28.9	29.2
Advanced maternal age at delivery (≥35 years) (per 100 deliveries)	12.6	13.0	16.4	14.5
Younger maternal age at delivery (<20 years) (per 100 deliveries)	9.8	6.7	5.6	5.8
Average maternal age at first delivery (nulliparous) (in years)	25.5	26.0	26.5	27.3
First time mothers (nulliparous) (per 100 deliveries)	41.6	43.7	44.1	41.8
First time mothers (nulliparous) ≥ 35 years (per 100 first time deliveries)	6.1	7.2	7.7	8.9
Pre-pregnancy BMI>25 Overweight/Obese (per 100 mothers)	41.6	48.2	45.2	47.2
Pre-pregnancy BMI<18 Underweight (per 100 mothers)	5.5	2.8	4.4	3.6
Mothers with <5 antenatal visits (per 100 deliveries)	-	-	-	4.4
Smoking during pregnancy (self-reported) (per 100 deliveries)	33.3	23.3	21.8	19.2
Alcohol Use during pregnancy (self-reported) (per 100 deliveries)	3.2	3.2	0.6	0.7
Drug Abuse during pregnancy (self-reported) (per 100 deliveries)	0.1	1.0	1.4	2.8
Labour/Postpartum Health Indicators				
Labour induction (per 100 deliveries ¥)	34.4	38.1	37.4	36.8
Epidural use in labour (per 100 deliveries with labour)	7.1	34.9	38.5	34.3
Episiotomy rate (per 100 deliveries)	33.1	10.3	10.2	7.5
Caesarean birth (per 100 deliveries)	22.1	29.7	30.1	28.5
Postpartum length of stay after vaginal birth (in hours)	-	-	59.8	58.1
Postpartum length of stay after caesarean birth (in hours)	-	-	100.1	89.8
Newborn Health Indicators				
Births (Babies born on PEI)	1509*	1426	1434	1405
Birth Weight (average in grams)	3475*	3492	3464	3482
Low Birth Weight (≥ 500 g to 2500g) (per 100 live births)	4.6 *†	4.0 †	5.0 ‡	4.0 ‡
High Birth Weight (≥ 4500g) (per 100 live births)	3.7*	3.2	2.7	2.9
Breastfeeding Initiation (per 100 live births)	-	67.9	74.0	78.3
Breastfeeding at Discharge (per 100 live births)	59.3*	62.8	70.5	73.2
Multiple births (rate per 100 live births)	-	2.3	1.4	0.9
Preterm Birth rate (per 100 live births)	5.4*	5.7	6.4	5.6
Crude stillbirth rate (per 1000 total births)	2.0*	8.4	3.4	2.1
Congenital Anomaly (per 100 live births)	-	3.8	5.8	6.1
Newborn Average Length of Stay (in hours)	-	-	87.5	86.8

Data Source: PEI Reproductive Care Program Perinatal Database.

¥ excludes planned Caesarean births

*1998 includes data from out of province births (i.e.: IWK)

† includes stillbirths

‡ excludes stillbirths

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1 Maternal Demographics, Prenatal Risks, and Prenatal Care

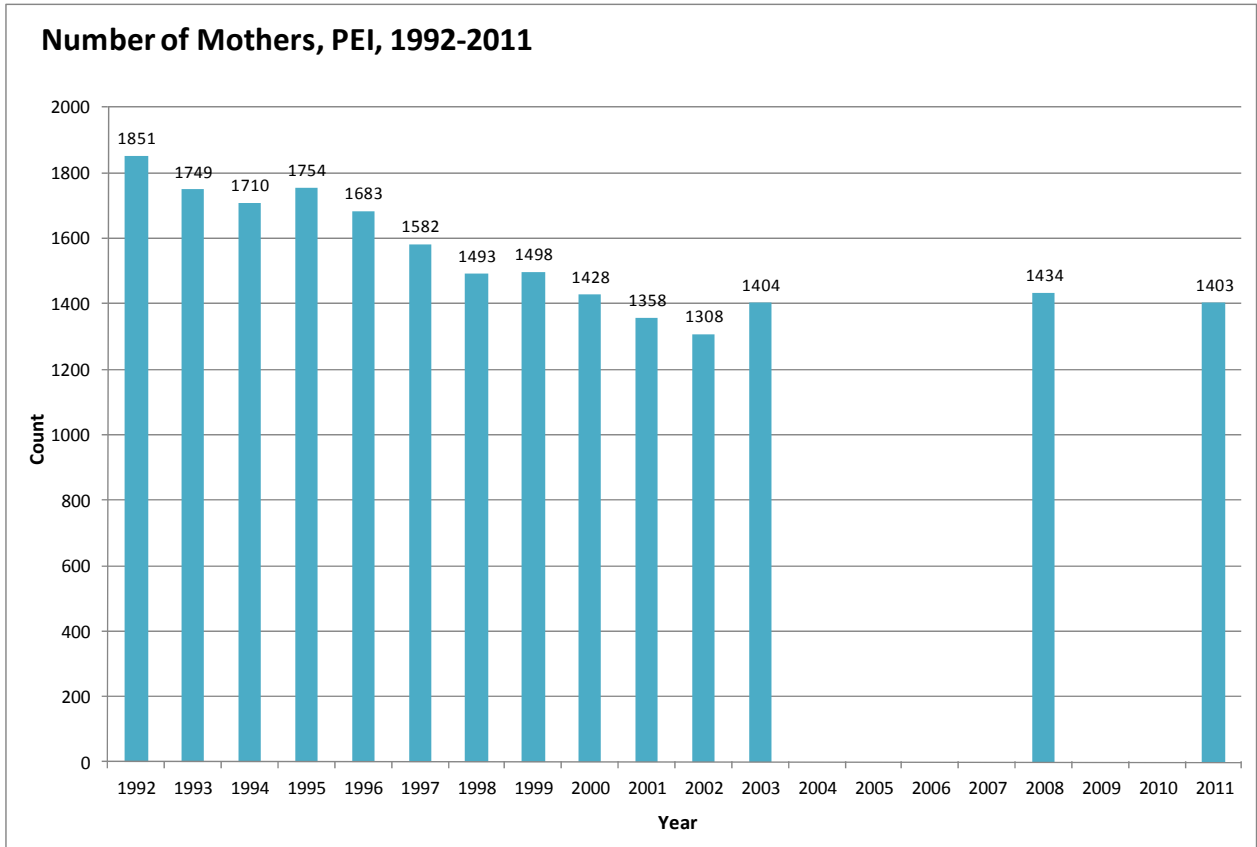
Maternal Demographics, Prenatal Risks, and Prenatal Care

Maternal Health Indicators	YEAR			
	1998	2003	2008	2011
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Drug Abuse during pregnancy (self-reported) (per 100 deliveries)	0.1	1.0	1.4	2.8

1.1 Number of Mothers

In 2011, data was captured for 1,403 PEI mothers. A number of mothers each year are transferred out of province for premature or high risk deliveries. At present we do not receive complete data on most mothers who deliver outside of PEI.

The number of women giving birth decreased steadily over time from 1992 to an all time low in 2002. This number appears stable since 2003, 2008 and most currently in 2011, however due to data gaps the overall trend cannot be truly measured.



Note: Data are not available from 2004 to 2007 or 2009 to 2010

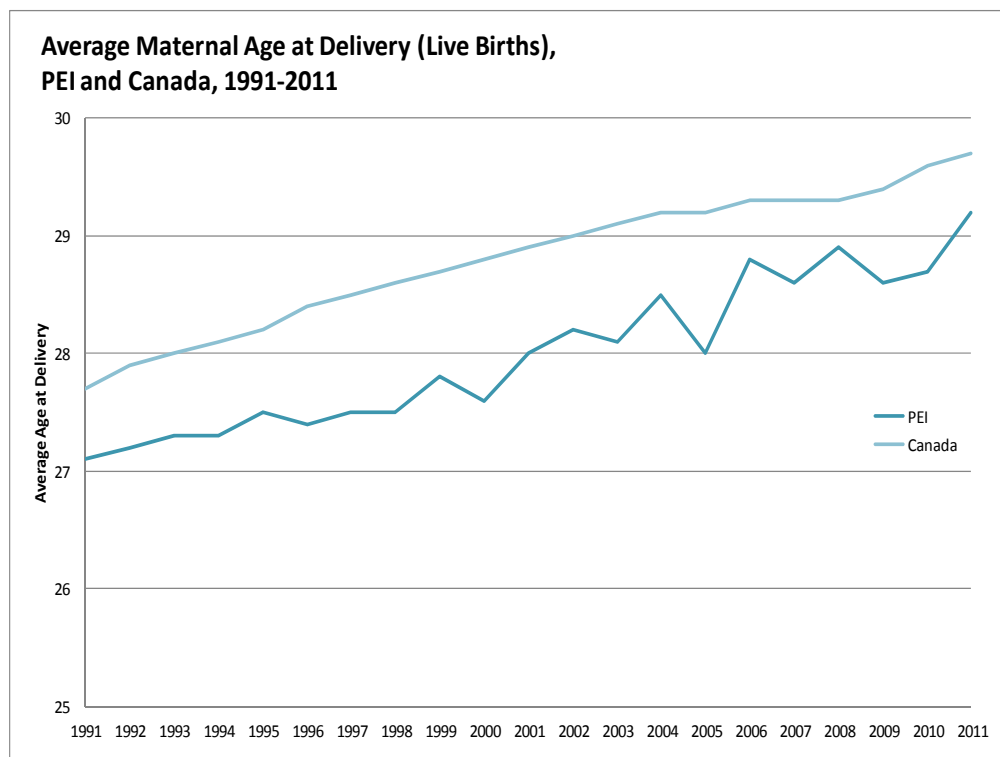
1.2 Maternal Age at Delivery

Maternal age is defined as the mother's age in years at the time she delivers and is calculated using the mother's date of birth and baby's date of birth. Age is one factor to consider in relation to maternal health, perinatal outcomes and newborn health factors. In PEI, maternal age at delivery ranged from 15 to 45 years.

- The proportion of young mothers has decreased since 1998. The proportion of mothers ≥ 35 years is 15% and appears to have decreased since 2008; however the proportion of first time deliveries in this age category has steadily been increasing.
- Mothers in Kings were the youngest in PEI in 2011 with 28.5% under 25 years.
- Mothers aged 30-34 years showed the greatest increase in the percentage of the total births in the province for 2011 with almost half (~47%) of the women in PEI who gave birth being 30 years of age or older.

Average Maternal Age

In PEI, as in Canada and other developed countries, the average maternal age at time of birth has been increasing over time. Mothers in PEI are slightly younger than the national average of 29.7 years according to Statistics Canada.^{1,2} Age of the mother at first birth is of interest to both researchers and the public as it influences the total number of births a woman might have in her life, which impacts the size, composition and future growth of the population.^{3,4} The average maternal age among mothers on PEI who had at least one birth in the past (parity ≥ 1) was 30.6 years.

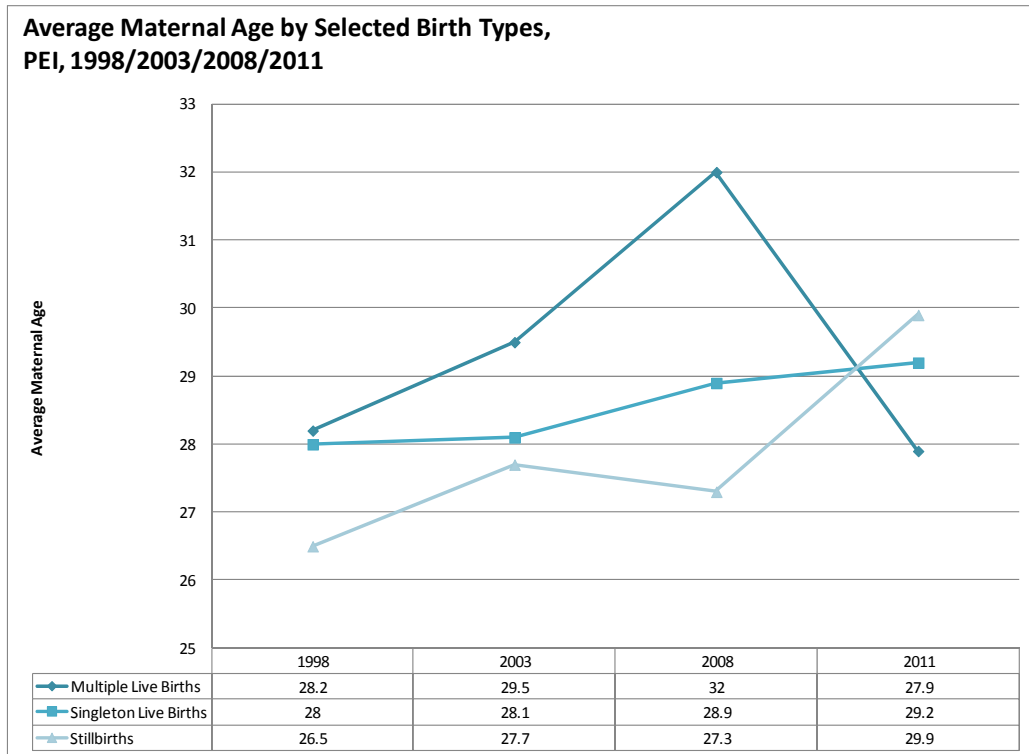


In 2011, 42% of all mothers were having their first baby. Of the women ≥ 35 years that gave birth 25% were having their first baby, this increased from 21% in 2008.

Percent Composition of Maternal Age Groupings by Parity, PEI, 2011

	Parity 0 (%)	Parity 1 (%)	Parity 2+ (%)
<20 years	84	14	1.2
20-24 years	57.7	32.6	9.6
25-29 years	44.5	37.5	17.9
30-34 years	30.4	42.2	27.3
35+ years	25.5	38.7	35.8
Overall	41.8	37.1	21.2

Both teen pregnancy (<20 years) and pregnancy with advanced maternal age (≥ 35 years) have been identified as being associated with potential risks to mother and baby.^{5, 6} Although 35 years of age is not an absolute number for when risks increase for women in pregnancy and childbirth, there are some prenatal complications for which there is increased risk after this age. Advanced maternal age alone is an important risk factor for chromosomal anomalies.⁷ Age can also have an impact on the rate of multiple births and stillbirths, though the use of reproductive technologies also has an impact.⁴



Marital Status

Pregnancy outcomes can be affected by marital status; this is often linked to socio-economic status and support systems.⁸

- Most pregnant women in 2011 were involved in an on-going partnership, 60% being married and 16% in a common-law relationship. Approximately one quarter of pregnant women were not in a relationship (23% single and <1% divorced or separated).
- 64% of mothers less than 25 years of age were single (60% in 2008) compared to 11% of mothers 25 years of age and older being single (11% in 2008).

