

Does Group Prenatal Care Improve Birth Outcomes and Breastfeeding Rates?

Saskatchewan Prevention Institute

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Table of Contents

Abbreviations	3
List of Appendices	4
List of Figures	4
List of Tables.....	4
Executive Summary	5
1. Origin of Prenatal Care	7
2. Today's Prenatal Care Model	7
2.1 Mothers' Satisfaction with Today's Prenatal Care Model.....	8
3. Health Status of Saskatchewan's Infants.....	9
3.1 Infant Mortality.....	9
3.2 Gestational Age at Birth	11
3.3 Birth Weight.....	12
3.4 Breastfeeding.....	13
4. Improving Infant Health Through Prenatal Care	14
5. Origin and Philosophy of the Group Prenatal Care Model.....	14
6. Group Prenatal Care Literature Review and Environmental Scan.....	16
7. Methodology	17
7.1 Literature Review	17
7.2 Environmental Scan.....	19
8. Summary of the Evidence.....	20
9. Cost of Group Prenatal Care	25
10. Saskatchewan Populations that could Particularly Benefit from GPC.....	26
10.1 Young Mothers.....	26
10.2 Indigenous Mothers	28
11. Discussion.....	29
12. Next Steps for the Saskatchewan Prevention Institute.....	31
References	32
Appendices	40

Abbreviations

CDC – U.S. Centers for Disease Control and Prevention

CI – Confidence interval

CP+ – CenteringPregnancy™ Plus

C-section – Caesarean section

GPC – Group prenatal care

HIV – Human Immunodeficiency Virus

IPC – Individual prenatal care

NICU – Neonatal intensive care unit

PHAC – Public Health Agency of Canada

RCT – Randomized control trial

RR – Relative Risk

SES – Socio-economic status

SOGC – The Society of Obstetricians and Gynecologists of Canada

STI – Sexually transmitted infection

List of Appendices

Appendix I. Individual Prenatal Care Compared with Group Prenatal Care.....	40
Appendix II. Group Prenatal Care Survey: Summary of Results	42
Appendix III. Additional Research Findings from the Four Systematic Reviews Summarized in this Report.....	48
Appendix IV. Defining Systematic Reviews and Meta-Analysis	50
Appendix V. Summary of Articles used in Systematic Reviews.....	51

List of Figures

Figure 1. Infant Mortality Rate, Provinces, Territories, and International Peers, 2009-2011	10
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List of Tables

Table 1. Infant Mortality Rates, by Saskatchewan Health Region, Five-Year Average (2001-2005) and Preliminary Data for 2006 and 2007	11
Table 2. Summary of Findings Regarding Selected Pregnancy Outcomes in GPC Versus IPC (Sheeder et al., 2012).....	21
Table 3. Summary of Findings Regarding Selected Pregnancy Outcomes in GPC Versus IPC (Lathrop, 2013)	23
Table 4. Adolescent Pregnancy Rates, Canada, Provinces and Territories, 2011	26

Executive Summary

While most Canadian women are satisfied with the prenatal care they receive, mothers who are young, have lower educational levels, or are living in a household at or below the low income cut-off are less likely to report that the prenatal care they received met their needs. Inadequate information about pregnancy-related topics is one of the reasons for their discontent. People's satisfaction with healthcare influences their further use of that healthcare system, and as women from the above mentioned populations are already less likely to receive regular prenatal care, finding ways for prenatal care to address their needs is a high priority.

There is a growing body of research suggesting that the health outcome of mother and baby is affected by the way in which prenatal care is delivered. In an effort to increase the effectiveness of prenatal care, new models of delivery are being implemented and evaluated. One of these models is group prenatal care (GPC).

GPC is a model of group healthcare where eight to twelve women of similar gestational age meet as a group with their healthcare provider for 90-120 minutes of regularly scheduled appointments, typically starting in their second trimester and continuing throughout their pregnancy. During these appointments, each woman has a brief individual physical assessment with the healthcare provider and then participates in a group discussion led by a member of a multidisciplinary care team. Different professionals lead different appointments, depending on their expertise and how it relates to the topics to be focused on that day. All prenatal care is provided in this group setting, combining the usual physical assessment with peer support and increased time for education about healthy pregnancy.