1.3 Maternal Weight

Women's height and pre-pregnancy weight were used to calculate body mass index (BMI). BMI was calculated and grouped according to the classification guide below (for the purpose of this report all ≥ 30 were classed as obese):

Classification	BMI Category (kg/m ²)	Risk of developing health problems
Underweight	<18.5	Increased
Normal Weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Obese	≥ 30.0	High to Extremely high*

*Risk depends on classification of obesity (Class I, II, III)

In 2009, Canadian women who are of "child-bearing age" were significantly heavier than in the past.¹³ This correlates with population weight increases in Canada that show that 'nearly half of adult Canadians are overweight or obese'⁹:

- One third of Canadian women enter pregnancy with a BMI equal to or greater than 25. A woman's high pre-pregnancy BMI can affect pregnancy and postpartum health outcomes, birth type, birth weights, prematurity risks, breastfeeding and childhood obesity outcomes.^{10, 11, 12, 13}
- 6% of Canadian women entered pregnancy at a low BMI. Low pre-pregnancy BMI can also affect pregnancy and postpartum health outcomes, preterm birth risks and birth weights.¹²

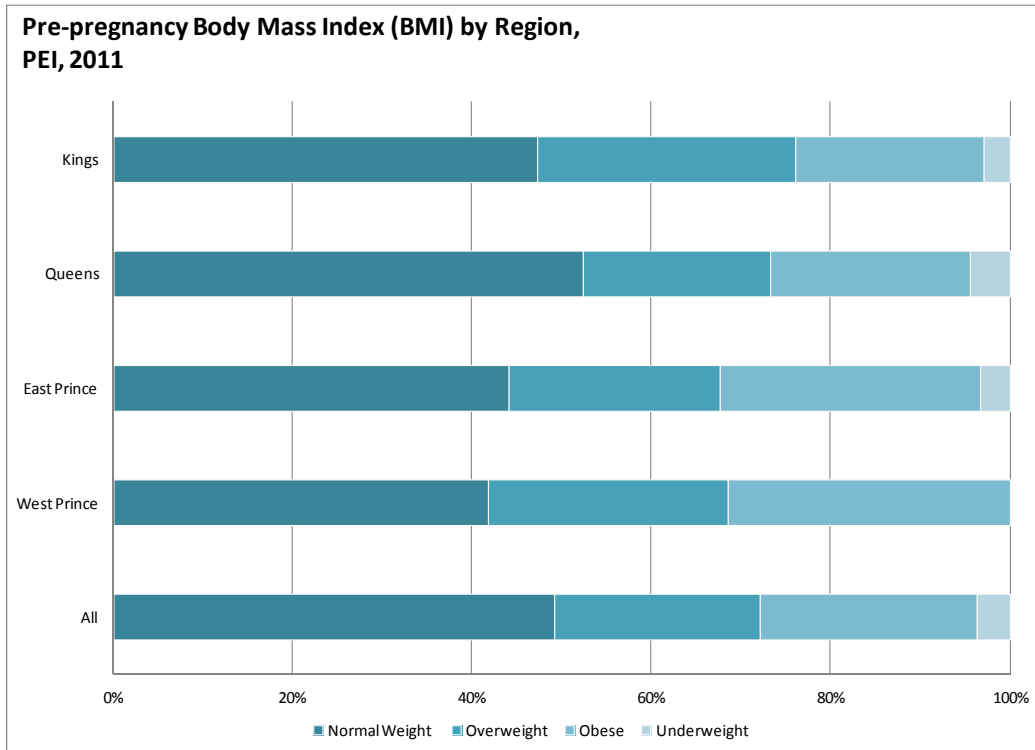
In PEI in 2011:

- 47.2% were overweight/obese (BMI >25) prior to pregnancy, with over half of these being obese (BMI >30), this has increased since 2008.
- 3.6% of PEI women were underweight, this has decreased since 2008.

The proportion of women who had a vaginal delivery decreases as pre-pregnancy BMI increases. For both overweight and obese mothers there is an increased likelihood of a Caesarean birth compared to normal weight mothers.

Type of Delivery by Maternal Pre-pregnancy BMI, PEI, 2011

	Vaginal	Assisted Vaginal	C-Birth
Underweight (%)	74.5	0.0	25.5
Normal Weight (%)	71.8	5.1	23.1
Overweight (%)	62.1	4.0	34.0
Obese (%)	58.9	2.5	38.6

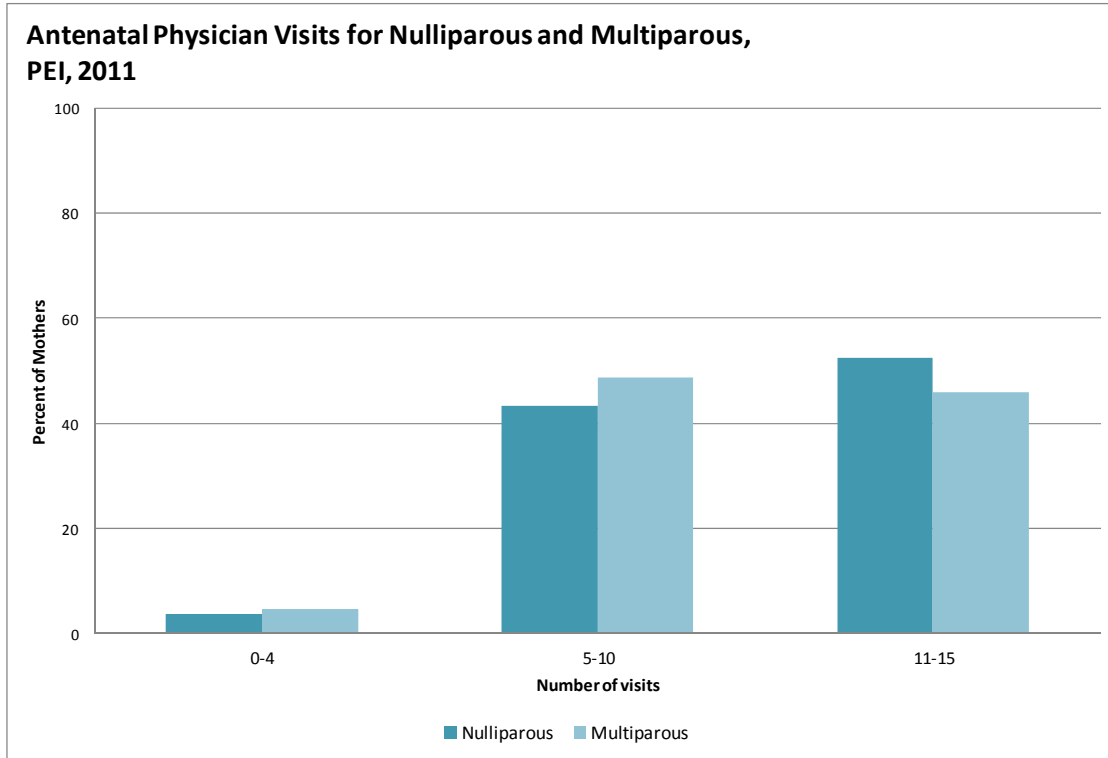


Note: Pre-pregnancy weight was missing in the prenatal records of 83 mothers (6%) of total mothers.

- Queens Region had the highest proportion of mothers considered to be underweight.
- West Prince had the highest proportion of mothers in the overweight/obese categories.

1.4 Prenatal Care

Prenatal care has important implications for maternal health and ongoing health care for women, infants and families. The Public Health Agency of Canada (PHAC) recommends women seek prenatal care early in pregnancy.¹⁴ Early prenatal care is more effective as it allows for early risk assessment, treatment of medical conditions or risk reduction and education.^{15,16} Less than 1% of PEI women who gave birth in PEI in 2011 did not receive prenatal care.



Note: Both Obstetrician and family practitioner visits are included in number of visits. Emergency room and walk-in visits are excluded.

Prenatal education is offered on PEI by Public Health Nursing, Community Dietitians, and Family Resource Centers as well as physicians, obstetricians, obstetrical nurses and nurse practitioners. It is important for preparing mothers and fathers for pregnancy, birth and parenthood. Prenatal education, particularly through prenatal classes, is valued as a way to prepare expecting parents for the physical and life changes of pregnancy, childbirth and parenting. It was not possible to analyze attendance at prenatal classes due to missing data.

Meeting an expecting woman’s information needs has been seen to be important to:

- Improve her overall health
- Adopt healthy behaviour changes (i.e.: nutrition, exercise and smoking cessation)
- Increase self-care and infant care knowledge
- Increase her ability to make informed choices.¹⁴

1.5 Smoking, Exposure to Second Hand Smoke, Alcohol Use and Drug Abuse

Smoking

Cigarette smoking is an important modifiable cause of adverse pregnancy outcomes.¹⁷ Maternal cigarette smoking has been associated with intrauterine growth restriction (IUGR), increased risk of preterm birth, spontaneous abortion, placental complications, stillbirth and sudden infant death syndrome (SIDS) as well as childhood respiratory illness, asthma, and neurodevelopmental and behavioural problems. Some research has shown that “in population studies and nationwide surveys, pregnant smokers report more illicit drug use than pregnant nonsmokers”.¹⁸ Mothers who smoke are also more likely to stop exclusively breastfeeding earlier in their newborn’s life.^{19, 20} Pregnant mothers exposure to second hand smoke has decreased substantially over time from 45.5% of pregnant mothers in 1998 to 21.2% in 2011.

There is variation in rates of cigarette smoking in PEI based on place of residence:

- Mothers in Kings had the highest rates of smoking during pregnancy at 25.1%, which has increased slightly since 2008.
- Mothers in West Prince have the highest rates (32%) of exposure to second hand smoke during pregnancy, but have reduced their rates of smoking during pregnancy (>35 % in 2008 to 20.3% in 2011).

Alcohol

Alcohol is a teratogen. Prenatal exposure can lead to a range of conditions known as Fetal Alcohol Spectrum Disorder (FASD) which can result in cognitive, behavioural, neurodevelopmental, physiological and physical impairments. Clinical guidelines have recommended that when planning a pregnancy and during pregnancy no alcohol is the best choice as even a small amount of alcohol during pregnancy can have a negative and permanent impact on the developing fetal brain. In August 2010 the Society of Obstetricians and Gynaecologists of Canada (SOGC) released the comprehensive Alcohol Use and Pregnancy Consensus Clinical Guideline reinforcing that ‘abstinence is the prudent choice for a woman who is or might become pregnant’.²¹ The effects of prenatal exposure to alcohol vary widely and can differ depending on amount of alcohol consumed, developmental stage of fetus and individual factors such as a mother’s own health status.²²

Alcohol use during pregnancy was self-reported by less than 1% of all women in PEI. There is concern that self-reports of alcohol consumption may be underestimates due to the potential under-reporting by women.²³

The PEI Meconium Study tested a meconium sample from all live newborns born to PEI mothers from November 2010 to November 2011. This province-wide study showed that at least 3.1% of PEI babies during this time period were exposed to heavy, or binge, prenatal alcohol consumption while in utero. Since approximately 40% of prenatally alcohol exposed babies will have FASD this means that “... at least 16 babies born during the one year study period will likely have FASD.”²⁴ Research into the correlation between alcohol use and illicit drug use during pregnancy has shown an increased risk of alcohol consumption with illicit drug use, increasing the risk of FASD in newborns.²⁵

Drug Abuse

Abuse of drugs around the time of pregnancy is a concern, but obtaining accurate data can be difficult because of the reliability of self-reports.

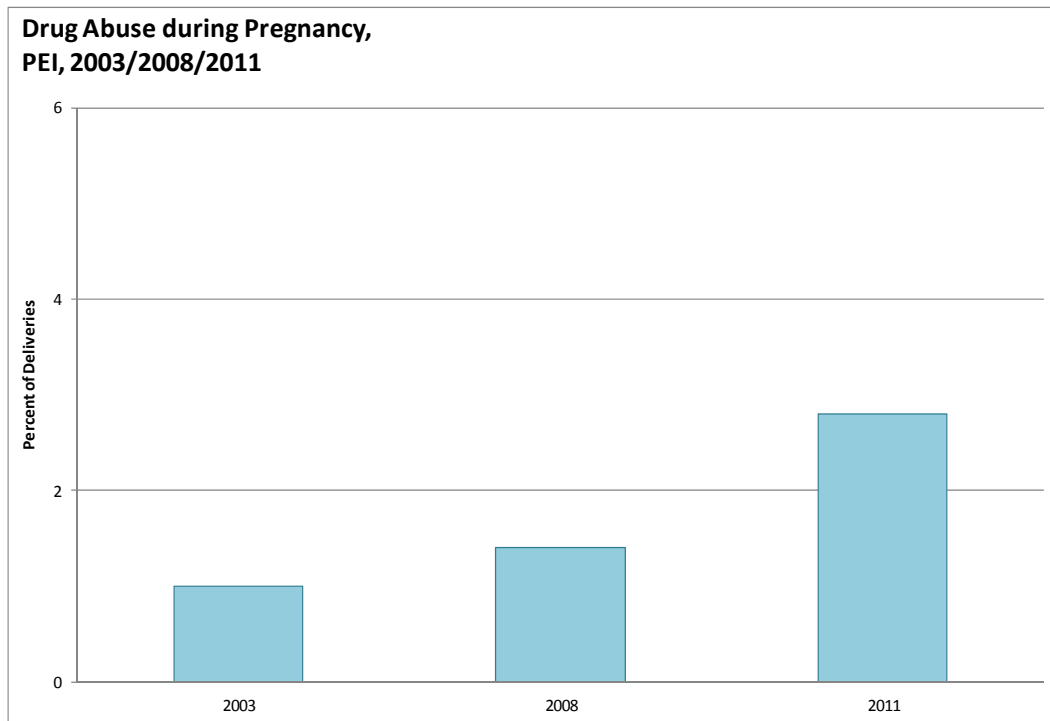
The negative effects on the fetus are potentially compounded by exposure to a combination of street drugs, smoking, alcohol use, high-risk behaviours, or lack of prenatal care which tend to be correlated with drug abuse.²⁶

Drug abuse during pregnancy has increased significantly across PEI:

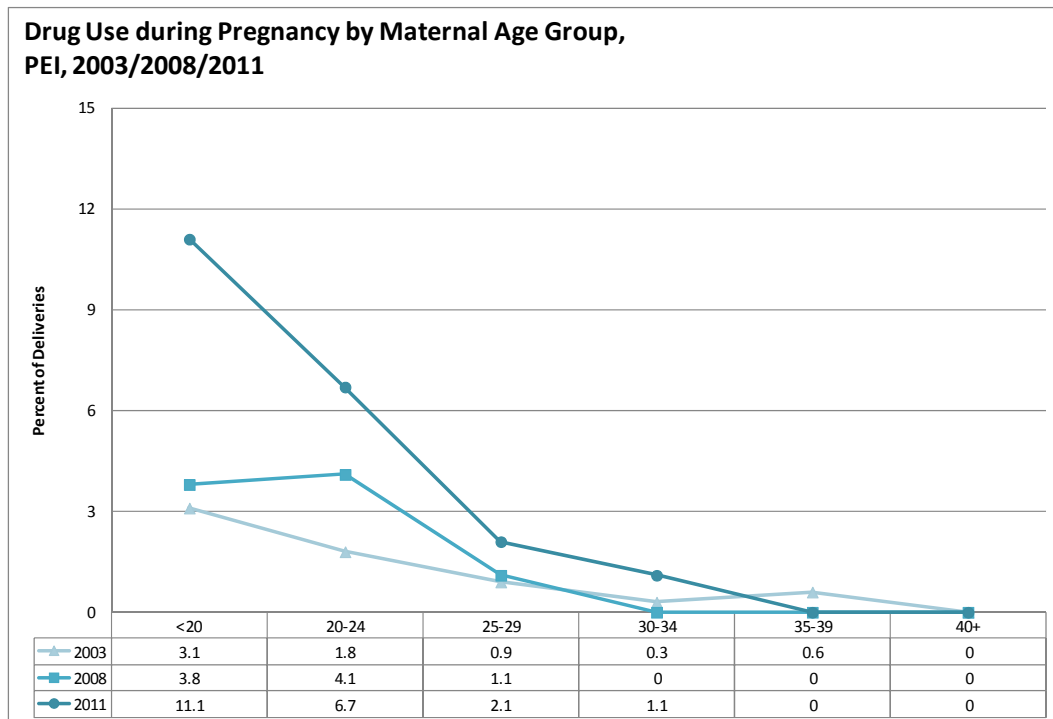
- 0.7% of expecting mothers self-reporting drug abuse in 1998
- 2.8% of expecting mothers self-reporting drug abuse in 2011
- When analyzed by regions East Prince and Queens had the highest increases drug abuse.

In 2011 drug abuse during pregnancy was associated with:

- Low birth weight (10.5% of singleton, liveborn deliveries)
- Preterm birth



There was a concerning and significant increase in the drug use risk factors for younger expectant mothers from 3.1% in 2003 to 11.1% in 2011.



On PEI, data shows that there is also a trending increase in the proportion of females aged 12-19 being hospitalized or visiting a medical professional for drug use or misuse (e.g.: acute toxicity, treatment for addiction or injury related to drug use). Drug abuse data in the PEI Reproductive Care Perinatal Database are based on self-reports. Drug abuse is often under-reported.²⁷

Marijuana use is included in the category of drug abuse in the Perinatal Database. Though often not considered a ‘hard drug’ marijuana is considered to be harmful to use during pregnancy and breastfeeding. It is recommended not to be used by nursing mothers; some studies have correlated marijuana use by mothers to severe neurobehavioural effects in infants due to “significant absorption in infants following exposure via breast milk”.²⁸ There is some concern that fathers smoking marijuana actually increase the risk of SIDS in breastfed infants.²⁹

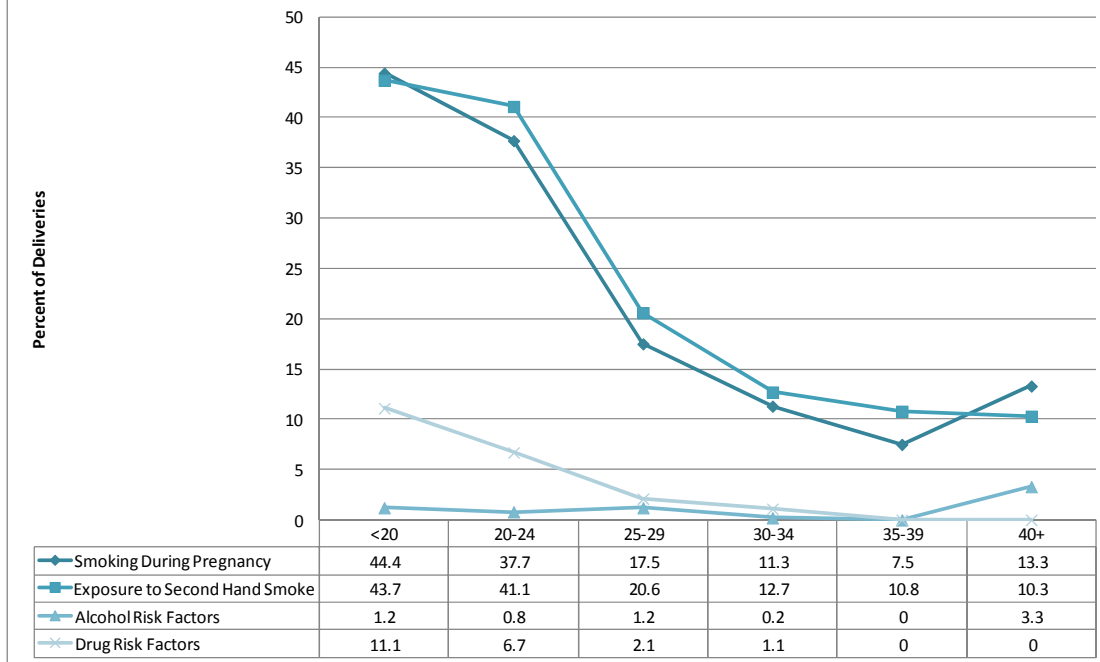
Teratogens such as smoking, exposure to second hand smoke, alcohol and drug use can affect pregnancy, birth and can have long term permanent effects on children over their lifetimes. These effects can include preterm birth rates, congenital anomalies and birthweight.

Preterm Birth Rate, Congenital Anomalies and Average Birthweight by Substance Use Category, PEI, 2011

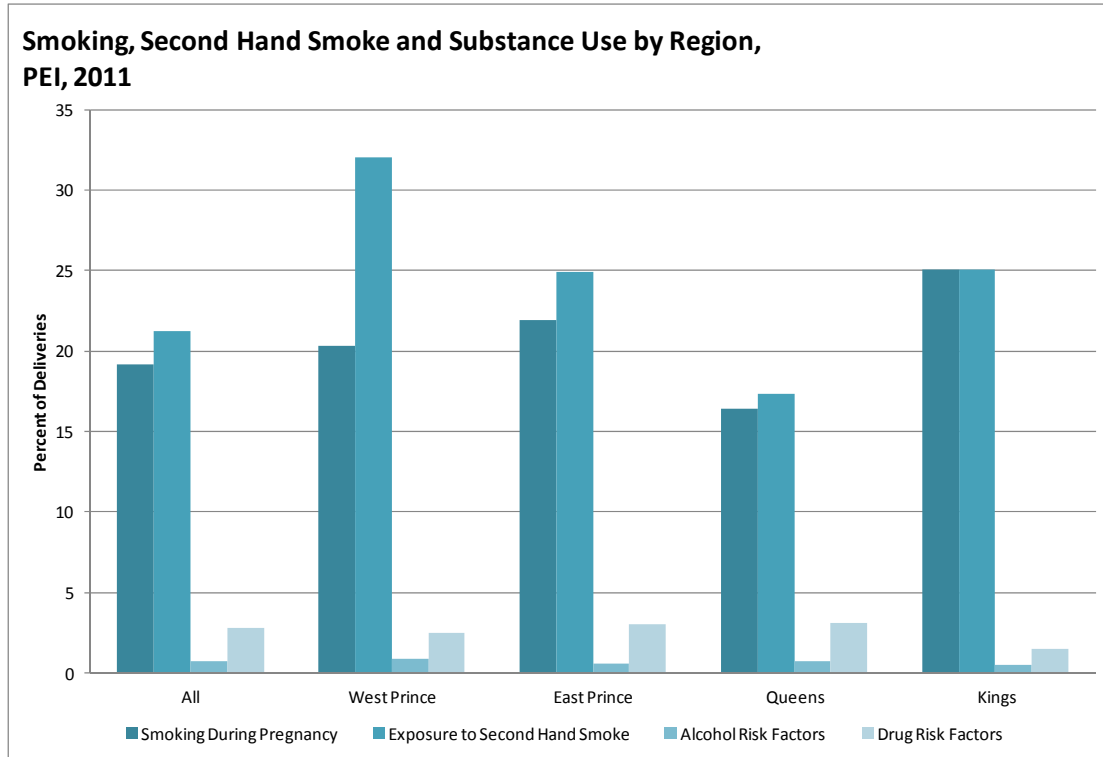
	Smoking	Second Hand Smoke Exposure	Alcohol Use	Drug Abuse	No Risk Factor
Preterm Births (%)	6.7	7.6	10.0	18.0	1.8
Congenital Anomalies* (%)	4.8	8.6	0.0	5.1	5.5
Average Birthweight for Term Singletons (grams)	3365	3378	3314	3365	3570

*It is important to note that congenital anomalies recorded by the PEI Reproductive Care Program Database are only those diagnosed after birth but before the newborn discharge. This does not take into account those congenital anomalies diagnosed over the child's lifetime.

Smoking, Exposure to Second Hand Smoke, Alcohol and Drug Abuse during Pregnancy by Maternal Age Group, PEI, 2011



Since 2008 smoking has decreased in all age categories except in 20-24 years olds where the rate increased from 35.8% to 37.7%. Exposure to second-hand smoke has decreased in all age categories. While self-reported alcohol use has decreased in the <20 years olds (3.8% in 2008) it has increased in the 40+ year old mothers (0% in 2008).



Cigarette smoke remains the most frequent teratogen exposure across all regions on PEI. In 2011, 23.3% of mothers report pre-pregnancy smoking while 21.2% of all mothers report smoking during pregnancy.

1.6 Diabetes and Hypertension

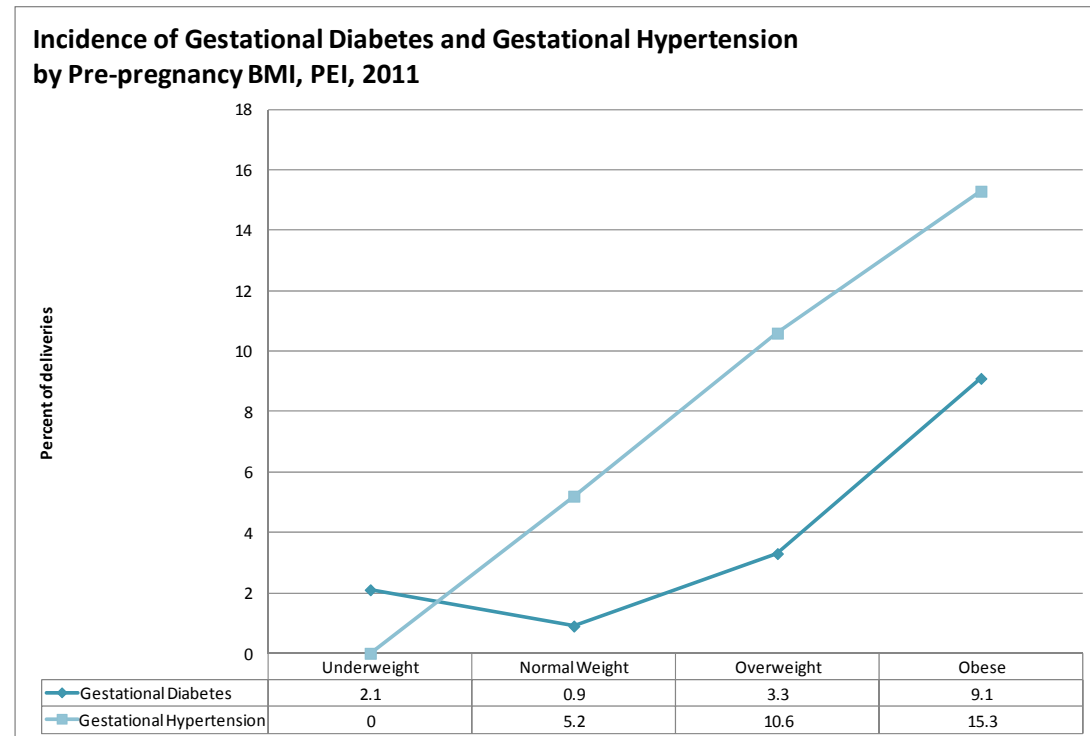
Diabetes and hypertension are two conditions that may be present prior to, or be exacerbated during pregnancy. Diabetes in pregnancy (both pre-existing and gestational) has been linked to changes in maternal and infant health outcomes. There has been a Canadian trend toward improvements in fetal survival in women with pre-eclampsia; however this has led to an increase in preterm births.³⁰ In 2011 9.6% of women were noted to have a hypertensive disorder in pregnancy and 4.0% were noted to have diabetes (pre-existing or gestational).

Pre-pregnancy BMI is associated with the incidence of gestational diabetes and hypertension.

Mothers with Diabetes or Hypertension, PEI, 1998/2003/2008/2011

	Pre-existing Hypertension	Gestational Hypertension	Pre-existing Diabetes	Gestational Diabetes
1998 (%)	1.5	9.7	0.1	4.2
2003 (%)	1.0	11.1	0.7	1.6
2008 (%)	0.8	7.9	0.4	3.0
2011 (%)	1.2	8.5	0.5	3.5

There was no difference in preterm (<37 weeks) birth rates for mothers with pre-existing hypertension, pre-existing diabetes, gestational diabetes, and gestational hypertension as compared to mothers who did not have these conditions. Severe complications which required transfer to a tertiary care centre outside of PEI would not be included in these numbers.



2 Labour and Delivery and Maternal Health Outcomes

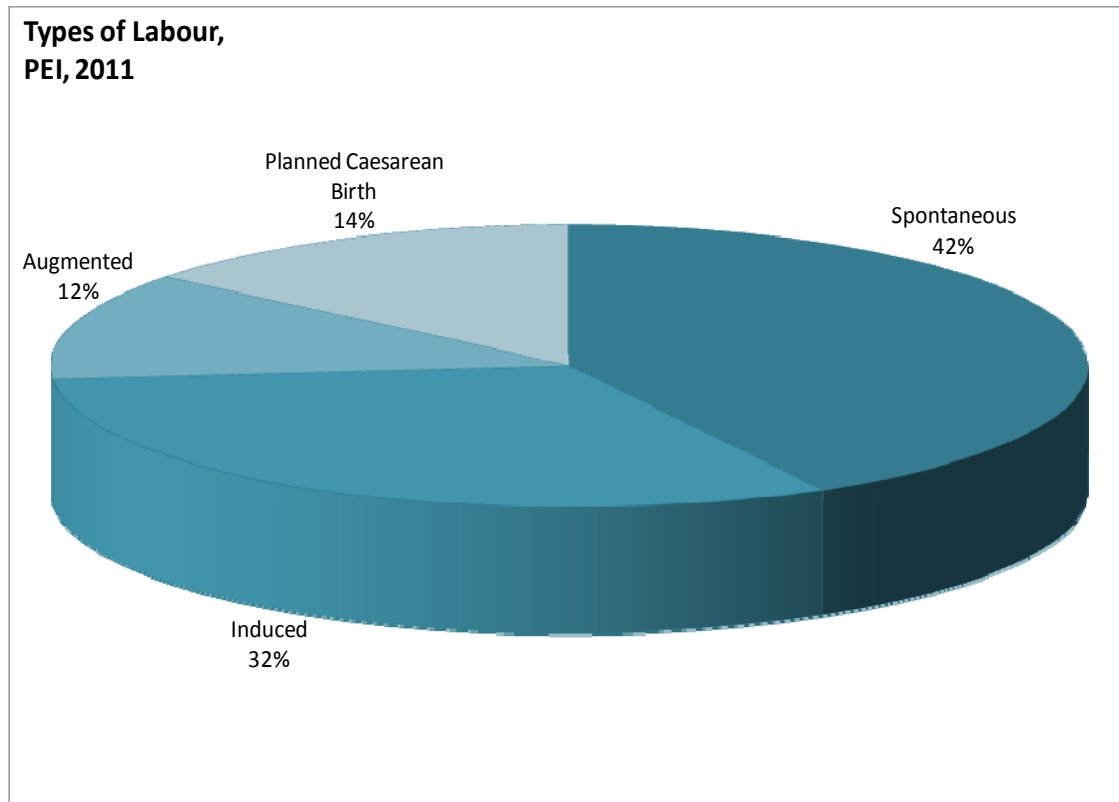
Labour/Postpartum Health Indicators	YEAR			
	1998	2003	2008	2011
Labour induction (per 100 deliveries †)	34.4	38.1	37.4	36.8
Epidural use in labour (per 100 deliveries with labour)	7.1	34.9	38.5	34.3
Episiotomy rate (per 100 deliveries)	33.1	10.3	10.2	7.5
Caesarean birth (per 100 deliveries)	22.1	29.7	30.1	28.5
Postpartum length of stay after vaginal birth (in hours)	-	-	59.8	58.1
Postpartum length of stay after caesarean birth (in hours)	-	-	100.1	89.8

† excludes planned Caesarean births

2.1 Labour

The focus of this section is the medical care and maternal outcomes during labour and birth. These include:

- categories of labour
- epidural use
- assisted vaginal births
- episiotomies and treated lacerations
- Caesarean births and Vaginal birth after Caesarean (VBAC)
- Robson classification of Caesarean births ³¹



When all labours are considered, the induction rate remains consistent at approximately 32%. The Canadian induction rate was approximately 24% reported for 2004-2005, the most recent available data.⁷ Labour induction (ex: amniotomy, and/or oxytocin infusion) rates refer to the use of medical or surgical means to initiate labour.³²

In capturing 'augmentation of labour' the PEI Reproductive Care Program Perinatal Database uses the following description: "Use of oxytocin to improve contractions after labour has started spontaneously. If the cervical dilatation is ≥ 3 cm and regular contractions are present when the oxytocin is initiated, code labour as augmented." In 2011, 23% of spontaneous labours were augmented, compared to approximately 20% in 2008.