This report examines current research on GPC to assess if there is an improvement in birth outcomes and breastfeeding rates associated with using this model of care compared to individual prenatal care (IPC). Birth outcomes examined in this report are gestational age at birth, preterm birth, and low birth weight. In an effort to use the most current, high quality evidence, systematic reviews are the primary source of information. When discussing a modified version of GPC, for which no systematic reviews exist, randomized controlled trials are included.

Although the research findings are not consistent between the systematic reviews, many statistically significant improvements for different birth outcomes were found. In three of the four systematic reviews, researchers found women who received GPC to have higher rates of breastfeeding. In one systematic review, researchers found decreased rates of preterm birth and in another review, decreased rates of low birth weight. Overall, it appears that GPC produces equivalent, if not improved, birth outcomes. Researchers from all four systematic reviews state the limited amount of quality research on this topic as a limitation, and highlight the importance of more quality research to determine if GPC is an effective method of improving birth outcomes. Despite the inconsistencies between the systematic reviews, more recent research continues to find improved birth outcomes when women receive GPC.

For example, there is currently a five-year, multi-million dollar study in progress in the United States with a target to enroll 50,000 women and ultimately improve maternal and infant outcomes. Three enhanced prenatal care interventions are being evaluated, one of which is GPC, to determine if they reduce preterm birth rates and the medical costs associated. Findings from the first two years of the evaluation are promising and indicate that mothers who receive GPC have higher breastfeeding rates and lower preterm birth rates than the national average.

A modified GPC program that integrates HIV and STI prevention strategies into the care model has been developed to target young mothers. In two randomized controlled trials, favourable birth, neonatal, and reproductive outcomes were found in mothers who received the modified GPC. The CDC promotes this modified GPC program as an evidence-based intervention to be used in communities for HIV/AIDS prevention. This modified program may be of particular interest in Saskatchewan, where rates of sexually transmitted infections are among the highest in Canada. (Saskatchewan Ministry of Health, 2015). Saskatchewan women of childbearing age continue to be a population with high rates of HIV (Saskatchewan Ministry of Health, 2015). Without effective education and prevention efforts, including those directed at women who are pregnant, HIV infection rates will likely continue to rise in Saskatchewan, and infants will be put at risk of being infected with HIV.

Particular populations may be the most likely to benefit from implementing GPC in Saskatchewan. The majority of research studies completed on GPC involve women who are young, from minority groups, and/or are of low socioeconomic status. Both young mothers and Indigenous mothers are at an increased risk of adverse pregnancy and infant health outcomes. Peer acceptance plays a large role in the lives of adolescents. Group programs that facilitate relationship building, a sense of belonging, and the development of individual identity can be beneficial when providing healthcare to pregnant adolescents. Compared with other women, young mothers report less favourable pregnancy experiences and are more likely to report not having enough information about pregnancy-related topics. For the reasons discussed above, GPC is theorized to be more relevant to young women, while also providing opportunities for healthcare providers to engage in discussions on health promotion strategies and interventions to address modifiable risk factors.

Canadian Indigenous people are more likely than the Canadian population in general to rate the quality of healthcare received as “fair” or “poor”. Indigenous people are less likely to receive needed healthcare, with reasons including lack of availability and lack of cultural appropriateness of care. Common suggestions by Indigenous people to improve their health include developing culturally-relevant healthcare programs and reviving Indigenous cultures and traditions. GPC provides a unique opportunity for healthcare providers to incorporate culturally appropriate care, focusing on the specific needs and risk factors of Indigenous populations

With approximately 14 healthcare settings currently providing GPC in Canada, the model of care is slowly growing across the country. In a survey sent to healthcare providers who currently work, or have previously worked, in a Canadian healthcare setting that provides GPC, the majority of respondents stated that the GPC model requires additional work as opposed to individual prenatal

care (IPC). Despite this, nearly three-quarters of respondents preferred the GPC model with respect to provider satisfaction, almost 95% of respondents preferred GPC with respect to patient knowledge and understanding of prenatal information, and over three-quarters preferred GPC with respect to patient satisfaction.

1. Origin of Prenatal Care

Before the turn of the last century, Ballantyne, a Scottish obstetrician, suggested that pregnant women receive organized medical care (Alexander & Kotelchuck, 2001). His suggestion for prenatal care was based on the observation that much was done for mothers during labour and the postpartum period, but little attention was put on complications that arose during pregnancy (Reiss, 1999). When pregnant women were hospitalized, they were put under the care of general physicians with no expertise in obstetrics (Reiss, 1999). Obstetricians met their patients for the first time when called by the attending midwife if the mother was experiencing difficulty in labour (Reiss, 1999). Ballantyne proposed a 'pro-maternity hospital' where obstetricians would study normal and abnormal pregnancies and use this knowledge to improve maternal and infant outcomes (Reiss, 1999). He believed that in order to understand conditions such as eclampsia (seizures during pregnancy), hydramnios (excessive amniotic fluid), and congenital anomalies (birth defects), physicians first needed to study the physiology of pregnancy which included changes in blood and circulation, origins of the amniotic fluid, and placental function (Reiss, 1999). Ballantyne's efforts were responsible for the first antenatal bed at the Royal Maternity Hospital in Edinburgh in 1901 with him in charge (Reiss, 1999). Support for the hypothesis that prenatal care could improve birth outcomes grew in the 1900s (Alexander & Kotelchuck, 2001) and to date, much research supports this theory (Gortmaker, 1979; McLaughlin et al., 1992; Quick, Greenlick, & Roghmann, 1981; Vintzileos, Ananth, Smulian, Scorza, & Knuppel, 2002). Today, prenatal care is widely seen as a value to both mother and baby, contributing to improved pregnancy outcomes through diagnosis and timely treatment of conditions and the elimination or reduction of modifiable maternal risk factors. Evidence suggests that prenatal care can play an important role in improving infant health, which includes the prevention of low birth weight, as well as neonatal and infant mortality (Alexander & Kotelchuck, 2001; Quick et al., 1981; Showstack, Budetti, & Minkler, 1984).

2. Today's Prenatal Care Model

Approximately 385,000 babies are born in Canada every year, with over 15,000 of these babies being born in Saskatchewan (Huang et al., 2015). Pregnant women residing in Saskatchewan typically receive prenatal care in a medical clinic or hospital and may spend extended periods of time in the waiting room to receive prenatal care from a range of practitioners. The Society of Obstetricians and Gynecologists of Canada (SOGC) recommends women receive prenatal care every four to six weeks in early pregnancy, every two to three weeks after 30 weeks' gestation, and every one to two weeks after 36 weeks' gestation until delivery (Schuurmans et al., 1998). These physician/patient appointments are typically 15-20 minutes in length (Catling et al., 2015). Estimates of patient-provider contact time during prenatal and postal visits range from 1.5 to 7 hours, depending on the healthcare provider and assuming women attended all

appointments (Massey, Schindler Rising, & Ickovics, 2006). During these appointments, women receive information on how to maintain or improve their health and the health of their baby throughout pregnancy as deemed necessary by their healthcare provider.

A number of new approaches to prenatal care are being implemented and evaluated worldwide. The *Strong Start for Mothers and Newborns Initiative* is an effort, announced in the United States in 2012, to reduce preterm births and improve birth outcomes among pregnant women at risk of preterm birth who are Medicaid or Children's Health Insurance Program beneficiaries (Centers for Medicare & Medicaid Services, 2016). The goal of the four-year initiative is to evaluate three enhanced prenatal care interventions to determine if they reduce preterm birth rates and the medical costs associated. The three evidence-based models being evaluated are group prenatal care (GPC), birth centres, and maternity care homes. The GPC model is the focus of this report and will be described in more detail later.

2.1 Mothers' Satisfaction with Today's Prenatal Care Model

Before considering revising the current prenatal care model in Saskatchewan, it is important to consider whether or not the current Canadian model is meeting the needs of pregnant women. In neighbouring Manitoba, a *Perinatal Services and Outcomes in Manitoba* (Heaman et al., 2012) report examined inequities in access to care and utilization of healthcare services. "Inadequate prenatal care" was defined as the situation in which mothers had fewer than recommended number of prenatal visits and/or initiated prenatal care later on in their pregnancies. Twelve and a half percent of mothers residing in Manitoba had inadequate prenatal care. Women who were at a higher risk of receiving inadequate prenatal care included young mothers, those in lower income quintiles, those who received income assistance, had lower education levels, were single, socially isolated, and multiparous. The percentage of mothers with inadequate prenatal care in Northern Manitoba increased from 26.4% in 2001/02 to 37.4% in 2007/08 (Heaman et al., 2012). Like Saskatchewan, Manitoba's North has a large Indigenous population that is physically isolated in the north.