2.2 Methods of Delivery

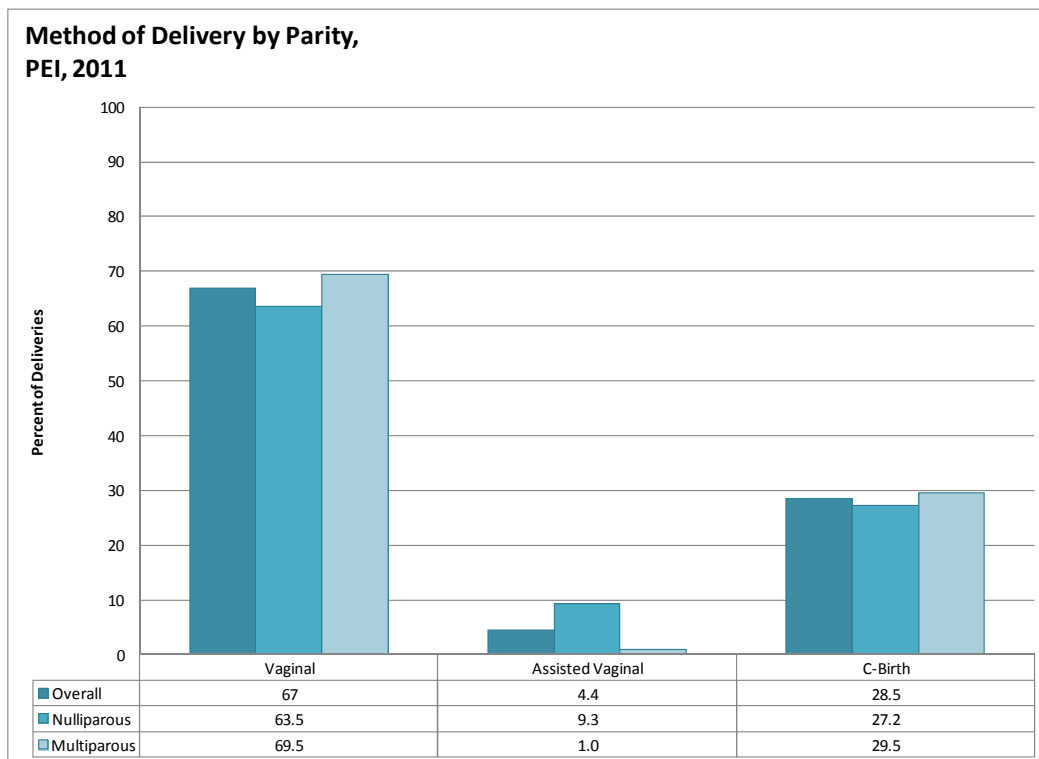
In 2011, the majority of births on PEI were vaginal births. The percentage of births by Caesarean and of assisted vaginal births has decreased since 2003. The Canadian Institute for Health Information (CIHI) “Health Indicators 2013” report noted a Caesarean birth rate of 28.9% for PEI compared with 27.1% in Canada for 2011-2012.³³

Method of Delivery, PEI, 2011

	1998	2003	2008	2011
Vaginal (%)	69.7	64.5	65.5	67.0
Assisted Vaginal (%)	8.2	5.8	4.5	4.4
C-Birth (%)	22.1	29.7	30.1	28.5

Note: Assisted vaginal deliveries include vacuum (66.1%) forceps (24.2%) vacuum & forceps (9.7%)

In 2011, nulliparous women were less likely to undergo a Caesarean birth which is the reverse from 2008. Nulliparous women were more likely to have an assisted vaginal birth than multiparous women in 2011.



2.3 Inductions and Epidurals

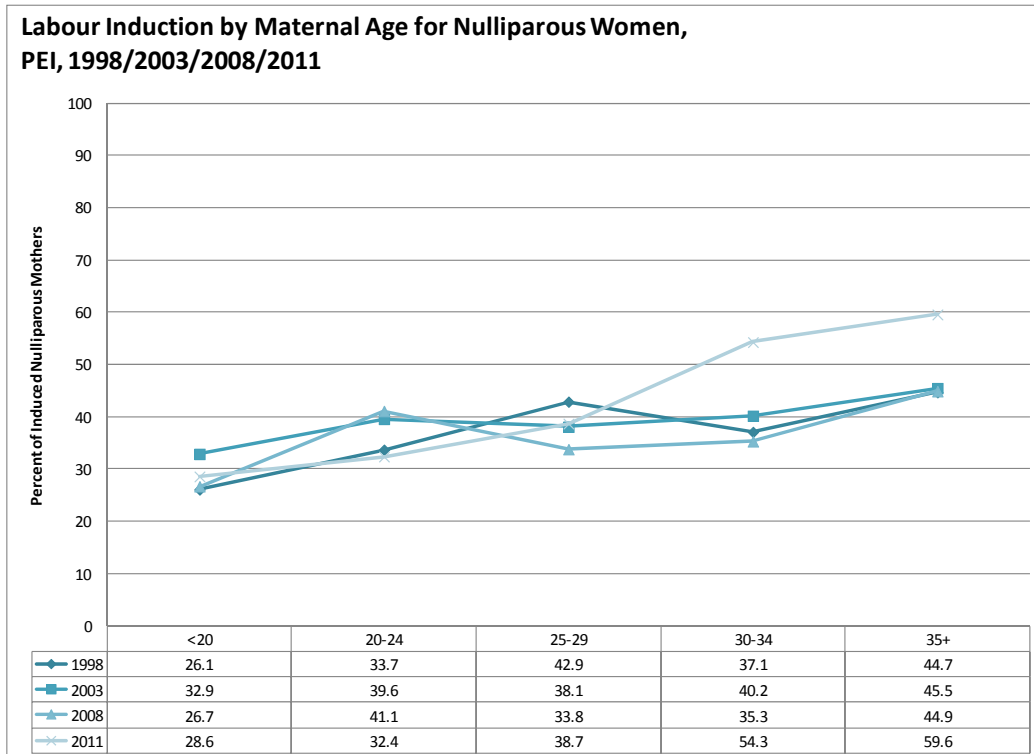
The rate of induction in these figures has been calculated excluding women where it was noted that a Caesarean birth was planned prior to labour initiation. In 2008 the rate of induction was similar regardless of parity, while in 2011 nulliparous women were receiving significantly more inductions than multiparous women. This was similar to years previous to 2008.

Rate of Labour induction by Parity, PEI, 2011

	1998	2003	2008	2011
Overall	34.4	38.1	37.4	36.8
Nulliparous (%)	38.0	41.0	38.2	41.3
Multiparous (%)	31.8	34	36.6	32.9

For nulliparous women, every year increase in age makes her 8% more likely to be induced. Older nulliparous women are most often induced and this trend has remained consistent over time. Similarly, teenage nulliparous women are least likely to be induced.

Labour Induction by Maternal Age for Nulliparous Women, PEI, 1998/2003/2008/2011



For women whose labour was induced the majority had a combined method of induction, most often oxytocin and artificial rupture of membranes.

Method of Labour Induction by Parity, PEI, 2011

	ARM	Combined Method	Oxytocin	Prostaglandin	Other
Overall	9.3	36.1	26.1	26.1	2.3
Nulliparous (%)	5.2	35.4	29.3	28.8	1.3
Multiparous (%)	13.7	37.0	22.7	23.2	3.3

Overall, post dates (≥ 41 weeks gestation) were the most frequently noted primary indication for induction.^{34, 35} When reviewing instances where post dates was noted as the indication for induction, 83% of the women were ≥ 41 weeks gestation. There are significantly more nulliparous women (90%) induced for post dates than multiparous (75.3%).

Primary Reason for Induction by Parity, PEI, 2011

	Overall	Nulliparous	Multiparous
Fetal Compromise*	4.5	5.4	3.4
Maternal Condition**	13.6	16.6	10.3
Other***	18.0	5.4	31.9
Post Dates	37.5	39.0	35.8
Premature Rupture of Membranes	26.5	33.6	18.6

* Fetal compromise: isoimmunization, suspected fetal distress, oligohydramnios, polyhydramnios, fetal anomaly, suspect intrauterine growth restriction (IUGR)

**Maternal condition: gestational Diabetes mellitus, Diabetes mellitus, significant Antepartum hemorrhage, hypertension, Pruritic Urticarial Papules and Plaques, cholestatic jaundice, thrombocytopenia, seizures

***Other: social/elective, history of precipitate labour, current intrauterine death, previous fetal death, poor obstetrical history, geographic, maternal age, multiple pregnancy, unstable lie, macrosomia, other

The rate of epidural administration for labour has increased significantly since 1998:

- 7.1% in 1998
- 38.5% in 2008
- 34.3% in 2011

According to the CIHI report “Highlights of 2010–2011: Selected Indicators Describing the Birthing Process in Canada” ‘In Canada, epidurals were used in 56.7% of all vaginal deliveries in 2010-11’.³⁶ This is a significant increase from 45.7% in 2001-2002. Epidural for labour is not available at all times in the two maternity hospitals on PEI.

2.4 Perinatal Trauma

Episiotomies and third and fourth degree lacerations are types of perinatal trauma. The rate of episiotomies has decreased significantly over time:

- 33.1% in 1998
- 10.2 % in 2008
- 7.5% in 2011

Of all episiotomies performed in 2011, over 77% were for nulliparous women (compared to 60% in 2008). Based on the 2008 Canadian Perinatal Health Report, 20.4% of women in Canada received an episiotomy (2004/05), compared to 14.6% of women in PEI.⁷

Despite overall decreases in the episiotomy rate there has not been any increase in the rates of third or fourth degree lacerations. Third and fourth degree lacerations can impact length of stay for mothers as well as recovery time.

Rate of Third and Fourth Degree Lacerations, PEI, 1998/2003/2008/2011

	Third Degree	Fourth Degree
1998	3.1	0.8
2003	2.4	0.3
2008	2.4	0.6
2011	2.1	0.0

Third and fourth degree lacerations for 2004/05 were similar, 3.2% in PEI (2.1% in 2011) and 3.8% nationally (newer nationally published data unavailable).⁷

2.5 Caesarean Births

Robson Classification

Caesarean birth (C-birth) rates have risen around the world, particularly in developed countries.^{31, 37, 38, 39} This rise is of debate and public health concern due to potential maternal and newborn health risks and health system cost issues.^{31, 37, 38, 39, 40}

The Robson Classification system was developed to define comparable, mutually exclusive groups of mothers using clinical factors such as parity, obstetrical history, course of labour and delivery, and gestation.³¹ The ten groups are analyzed in relation to the size of the group, C-birth rate within the group, and the contribution of the groups to the overall C-birth rate. When data is analyzed using the Robson Classification System it follows a specific methodology designed to explore groups of mothers and their overall impact on C-births. One of the disadvantages of the classification is that it identifies who are having C-births, but does not explain why they are having them.^{40, 41} This is particularly significant when looking at rates of C-birth that are occurring by mother's request, or for specific high-risk medical conditions. Some jurisdictions such as British Columbia gather data regarding maternal requests, since maternal request is not taken into account in the Robson Classification system, but can explain some increase in C-birth rates.⁴² The Robson Classification has been recommended by the World Health Organization to standardize the comparison C-births both internationally and locally. Using a single system facilitates auditing, analyzing, and comparing rates across settings, regions and over time.^{31, 40}

Recently in 2012, the SOGC recommended that a modified Robson Criteria be used to sub-classify women who had a C-birth to help further compare rates and indications. These recommended sub-groups show whether the C-birth occurred after an expecting women went into spontaneous labour, was induced or before labour (depending on the grouping).⁴¹

Group	Description	Size of Group*				C-Birth Rate**				Contribution of Each Group***			
		1998	2003	2008	2011	1998	2003	2008	2011	1998	2003	2008	2011
1	Nulliparous, singleton, cephalic, ≥37 weeks, spontaneous labour	22.3	22.2	23.3	21.6	12	21.8	24.9	11.9	2.7	4.8	5.8	2.6
2	Nulliparous, singleton, cephalic, ≥37 weeks	15.8	16.5	16.4	16.8	37.3	42.4	40	39.3	5.9	7.0	6.6	6.6
	b) induced labour				15.8				35.8				5.7
	c) C-birth before labour				0.9				100				0.9
3	Multiparous, without uterine scar, singleton, cephalic ≥37 weeks, spontaneous labour	26.7	24.9	23.3	25.3	2.5	2.6	2.1	1.4	0.7	0.6	0.5	0.4
4	Multiparous, without uterine scar, singleton, cephalic ≥37 weeks	15.1	14.7	14.3	14.8	9.3	8.2	8.3	15.0	1.4	1.2	1.2	2.2
	b) induced labour				13.5				7.9				1.1
	c) C-birth before labour				1.2				94.1				1.1
5	Multiparous, previous uterine scar, singleton, cephalic ≥37 weeks	11.3	12	13.7	14.5	60.7	77.5	79.7	83.7	6.8	9.3	10.9	12.1
	a) spontaneous				3.4				57.5				1.9
	b) induced labour				1.4				36.8				0.5
	c) C-birth before labour				9.7				99.3				9.7
6	Nulliparous, singleton breech	1.4	1.9	1.9	1.9	90.5	100	100	92.3	1.3	1.9	1.9	1.7
7	Multiparous, singleton breech including previous uterine scar	1.9	1.9	1.1	1.8	82.1	100	93.8	92	1.5	1.9	1	1.6
8	Multiples including previous uterine scar	1.1	1.5	1.4	0.9	35.3	66.7	55	76.9	0.4	1	0.8	0.7
9	Singleton, transverse or oblique lie including previous uterine scar	0.3	0.6	0	0	100	100	0	0	0.3	0.6	0	0
10	Singleton, cephalic, ≤36 weeks including previous uterine scar	4.0	3.8	4.6	2.4	26.7	34	30.3	23.5	1.1	1.3	1.4	0.6
Overall Caesarean Rate									22.1	29.7	30.1	28.5	

*Size of group = total number women in group/overall total number of women X 100%

**C-birth rate = number C-birth total /number women in each group X 100%

***Contribution of each group = number C-birth in group/overall number women X 100%

Size of Groups

The size of groups 1 and 2 continues to remain stable over time, however there is a lower proportion of nulliparous women in group 1 compared to 2 suggesting a high induction issue.

The sizes of groups 3, 4, and 6 through 9 are also stable over time. The decrease in size of group 10 may be a reflection of premature labours being referred to IWK, our tertiary care center and therefore that data is not included in this report.

The size of group 5, our previous C-birth mothers, continues to increase over time to a current size of 14.5%. The average or goal size of this group is 10% and higher sizes are reflective of high C-birth rates in the past, particularly in groups 1 and 2.

C-Birth Rates

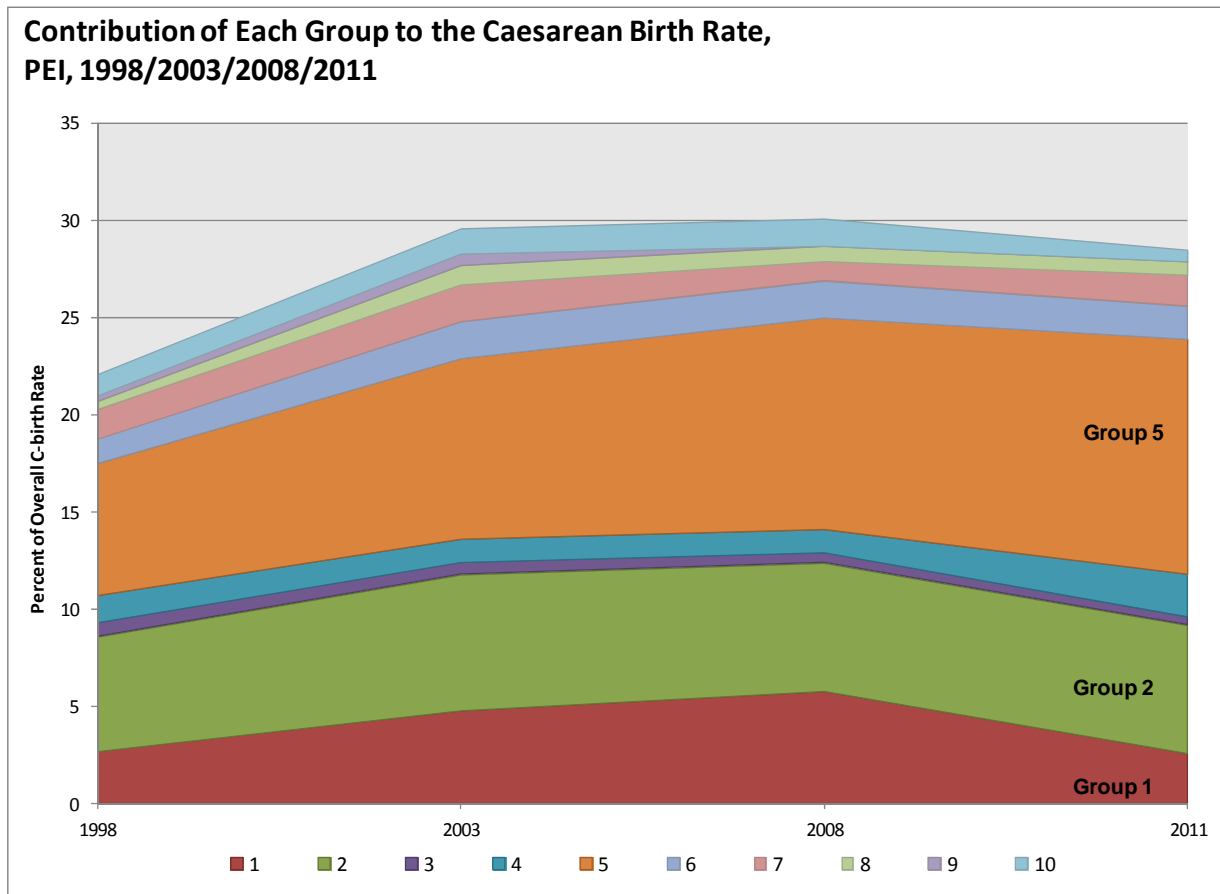
The rate of C-birth in group 1 has decreased to 11.9% (2011) from 24.9% (2008). This change alone explains the overall decrease in 2011 C-births to 28.5% from 30.1% in 2008. The goal C-birth rate for group 1 mothers is <10% so PEI has seen much progress towards this.