The Public Health Agency of Canada's Canadian Perinatal Surveillance System led a national survey called *What Mothers Say: The Canadian Maternity Experiences Survey*. In 2006, data on women's maternity experiences was collected from 6,421 women (87% response rate) across the country through telephone interviews (Chalmers, Dzakpasu, Heaman, & Kaczorowski, 2008; Public Health Agency of Canada, 2009). The results of this survey help to give a picture of the prenatal experience in Saskatchewan. Survey results found the majority of Saskatchewan women received prenatal care from an obstetrician/gynecologist (35.0%) or family physician (64.4%). The provincial percentage who received care from a midwife or nurse/nurse practitioner was not released due to a small sample size. Most Saskatchewan women (94.9%) initiated prenatal care in their first trimester and, on average, women attended 12.4 prenatal appointments (SOGC recommends 13-14 prenatal visits for low-risk mothers). Thirty-six point four percent of Saskatchewan mothers attended prenatal classes, with national stats showing young mothers (15-19 years) to be

more likely to attend prenatal classes and low income mothers to be less likely to attend prenatal classes. Saskatchewan women reported their most useful source of pregnancy-related information to be their healthcare provider (29.1%), books (21%), and a previous pregnancy (18.8%). Mothers who are young, have lower educational levels, or are living in a household at or below the low income cut-off, were identified as vulnerable populations. While most women felt they received adequate pregnancy-related information, vulnerable populations were more likely to report not receiving adequate information about pregnancy-related topics and were less likely to have prenatal care in the first few months of pregnancy. These findings align with other research which has found women experiencing multiple social health problems, young mothers, women of non-English speaking background, and women at high risk of pregnancy-related complications to be less likely to report that the prenatal care they received met their needs (Brown, Sutherland, Gunn, & Yelland, 2014). Compared with other women, vulnerable Canadian women also more frequently reported abuse and symptoms of postpartum depression. More than half (57%) of Canadian women stated that most days were either “somewhat stressful” or “very stressful” during pregnancy. Most women (87%) had support from a partner, family, or friends available throughout most of their pregnancy, but 8% had support only some of the time and 5% had little or no support throughout their pregnancy. Authors of the survey recommend placing particular attention on vulnerable populations when developing maternal health policies and programs. It is worth noting that the *What Mothers Say: The Canadian Maternity Experiences Survey* excluded women residing in institutions and in Indigenous communities.

Swedish and Australian studies have found approximately one in five women dissatisfied with the prenatal care they received, with lack of consistent care providers throughout their pregnancy and deficiencies in provision of information contributing to their dissatisfaction (Hildingsson, 2005, 2013).

These findings of maternal satisfaction are of great importance, as research has found people’s satisfaction with healthcare to influence their continued use of that healthcare system (Galle, Van Parys, Roelens, & Keygnaert, 2015). It could be argued that a mother, who has had a negative experience with the healthcare system during a pregnancy, may be less likely to attend all of the recommended prenatal care visits in her current pregnancy and future pregnancies as per medical association’s recommended schedules.

3. Health Status of Saskatchewan’s Infants

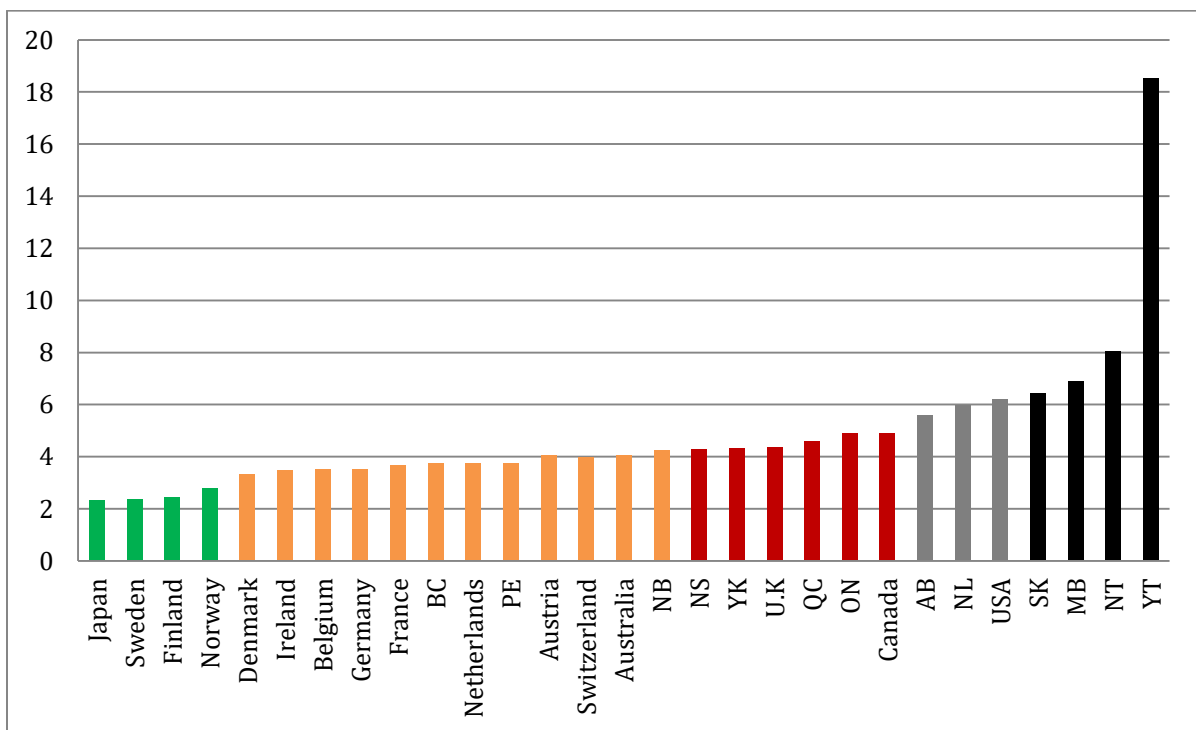
It is important to understand what the health status of Saskatchewan’s infants is in order to determine how it can be impacted by prenatal care.

3.1 Infant Mortality

The infant mortality rate is defined as the number of deaths for infants under the age of one per 1,000 live births. The infant mortality rate is internationally accepted as one of the best indicators to measure the health status of a population and the value placed on maternal

and child health. The Organization for Economic Cooperation and Development (OECD) Factbook (2009) compares the annual infant mortality rates between a number of countries. The Conference Board of Canada (2015) compared the OECD rates to the infant mortality rates of Canada’s provinces and territories as reported by Statistics Canada from 2009 to 2011. A grade level was assigned to each country/province/territory using a method described in the notes section of Figure 1. Canada’s 2009-2011 average infant mortality rate of 4.9 earned a grade “C” and is higher than the three-year average infant mortality rate of almost all of its peer countries (Figure 1). Saskatchewan ranked below the Canadian average, receiving a D-grade with an average infant mortality rate of 6.43.

Figure 1. Infant Mortality Rate, Provinces, Territories, and International Peers, 2009-2011 (The Conference Board of Canada, 2015; The Organization for Economic Cooperation and Development Factbook, 2009)



Grade: **A** **B** **C** **D** **D-**

Note: A grade level is assigned to each province/territory/country using the following method:

- For a given indicator, the difference between the top and bottom peer country performers is calculated, and this figure is divided into four quartiles.
- A country/province/territory receives a report card rating of “A” on a given indicator if its score is in the top quartile, a “B” if its score is in the second quartile, a “C” if its score is in the third quartile, and a “D” if its score is in the bottom quartile.
- Any province/territory that scores worse than the poorest-performing peer country receives a “D”.