The C-birth rate in group 3 was 1.4% which is ideal. The C-birth rate in group 4 has increased since 2008. This demonstrates that compared with 2008, multiparous women who are induced are more likely to end up with a C-birth than 3 years previously. This increase has impacted the overall C-birth rate. The C-birth rate in group 5 is high in 2011 at 83.7% and is a reflection of VBAC attempts and successes. Optimally group 5 should have a rate between 50-60%.

Overall Contribution of Each Group

Groups 1, 2, and 5 normally contribute approximately two thirds of the overall C-birth rate. In PEI in 2011 these groups account for 75% of the overall rate.

The overall C-birth rate has decreased since 2008 and is lower than the rate in 2003. It appears that much progress has occurred in group 1 mothers which will over time help reduce the group 5 size in future which will in turn decrease C-birth rates further. It is important to remember that C-birth rates should not be considered as high or low, without taking the relevant epidemiological information into consideration.³¹



The contribution of Group 1 to the overall C-birth rate has decreased in 2011. This is the most important group in changing our future C-birth rates. This group contains nulliparous women, with a normal singleton presentation that have gone into spontaneous labour.

PEI rates of C-births had been increasing (similar to other Canadian provinces)^{37, 43, 45} but have decreased in 2011 compared with 2008. Nulliparous women are being induced in higher numbers than would be expected. A review of this practice will be important in our C-birth rates moving forward. If the size of group 2 relative to group 1 can be reduced then the overall C-birth rate will continue to decline because it will decrease the future size of group 5 and hopefully increase the size of groups 3 and 4. Reviewing C-births using the Robson (or Modified) Classification is helpful in reporting C-births rates over time but more study is needed to truly determine the factors contributing to C-births (i.e. age, weight, maternal choice, health policy). Once these factors are understood, effecting C-birth appropriateness will be more achievable.

Vaginal Birth After Caesarean (VBAC)

In 2011, 15.6% of mothers who had a previous C-birth gave birth vaginally (19.6% in 2008). Forty-five women on PEI attempted a VBAC delivery and 73.3% of these were able to give birth vaginally.

Analysis of the rate of VBAC is complicated by the determination of a woman's eligibility for a trial of labour. Not all women who had a previous C-birth would be considered candidates to attempt a VBAC.⁴⁴ The SOGC also makes recommendations for the use of induction medications (i.e.: prostaglandins) specific to VBAC candidates which may impact a trial of labour decision. The PEI Reproductive Care Program database does not capture the number of mothers who had a previous Caesarean birth that are candidates for VBAC due to the complex number of factors considered by obstetricians.^{34, 44, 45}

Compared with 1998, the rate of primary Caesarean birth has decreased while repeat C-birth rates have doubled.

Primary and Repeat Caesarean Birth, PEI, 1998/2003/2008/2011

	Primary	Repeat
1998 (%)	16.0	6.1
2003 (%)	16.0	13.7
2008 (%)	17.8	12.3
2011 (%)	14.9	13.6

As the rate of primary C-birth increases, so subsequently does the rate of repeat C-births. In 2011, the most common indication for C-birth was previous C-birth; this has been a consistent increase over time. The second most reported indication for Caesarean birth in 2011 was dystocia (18.1%), although this primary indication has decreased since 2008 (25.7%).

2.7 Maternal Length of Stay

The appropriate length of hospital stay for childbirth has been a controversial issue for decades, but is generally seen as an indicator of maternal health. The mother's health condition does affect length of stay but a number of other factors do as well:

- healthcare policies and resources
- characteristics of the health care delivery system
- availability of follow-up resources/supports in the community
- socio-demographic characteristics of the mother.⁷

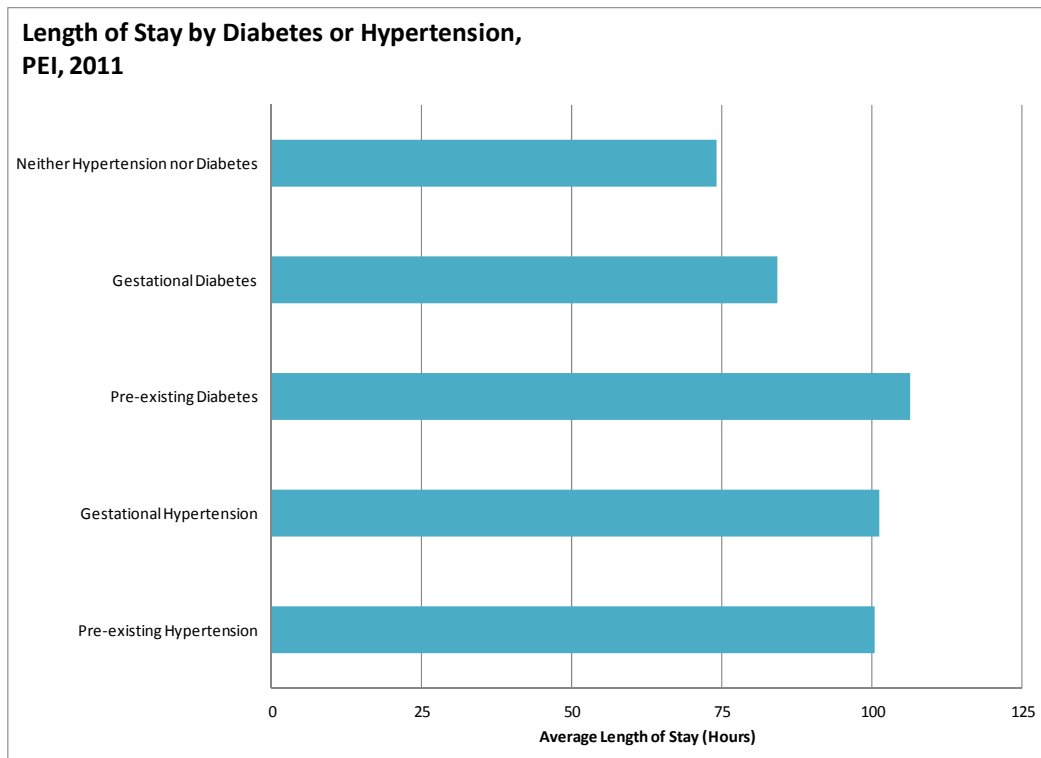
Length of Stay by Delivery type, PEI, 2011

	Vaginal	C-Birth
Average Antepartum Length of Stay (hrs)	8.9	13.6
Average Postpartum Length of Stay (hrs)	58.1	89.8
Average Total Length of Stay (hrs)	66.9	102.4

Women who had a C-birth on PEI had a postpartum hospital stay 31.7 hours longer than those who had a vaginal birth (this difference decreased from 40.3 hours in 2008). In 2011 the total length of hospital stay for vaginal births was 66.9 hours (2.8 days) and for C-births 102 hours (4.3 days).

An overly shortened length of stay (less than 2 days for vaginal birth and less than 4 days for C-births) has been shown to have an effect on breastfeeding duration, maternal and infant readmission & infant morbidity and mortality. Government and professional guidelines have recommended a postpartum follow-up visit shortly after hospital discharge which can positively impact breastfeeding, maternal/infant readmissions and infant outcomes considerably.^{46, 47, 48} In PEI all women are offered a postpartum home visit by Public Health Nursing, with continued follow-up as necessary.

Mothers with diabetes or hypertension, either pre-existing or gestational, were more likely to experience a C-birth (37.8%) than mothers without these conditions (27.2%) and were more likely to have a longer stay in hospital (4 days versus 3 days for those without these conditions) as demonstrated in the table below. This longer hospital stay may also be attributed to the longer stay associated with C-birth as compared to vaginal birth.



2.8 Maternal Morbidity and Mortality

The most common severe maternal morbidities in 2011 were:

- severe pregnancy-induced hypertension (1.4%)
- anesthetic complications (0.8%)
- postpartum haemorrhage with transfusion (0.5%)

As would be expected, length of stay was significantly increased when complications occurred (4.9 days) compared to no complications (3.2 days).

Women with any severe maternal morbidity (57.1%) were more likely to experience a C-birth than women with no severe condition (27.8%).

There were no reported maternal deaths in PEI in 2011. Maternal deaths are defined as deaths of women while pregnant or within 42 days of the completion/termination of pregnancy, irrespective of duration or site of pregnancy, from any reason related to pregnancy.⁴⁶ Severe maternal morbidity is used to monitor the quality of maternity care since the incidence of maternal deaths has declined in developed countries.

3 Newborn Health Outcomes

Newborn Health Indicators	YEAR			
	1998*	2003	2008	2011
Births (Babies born on PEI)	1509*	1426	1434	1405
Birth Weight (average in grams)	3475*	3492	3464	3482
Low Birth Weight (≥ 500 g to 2500g) (per 100 live births)	4.6* †	4.0 †	5.0 ‡	4.0 ‡
High Birth Weight (≥ 4500 g) (per 100 live births)	3.7*	3.2	2.7	2.9
Breastfeeding Initiation (per 100 live births)	-	67.9	74.0	78.3
Breastfeeding at Discharge (per 100 live births)	59.3*	62.8	70.5	73.2
Multiple births (rate per 100 live births)	-	2.3	1.4	0.9
Preterm Birth rate (per 100 live births)	5.4*	5.7	6.4	5.6
Crude stillbirth rate (per 1000 total births)	2.0*	8.4	3.4	2.1
Congenital Anomaly (per 100 live births)	-	3.8	5.8	6.1
Newborn Average Length of Stay (in hours)	-	-	87.5	86.8

* 1998 includes data from out of province births (i.e.: IWK) which tend to be premature, high-risk or low birth weight babies

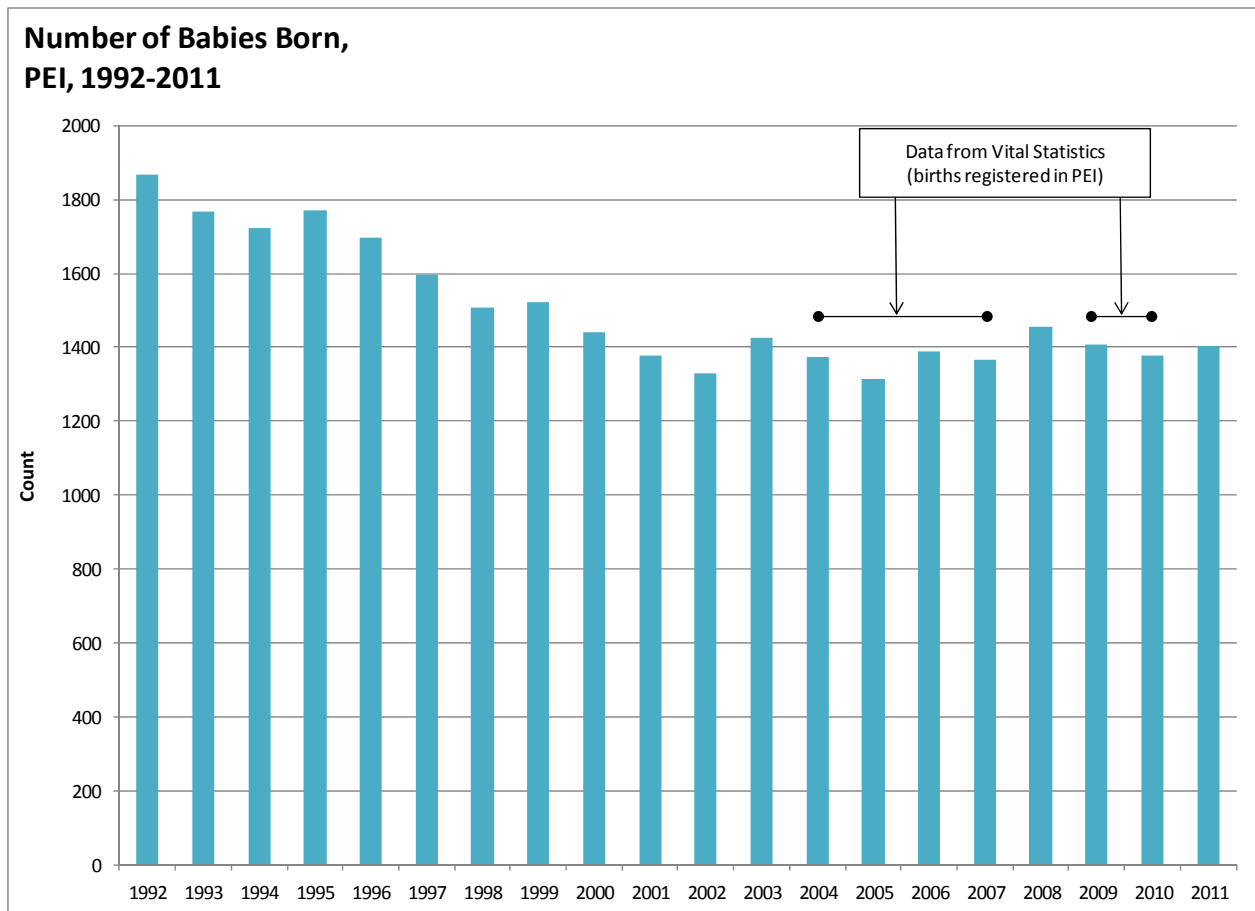
† includes stillbirths

‡ excludes stillbirths

3.1 Newborns

In 2011 there were 1,405 babies born on Prince Edward Island, 2 of which were homebirths. There were also approximately 25 babies born at the IWK Hospital in Nova Scotia to Island mothers who required more complex care. These mothers and babies are not included in this report as the information for these babies is unavailable from Nova Scotia at this time.

Statistics Canada reports show that from 2007 to 2008 there was a large percentage increase of 6.8% in births on PEI. This correlates with a high rate of international migration in 2008.^{49, 50} Since then PEI has seen yearly percentage decreases in births in both 2009 (-1.8%) and 2010 (-3.7%) with a slight increase in 2011 (+1.2%). Canada as a whole has seen little change in numbers of births over the last 3 years.



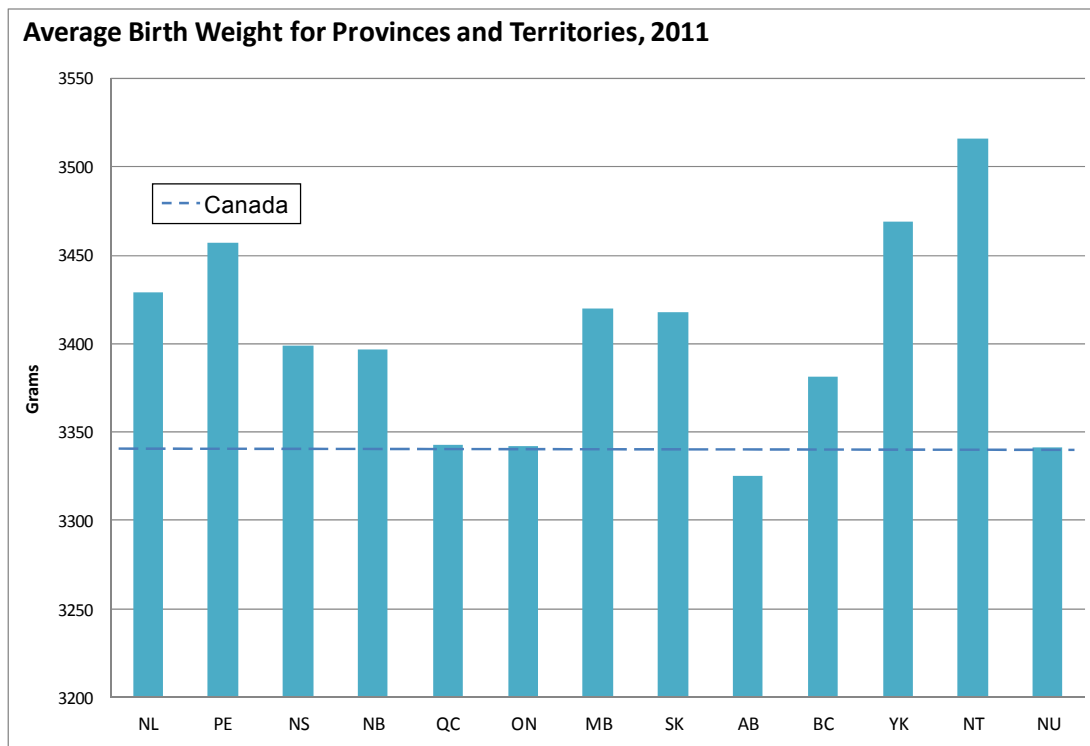
3.2 Newborn Birth Weight

Birth weight has been shown to be the primary determinant of perinatal, neonatal, and post-natal outcomes for newborns.^{30, 51} Gestational ages can be difficult to determine while the measurement of birth weight can be relatively simple, accurate, valid and reproducible therefore it is the most commonly used indicator worldwide to compare populations.⁵² Low birth weight can result from preterm or IUGR birth, or a combination of the two and may have health implications. High birth weight can be associated with both infant and maternal birth complications and may increase the risk of Type 2 diabetes later in life.^{2,7, 49}

Newborn Birth Weight Classifications:

- Low Birth Weight: $\geq 500\text{g}$-2,500 grams
- High Birth Weight: 4,000 grams-4,499 grams
- Macrosomic: $\geq 4,500$ grams

The average newborn birth weight was 3,482 grams. These numbers do not include newborns of PEI mothers who were born outside the province of PEI. Statistics Canada reports indicate the mean birth weight for babies born in Canada was 3,355 grams.



In Canada 6% of live births were categorized as low birth weight and 1.9% as high birth weight in 2011.^{2, 49}

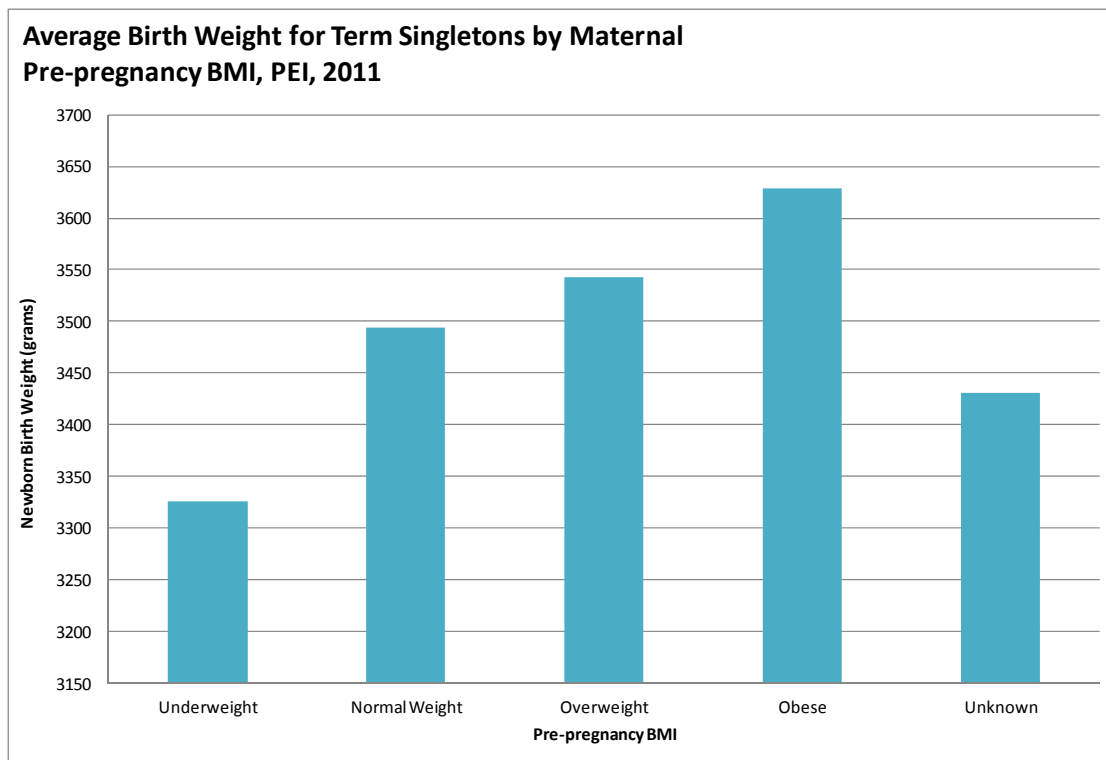
Of PEI live births 4.0% were low birth weight and 2.9% were high birth weight.

Live Term Singleton Birth Weight Categories by Maternal Pre-Pregnancy BMI, PEI, 2011

	Underweight	Normal Weight	Overweight	Obese
Low Birth Weight (%)	0.0	2.9	2.0	2.0
High Birth Weight (%)	9.3	10.5	12.5	18.2
Macrosomic (%)	0.0	1.8	3.7	5.2

Mother's pre-pregnancy BMI impacts the infant's birth weight. When term singleton births were reviewed, it was noted that as the maternal pre-pregnancy BMI increased, so did the likelihood the baby would be either high birth weight or macrosomic.

The average birth weight for term singleton infants born to mothers whose pre-pregnancy BMI put them in the obese category was 3,629 grams. This compares to 3,494 grams for infants whose mothers are in the normal weight category (according to pre-pregnancy BMI).



3.3 Infant Feeding

Many worldwide and Canadian health organizations support breastfeeding, these include: Health Canada (HC), PHAC, Canadian Paediatric Society (CPS), SOGC, the United Nations Children's Fund, and the World Health Organization. The rationales given highlight breastfeeding providing optimal nutritional and immunological benefits for the growth and development of infants. Breastfeeding is recommended for the first six months of life, at least, for healthy term infants. Breast milk is the optimal food for infants, and breastfeeding may continue for up to two years and beyond.^{47,48,53,54,55} Increasing breastfeeding rates has also been shown "help reduce the prevalence of various illnesses and health conditions, which in turn results in lower health care costs".⁵⁶

Recognizing the importance of promoting, supporting and protecting breastfeeding has become increasingly important across jurisdictions. The PEI Department of Health and Wellness recently adopted a Breastfeeding Policy that "unequivocally supports breastfeeding as the optimal form of nutrition for newborns given its beneficial effects on infants' growth, immunity, and cognitive development."⁵⁷ (Appendix A) The Baby Friendly Initiative is being utilized across the world as a focused, consistent and evidence-based method of increasing breastfeeding rates.^{48, 58}

In 2012 a joint statement of HC, CPS, Dietitians of Canada, and Breastfeeding Committee for Canada titled 'Nutrition for Healthy Term Infants: Recommendations from Birth to Six Months' was released to be used by parents and caregivers, with tips on talking with families about infant nutrition.

'Nutrition for Healthy Term Infants: Recommendations from Birth to Six Months' states:

- Breastfeeding is the normal and unequalled method of feeding infants.
- Breastfeeding initiation and duration rates increase with active protection, support, and promotion.
- Supplemental Vitamin D is recommended for breastfed infants.
- First complementary foods should be iron-rich.
- Routine growth monitoring is important to assess infant health and nutrition.
- Feeding changes are unnecessary for most common health conditions in infancy.
- Breastfeeding is rarely contraindicated.⁵³

It also includes specific guidelines on the use of breast milk substitutes.

The 2012 PEI Chief Public Health Officer's Report and Health Trends noted that breastfeeding research has indicated protective effects for infants such as:

- Illness, infection and allergy reduction
- Reduction in risk factors for Type 2 diabetes and childhood obesity.⁵⁹

Mothers who breastfeed may also benefit by lower rates of:

- Osteoporosis
- Specific types of ovarian and breast cancer.⁵⁹

According to 'Breastfeeding Initiation in Canada: Key Statistics and Graphics (2009-2010)', 87.3% of Canadian mothers breastfed or tried to breastfeed their last child, which was down 0.6% from 2007-2008. Rates were lowest in the Atlantic Region at 74.8% and highest in British Columbia at 93.1%. Breastfeeding initiation rates have improved in the Atlantic Region by 1% since 2007-2008.⁵⁵ In Canada breastfeeding rates have been found to be related to income levels, education levels, marital status, area of residence and age in 2009-2010.^{55, 60}

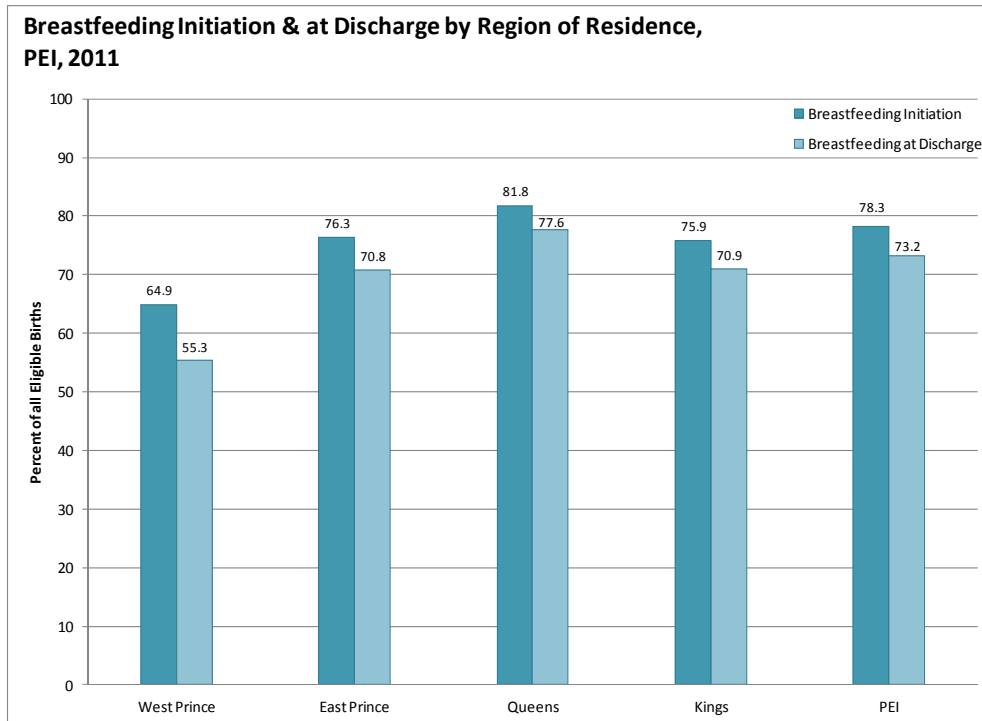
In PEI in 2011 approximately 78.3% of all mothers initiated breastfeeding with their newborns. At discharge from hospital, 73.2% were still breastfeeding, which is a loss of 5% of breastfeeding mothers within days of giving birth.

In PEI in 2011 breastfeeding rates have been found to be related to:

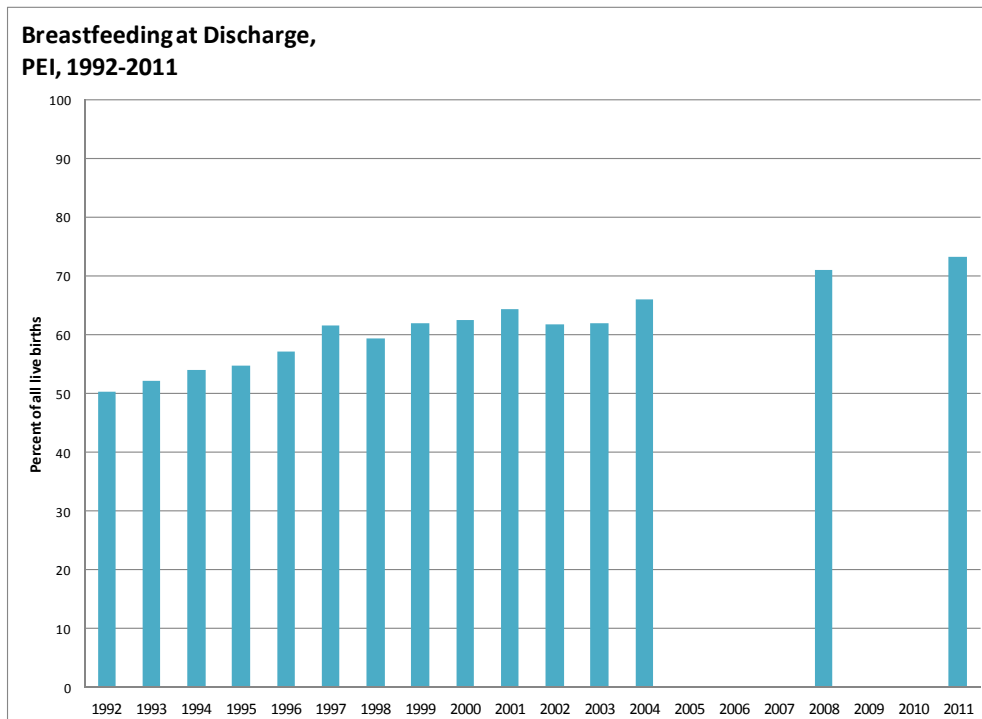
- Maternal age:
 - Those 25 years of age were less likely to be breastfeeding at discharge with 61.2% in 2011 (50% in 2003 and 63% in 2008)
 - For mothers >25 years breastfeeding at discharge rates were 76.7% in 2011 (67% in 2003 and 73% in 2008).
- Women in partnerships (married or common-law) were more likely to be breastfeeding at discharge (78%) than women in no relationship (single, separated, or divorced) (57.2%). There is no change in breastfeeding at discharge rates for single women since 2008; this factor is important to breastfeeding rates since 23% of pregnant women in PEI were not in a relationship in 2011.
- Normal weight mothers (based on pre-pregnancy BMI) are significantly more likely to initiate breastfeeding than are underweight, overweight and obese mothers combined.

Vaginal or Caesarean birth did not affect the rates of breastfeeding initiation or breastfeeding at discharge.

Breastfeeding rates vary in different regions of the province. West Prince has the lowest rate of breastfeeding at both initiation and discharge from hospital when compared to other regions of PEI.



Breastfeeding at discharge is a better indicator than initiation of a jurisdiction's breastfeeding rate. On PEI the rate of breastfeeding at discharge is improving slowly over time.

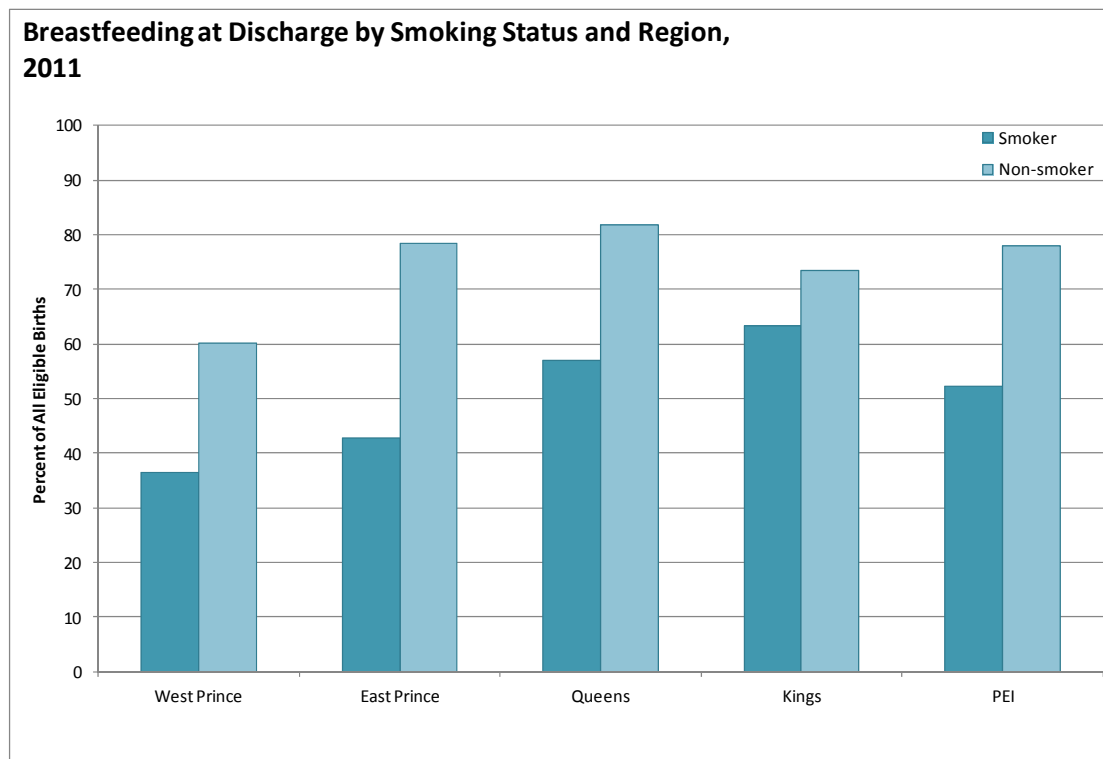


“Nutrition for Healthy Term Infants: Recommendations from Birth to Six Months” recommends that a mother should be advised to reduce or stop smoking since smoking can affect:

- Mother’s milk production
- Infants’ growth
- Infants’ sleep patterns in the short term.⁵³

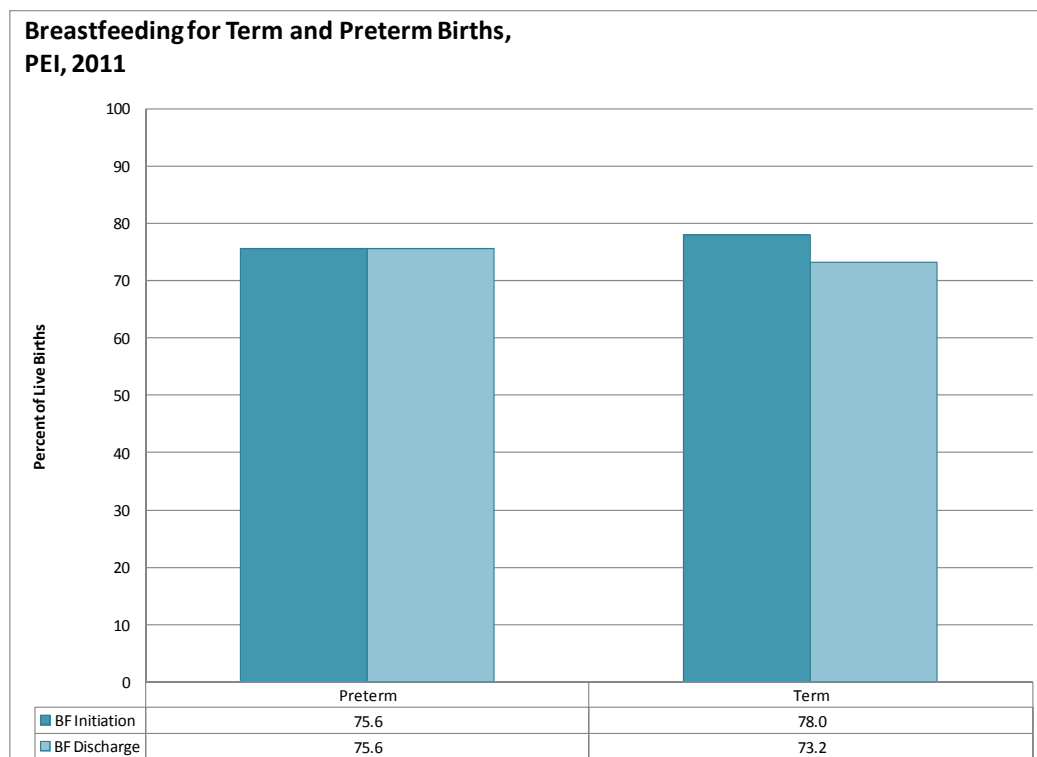
Healthcare providers should advise the mother to keep breastfeeding even if she keeps smoking since breastfeeding can reduce the negative effects of the infants’ exposure to cigarette smoke.⁵³ A recent study out of Nova Scotia showed that one modifiable risk factor to early cessation of exclusive breastfeeding was smoking.²⁰

Smoking mothers are much less likely to breastfeed at discharge when compared to non-smoking mothers. This trend is evident across the province.



Breast milk fed infants in the neonatal intensive care unit (NICU) have:

- fewer severe infections
- less necrotizing enterocolitis
- reduction in colonization by pathogenic organisms
- some data also documents an improved neurodevelopmental outcome for preterm infants fed breast milk
- some research supports a decreased length of hospital stay for babies fed expressed human breast milk.⁶¹

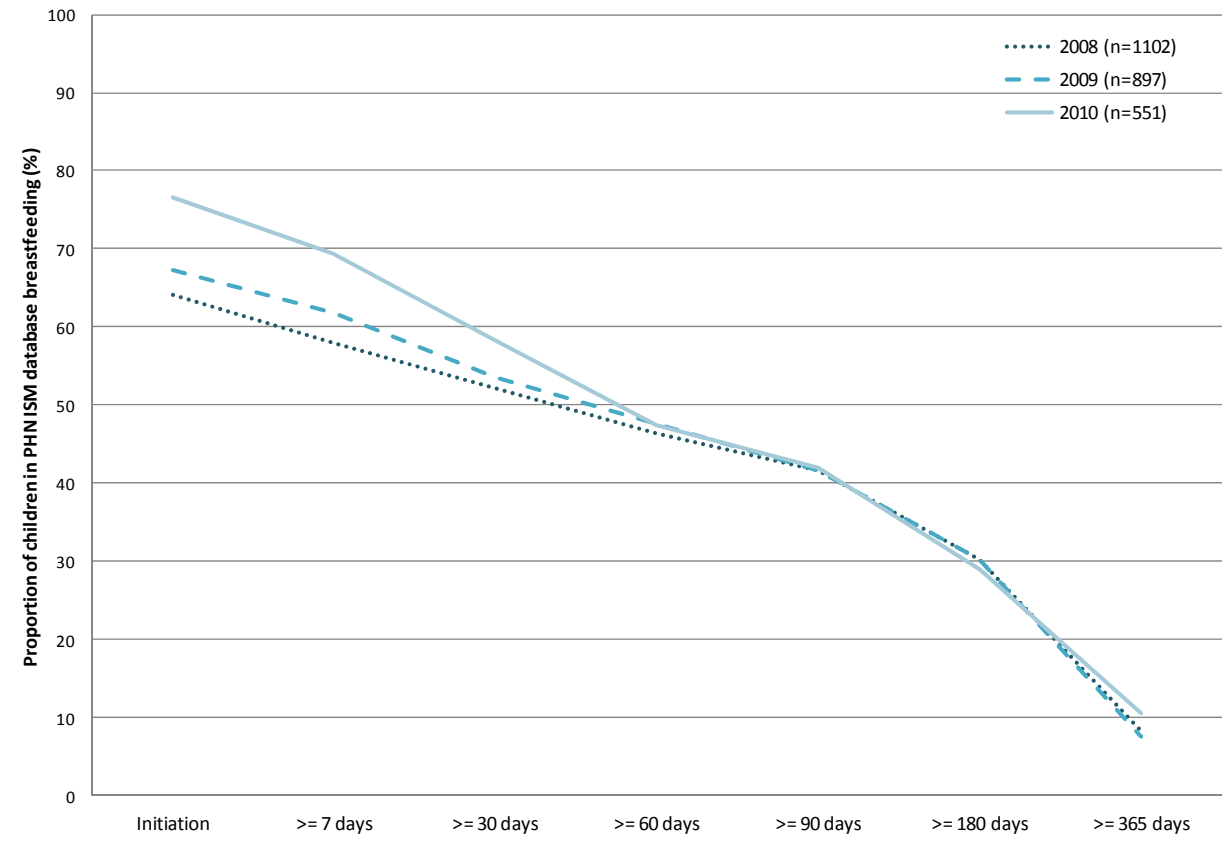


There is increased awareness/acknowledgement of the added importance of breast milk for preterm infants. In 2011 there was no significant difference between breastfeeding rates for premature infants or term newborns. Within the PEI Reproductive Care Program Perinatal Database data gathered on breastfeeding rates is based on breastfeeding or breast milk feeding, partial or exclusive.

Interestingly, though there was no change in initiation or discharge rates for preterm infants (75.6%), term infants consistently have lower rates of breastfeeding at discharge compared to initiation. This may be related to mothers and preterm infants being in hospital for much longer durations therefore having more time to problem-solve with care providers if they encounter difficulties. Preterm infants are also not discharged unless they can feed effectively and consistently, and most require intensive breastfeeding support throughout their hospital stay.

When infants are breastfed for longer durations there are increased health benefits realized by infants, families and society at large.⁵³

Breastfeeding Duration, PEI 2008-mid-year 2010 (Sample)



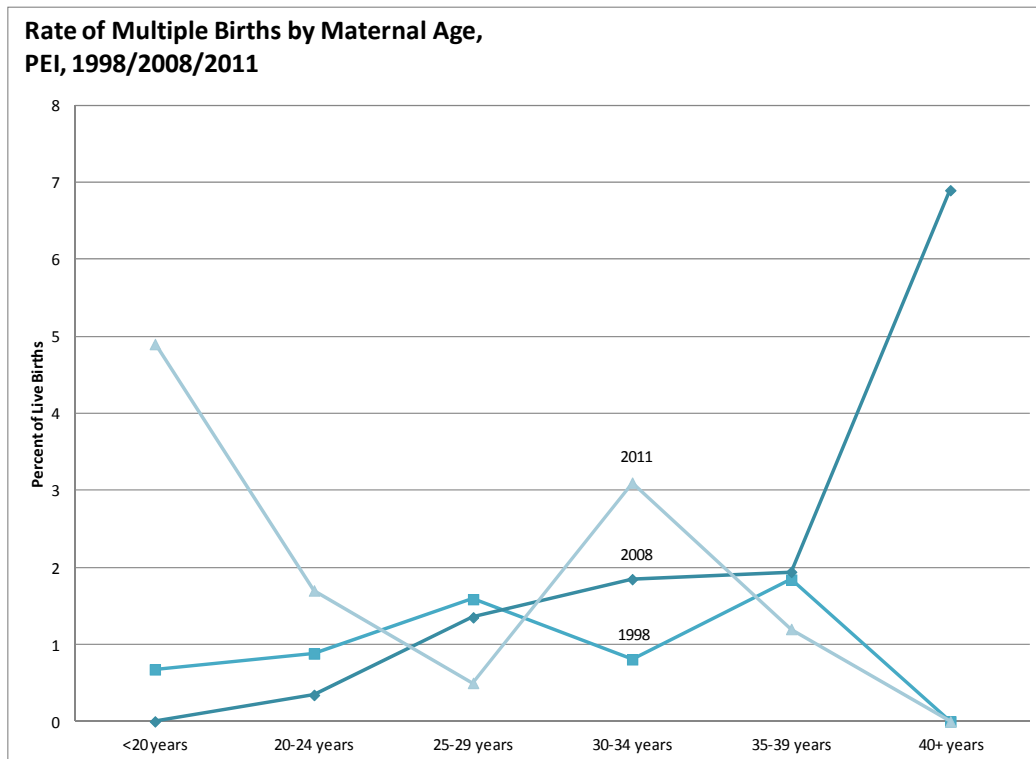
Source: Public Health Nursing, ISM Database

Educating Healthcare Providers to Increase Breastfeeding Support

It is extremely important to provide continuing education for healthcare providers who care for pregnant and breastfeeding mothers. The PEI Reproductive Care Program helps support the promotion, protection and support of breastfeeding by administering the Breastfeeding Education Series. These specialized courses provide consistent, evidence-based knowledge to care providers and are ideal for nurses, family doctors, nurse practitioners, obstetricians, pediatricians, dietitians, pharmacists and anyone who offers pre- and post-natal care and support. Since 2011, 194 care providers have enrolled in 246 Breastfeeding Education courses. See Appendix B for 2013 registration form and course descriptions.

3.4 Multiple Births

There were 13 sets of twins born on PEI. Out of province births (i.e. multiples born at the IWK) are not included in this report because of the unavailability of complete data; therefore this number is an underestimation of the actual number. In 2008 the rate of multiple births increased with maternal age, this did not occur in 1998 or 2011. In the past decade the increased use of assisted human reproduction (AHR) and higher maternal age at conception had been attributed to the rise in the rate of multiple births.⁶²



3.5 Preterm Births

Preterm birth is of significant public health importance because of its association with an increase in mortality and increased morbidities. Preterm birth is defined as an infant born at <37 weeks (259 days) gestation. The most severe effects of prematurity are noted when infants are <32 weeks gestation at birth but all infants born at <37 weeks gestation have an increased risk of morbidity or mortality. It is general practice in PEI to refer all threatened premature labours occurring at <32 weeks gestation to IWK in Nova Scotia. For the purpose of this report preterm birth was calculated using clinical estimate of gestational age at birth.

Medically indicated preterm birth may be required for maternal medical conditions, pregnancy-related conditions or fetal conditions when the health benefits for the mother and/or baby outweigh the potential risks associated with preterm birth. The PEI Reproductive Care Program Database does not differentiate between spontaneous and medically indicated preterm births.

In 2011, premature birth was noted for 5.6% of all live births in PEI. In total, 4.6% of these births occurred at 34-36 weeks gestation and 1% occurred at less than 34 weeks gestation with no data available on out of province births.

Preterm Birth Rates using Clinical Estimate of Gestational Age, PEI, 2011

	Number	% of Live Births
Spontaneous Preterm Birth	36	2.6
Preterm Labour Induction	21	1.5
Preterm Caesarean with No Labour	21	1.5
Total	78	5.6

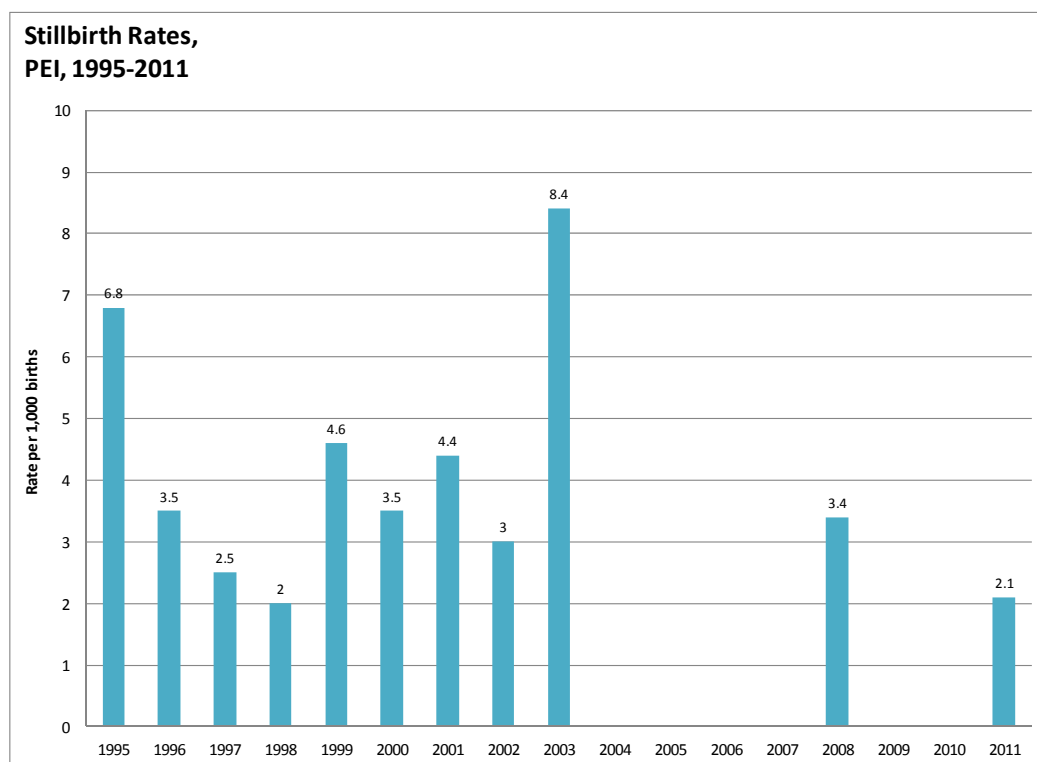
“Perinatal Health Indicators for Canada 2011” reports a preterm birth rate of 7.9 per 100 live births in Canada (excluding Ontario) for 2008.⁶³ The 5.6% noted here for PEI may reflect a decrease in preterm births but is likely also a result of our inability to include data for mothers transferred to, and babies born at, tertiary centres out of province (i.e.: IWK tertiary care centre).

3.6 Fetal and Infant Mortality

Fetal Mortality

The PEI Vital Statistics Act states ‘stillbirth means the complete expulsion or extraction from its mother after at least twenty weeks pregnancy, or after attaining a weight of at least 500 grams, of a product of conception in which, after the expulsion or extraction, there is no breathing, beating of the heart, pulsation of the umbilical cord or unmistakable movement of voluntary muscle’.⁶⁴ The fetal mortality (stillbirth) rate is defined as the number of fetal deaths per 1,000 total births (live births and stillbirths).⁷

Stillbirth rates fluctuate greatly from year to year in PEI, largely due to our small population and small total number of births.



Infant Mortality

The infant mortality rate is defined as the number of deaths of live born infants in the first year after birth per 1,000 live births. Infant mortality can be divided into three components: early neonatal deaths (0-6 days), late neonatal deaths (7-27 days) and postnatal deaths (28-364 days).⁷ For privacy reasons this report does not publish infant mortality rates when there have been less than 5 individuals affected.

3.7 Congenital Anomalies

Congenital anomalies, birth defects and congenital malformations are synonymous terms that describe an abnormality of structure or function present at birth.⁷ Within the PEI Reproductive Care Program Perinatal Database only anomalies diagnosed after birth but before newborn discharge are reported.

Of live births in 2011, 6.1% were classified with a congenital anomaly (5.8% in 2008).

Congenital Anomalies, PEI, 2008 and 2011

System	Rate per 1,000 Births 2008	Rate per 1,000 Births 2011
Central Nervous	2.1	0
Cardiovascular	9.0	13.6
Gastrointestinal	2.8	0.7
Genitourinary	13.8	10.8
Musculoskeletal	13.1	16.5
Ear/Nose/Mouth/Throat	17.3	19.4
Chromosomal	0	0

3.8 Length of Stay

The average length of stay for all liveborn newborns born in hospital and then discharged home in 2011 was 86.8 hours (3.6 days). Typically babies born via vaginal birth (73.8 hours) have shorter lengths of stay than those born by C-birth (116.5 hours).

It is important to note again that this does not include data from newborns born outside the province such as those born at IWK. Babies born in tertiary care centres such as the IWK are often most at risk and may well be premature infants with complications that require intensive care. If their data was included these length of stay estimates would likely be higher

3.9 Newborn Readmissions

The PEI Reproductive Care Program Perinatal Database captures information on infants with readmissions to hospital up to and including 28 days of age. In 2011, 46 newborns were readmitted for various reasons (a total of 47 readmissions) reflecting 3.3% of live births delivered on PEI. The most common reasons for readmission were:

- feeding difficulties: 17.0% (10.9% in 2008)
- hyperbilirubinemia: 14.9% (28.3% in 2008)
- respiratory conditions 12.8%
- infections 12.8%
- gastro-esophageal reflux disease (GERD): 10.6% (17.4% in 2008)

In 2011, 14.9% of readmitted newborns born on PEI had 2 or more of the above diagnoses associated with the readmission.

Data analysis showed no significant difference in rate of re-admissions between newborns with a shorter or longer length of stay after birth. There is no significant difference between rates of newborns born via vaginal birth who were re-admitted and those born via C-birth.

4 Appendices

4.1 Glossary of Terms

Advanced maternal age: ≥ 35 years of age at the time of birth.

Antepartum: period of time from conception to labour and birth.

Assisted vaginal delivery: vaginal birth which required assistance of forceps or vacuum.

Augmentation: use of oxytocin to improve/increase contractions after labour has started spontaneously (cervical dilation is ≥ 3 cm and regular contractions are present when the oxytocin is initiated).

Body Mass Index (BMI): calculated using the expectant mother's height and pre-pregnancy weight.

Clinical estimate of gestational age: closest approximation in weeks to the gestational age, obtained by the physical examination of the newborn.

Dystocia: unable to deliver, possibly due to cephalopelvic disproportion, failure to progress, maternal exhaustion, cervical stenosis as recorded by the delivering doctor.

Episiotomy: surgical incision on the perineum intended to facilitate delivery.

Induction: procedure or medication administration intended to initiate labour when there are no regular contractions which results in labour within 24 hours (generally at cervical dilation of < 3 cm).

Maternal age at delivery: calculated using mother's date of birth and date of delivery.

Meconium: the first bowel movement of a fetus/newborn before or after delivery which is formed by the fetus during the 2nd and 3rd trimester of pregnancy.

Multiparous: expectant mother with one previous pregnancy that resulted in one or more infants weighing ≥ 500 g at birth or ≥ 20 weeks gestational age.

Multiple births: present pregnancy of two or more fetuses.

Nulliparous: expectant mother with no previous pregnancies.

Post dates: ≥ 41 weeks gestation.

Postpartum: period of time immediately following birth until 28 days after birth.

Pre-eclampsia: abnormally high blood pressure during pregnancy and labour with proteinuria and/or edema which may progress to eclampsia (i.e. abnormal reflexes, seizures or convulsions) as diagnosed by the attending doctor.

Primary C-birth: a mother who has a Caesarean birth for this delivery (but may have had previous vaginal birth).

Repeat C-birth: a mother who has a Caesarean birth for this delivery and has had a previous C-birth.

Singleton: present pregnancy of one fetus.

Teratogens: substance to which an expectant mother is exposed or ingests that can disturb the development of an embryo or fetus. Teratogens may cause a birth defect in the child or may halt the pregnancy outright. The Perinatal Database looks at teratogens such as smoking, exposure to second hand smoke, alcohol and drug abuse.

Third/Fourth degree laceration: **third degree laceration** is defined as a tear in the vaginal tissue, perineal skin, and perineal muscles and may extend into the anal sphincter. A **fourth degree laceration** goes through the anal sphincter and the tissue underneath. This is noted in the Perinatal Database as diagnosed by the delivering doctor.

4.2 Synopsis of PEI Department of Health and Wellness Breastfeeding Policy



Health and
Wellness

Santé et
Mieux-être



I. Statement

The PEI Department of Health and Wellness unequivocally supports breastfeeding as the optimal form of nutrition for newborns given its beneficial effects on infants' growth, immunity, and cognitive development.

In order for the PEI Department of Health and Wellness to provide leadership of the protection, promotion and support of breastfeeding, and to improve the health status of mothers and babies, we will:

- Make breastfeeding a public health priority
- Re-establish breastfeeding as our cultural norm
- Create momentum to strive for Baby Friendly Initiative status in PEI facilities
- Work collaboratively with stakeholders to develop educational and communication material to improve societal acceptance
- Work collaboratively with Health PEI to implement this policy

II. Rationale

The World Health Organization and countless other professional health organizations recommend exclusive breastfeeding for the first six months of life followed by the gradual introduction of nutrient-rich solid foods to complement breastfeeding for up to two years and beyond.^{1,2}

Historically Prince Edward Island has low breastfeeding rates. Approximately 71% of newborns born in 2008 were being breastfed at discharge from the hospital.³ While initiation rates are low, the duration of breastfeeding also needs improvement. Based on the 2006/07 Maternity Experiences Survey, only 35% of mothers breastfed (any amount) their infants at six months of age. This was significantly lower than the national average.⁴

Increased rates of breastfeeding initiation and duration result in reduced incidence of many acute childhood diseases and chronic adult diseases regardless of economic status (including asthma, diabetes, heart disease and obesity).

III. Applicability

This policy applies to the Department of Health and Wellness and Health PEI including all provincial government and health system funded practitioners and staff.

¹ World Health Organization. (2003). The Global Strategy for Infant and Young Child Feeding. Geneva: World Health Organization, <http://whqlibdoc.who.int/publications/2003/9241562218.pdf>.

² Infant Feeding Joint Working Group (2012). Nutrition for Healthy Term Infants: Recommendations for Birth to Six Months. A Joint Statement of Health Canada, Canadian Paediatric Society, Dietitians of Canada, and Breastfeeding Committee for Canada. (Draft), <http://www.hc-sc.gc.ca/fn-an/consult/infant-nourisson2/recommendations/index-eng.php#a1>

³ Prince Edward Island Reproductive Care Program (2008). Perinatal Database Report 2008. http://www.gov.pe.ca/photos/original/dhw_rcp_pdr08.pdf

⁴ Public Health Agency of Canada (2009). What Mothers Say: The Canadian Maternity Experiences Survey. Ottawa, 2009. <http://www.phac-aspc.gc.ca/hrs-ssg/pdf/survey-eng.pdf>

4.3 Breastfeeding Education

The Breastfeeding Education Series are specialized courses designed for health care professionals working with women who plan to, or who are, breastfeeding. The Health e-Learning courses & Step2 Education courses are offered with registration through the PEI Reproductive Care Program.



Registration Form

Name _____ Phone# _____
 Position/Work Place _____ Supervisor/Manager _____
 E-mail _____ Payment included: \$ _____

Step 2 Education: Core Courses \$72.00	
ES 01 Breastfeeding Essentials (20 hours-Online study)	
ES 03 Breastfeeding Essentials for Doctors (5 hours-Online study)	
Health e-Learning: \$115.00 12 hour BreastEd Online study courses	
BE01 Breast Milk: Composition and Function	
BE02 Anatomy and Physiology of the Lactating Breast	
BE03 Positioning and Latch of the Baby to the Breast	
BE04 Breastfeeding Initiation and the First Week	
BE05 Communication and Education	
BE06 Breast milk, Breastfeeding and the Preterm Infant	
BE07 Breastfeeding after the First Week	
BE08 Breast milk, Lactation and Medications	
BE09 Other Factors Influencing the Breastfeeding Dyad	
BE10 Evolution of Breastfeeding as a Public Health Issue	
Step 2 Education: Continuing Education Lectures \$18.00 1 hour Online Lectures	
CE12 Jane Morton: Making Enough Milk For The Preterm	
CE15 Lawrence Gartner: Bilirubin Management And Implications For Breastfeeding	
CE16 Martin Ward-Platt: Neonatal Hypoglycaemia - Evidence And Recommendations	
CE19 Marsha Walker: Stemming The Tide Of Supplementation: What, When, How, And Why	
CE20 Laurie Nommsen-Rivers: Delayed Onset Of Lactogenesis: Causes, Consequences, Lactation Support	
CE23 Barbara Morrison: Translating Evidence Into Practice: Birth Kangaroo Care	
CE28 Nils Bergman: Infant Feeding Frequency: Proposal Based On Available Evidence And Neuroscience	
CE32 Diane Weissinger: Watch Your Language	
CE35 Yvette Sheehy: Breastfeeding Premature Infants	
CE36 Kathleen Marinell: Breastfeeding The Late Preterm Infant	

REGISTRATION FEE: Must accompany registration form. PRICES SUBJECT TO CHANGE

Cheque/ Money order made payable to: **PEI Minister of Finance**

Send registration form and payment to: Breastfeeding Education, c/o PEI Reproductive Care Program, 16 Fitzroy St. 2nd Floor Sullivan Building, PO Box 2000, Charlottetown, PE, C1A 7N8 (contact: 368-4952 or repcare@ihis.org)

See Breastfeeding Education Course Descriptions on our Website:
<http://www.gov.pe.ca/health/reproductivecare>

4.4 Variables Available in the PEI Reproductive Care Program Perinatal Database

* The type of data collected over time has been adjusted. The list below reflects data captured in 2011 onward. For data available historically please contact the PEI Reproductive Care Program.

** For data analysis or raw data requests please complete below forms (available online) and forward to the PEI Reproductive Care Program.

Maternal Data

Indicator of singleton or multiple pregnancy

Type of prenatal care provided

Date of delivery

Maternal residential postal code at delivery (or out of province indication)

Maternal age at delivery

Education (last level completed)

Marital status at delivery

Pre-pregnancy weight

Maternal height

Gravida

Parity

Abortions

Number of previous stillbirths/intrauterine deaths

Number of previous neonatal deaths

Number of previous preterm births

Number of previous caesarean sections

Number of previous low birth weight infants

Number of previous high birth weight infants

Previous IUGR

Received flu vaccine this pregnancy

Pre-conceptual folic acid

Prenatal vitamins

Use of assisted conception

Method of assisted conception

Date of last menstruation

First intrapartum ultrasound date

Gestational age at first ultrasound

Rh immunoglobulin given antepartum

Haemoglobin in third trimester

Group B Strep screening completed

Date of first contact with prenatal provider

Type of prenatal care provider

Prenatal family physician/obstetrician

Prenatal education classes

IUGR assessed for this pregnancy

Exposed to second hand smoke

Pre-pregnancy smoking

Smoking 0-20 weeks

Smoking at delivery

Average # of alcohol containing drinks per week

Binge drinking 1 or more times during this pregnancy

Maternal drug therapy during this pregnancy

Maternal drug and chemical abuse during pregnancy

Maternal carrier states
Maternal steroid therapy
Cesarean Birth with no labour
Date and time and location of labour admission
Gestation at 1st stage
Cervical dilatation on admission
Maternal admission weight
Labour medication and administration
Maternal drug therapy intrapartum/postpartum
Antepartum/Intrapartum/Postpartum antibiotics
Labour 1st stage onset date and time
Labour 1st stage initiation
Medical augmentation of labour
Induction of labour
Anaesthesia/Analgesia during labour and delivery
Episiotomy
VBAC Attempted
VBAC Successful
Electronic Fetal Monitoring
Cesarean birth
Primary indication for C-section
Secondary indication for C-section
Period of PURPLE Crying education
Received Pertussis vaccine
Maternal admission date/time
Admitting facility
Attending physician
Reason for admission
Diagnostic codes according to the International Classification of Diseases (ICD)
Procedure codes according to the International Classification of Diseases (ICD)
Maternal disposition at discharge
Discharge date/time
Referring hospital
Cause of death (if applicable)

Newborn Data

Admission type
Admission facility
Attending physician
Admission date/time
Discharge date/time
Type of care required/length of stay in specialized units
Diagnostic codes according to the International Classification of Diseases (ICD)
Procedure codes according to the International Classification of Diseases (ICD)
Outcome of stay
Cause of death (if applicable)
Baby's sequence (if applicable)
Type of membrane rupture
ROM date and time
Meconium before delivery
Mode/Method of delivery

Position/Presentation at delivery
Date and time of birth
Sex
Birth weight (g)
Head Circumference (cm)
Length (cm)
Clinical estimate of gestational age
Apgars at 1, 5, 10 minutes (if applicable)
Cord Artery pH / Cord Venous pH / pCO₂
Base Excess/Deficit Value
Breastfeeding Initiation
Breastfeeding at Discharge
Breastfeeding Status at Discharge
Neonatal Resuscitation/Details

4.5 PEI Perinatal Database Data Request Form

PEI Reproductive Care Program

16 Fitzroy Street, PO Box 2000
2nd Floor Sullivan Building
Charlottetown, PE C1A 7N8
Tel: 902 368-4952
Fax: 902 620-3354
E-mail: repcare@ihis.org
<http://www.gov.pe.ca/health/reproductivecare>



Data Request Form

Date Submitted: _____ Date requested by: _____
Name(s): _____
Organization (if applicable): _____
Phone Number: _____ email: _____
Mailing Address: _____

1. Project title:

2. Copy of proposal attached: Yes___ No___

3. Copy of ethical review attached: Yes___ No___

4. Purpose of the request/objective of the study:

4.6 PEI Perinatal Database Data Analysis Request Form

PEI Reproductive Care Program

16 Fitzroy Street, PO Box 2000
 2nd Floor Sullivan Building
 Charlottetown, PE C1A 7N8
 Tel: 902 368-4952
 Fax: 902 620-3354
 E-mail: repcare@ihis.org
<http://www.gov.pe.ca/health/reproductivecare>



Data Analysis Request Form

Date Submitted: _____ Date analysis requested by: _____
Name(s): _____
Organization (if applicable): _____
Phone Number: _____ email: _____
Mailing Address: _____

1. Purpose of the request (What are you trying to answer?): _____

2. I plan to use this information in the following way (please circle any that are appropriate and provide details about expected audience and format)

program/practice evaluation: _____

publication: _____

poster presentation: _____

oral presentation: _____

review of clinical practice: _____

non-published research: _____

other: _____

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