In the Saskatchewan Prevention Institute’s *Infant Mortality in Saskatchewan: Evidence to Inform Public Health Practice* (2009), the infant mortality rates of the province’s thirteen health authorities/regions are compared. In 2001-2005, five-year average infant mortality rates varied among health regions, from a high of 15.34 infant deaths per 1,000 live births in the Athabasca Health Authority to a low of 3.72 infant deaths per 1,000 live births in the

Cypress Health Region (Table 1). When the 2001-2005 five-year average infant mortality rates for Saskatchewan's health regions are compared to Canada's rate of 5.3 for 2001-2005, only three regions have lower rates than the Canadian rate. These are Cypress (3.72 deaths/1,000 live births), Heartland (4.6 deaths/1,000 live births), and Sunrise (4.54 deaths/1,000 live births).

Table 1. Infant Mortality Rates, by Saskatchewan Health Region, Five-Year Average (2001-2005) and Preliminary Data for 2006 and 2007 (Saskatchewan Prevention Institute, 2009).

	2001-2005	2006	2007
Canada	5.3	na	na
Saskatchewan	6.3	6.3	5.9
Athabasca	15.3	15.2	27.4
Cypress	3.7	2.3	6.3
Five Hills	7.7	6.2	na
Heartland	4.6	11.6	6.3
Keewatin Yatthe	6.2	8.4	11.2
Kelsey Trail	8.7	6.7	13.2
Mamawetan Churchill River	11.4	10.1	9.2
Prairie North	6.5	10.0	8.7
Prince Albert Parkland	6.7	4.3	8.3
Regina Qu'Appelle	6.2	5.2	6.6
Saskatoon	5.8	5.9	3.5
Sun Country	5.5	3.2	1.6
Sunrise	4.5	7.4	3.5

Interventions in the prenatal period have the potential to impact maternal behaviour and subsequent birth outcomes, some of which are discussed below. Healthcare providers play a pivotal role in providing pregnant women with information on vital topics such as smoking, alcohol use, and proper nutrition. While it is recognized that there are additional birth outcomes not discussed in this report, the ones discussed below, in addition to breastfeeding rates, are more frequently studied and discussed in literature when researching GPC. These birth outcomes (and breastfeeding rates), have long-term consequences, are well researched, contribute to infant mortality, and are a continual focus of the Saskatchewan Prevention Institute.

3.2 Gestational Age at Birth

A baby's gestational age is the time in pregnancy in which he/she is born. A full term birth is considered between 37 and 42 weeks. Babies born prior to 37 complete weeks are

considered preterm. Preterm birth rates have increased globally in the past quarter century and while the etiology of most preterm birth remains obscure, the increased use of assisted reproductive technology and the associated multiple births account for some of this increase (Gunby, 2011).

The earlier a baby is born, the greater the risk of major long-term complications. The consequences of preterm birth are significant and include neurological (e.g., cerebral palsy), behavioural (e.g., ADHD and anxiety), and developmental disability (e.g., delays in physical or cognitive development and communication), as well as prolonged hospitalization, increased cost, and death (Ickovics et al., 2007; March of Dimes, 2013). There is increasing evidence that births at 39-41 weeks provides developmental advantages compared to births at 37-38 weeks (Rose et al., 2013). Research has found infants born at 39-41 weeks score higher on mental and psychomotor scores than infants born at 37-38 weeks (Rose et al., 2013). In addition to the significant impacts preterm birth has on the individual, it also has a large impact on the healthcare system. According to CIHI data, in 2005-2006, the average hospital cost for a singleton preterm newborn had hospital costs nine times higher than newborns born full term (\$9,233 vs \$1,050) (Canadian Institute for Health Information, 2009).

Rate of Preterm Birth in Saskatchewan

In 2013/2014, 7.7% of livebirth babies were preterm, with 6.2% of singletons born preterm and 58% multiples born preterm (Huang et al., 2015).

3.3 Birth Weight

Babies who are born weighing less than 2,500 grams (g) or 5.5 pounds (lbs.) are considered to be of “low birth weight”. Birth weight has a direct link to the gestational age at which a baby is born. The two main causes of low birth weight are premature birth and fetal growth restriction (March of Dimes, 2014). Like preterm babies, low birth weight babies are at a greater risk of serious and long-term problems including neurological and developmental health as they grow (Sick Kids, 2004-2016). Many of the short- and long-term conditions low birth weight and preterm babies are at risk of overlap. The costs associated with the immediate and long term care required by some of these babies are significant (Huang et al., 2015). Hospital costs increase as birth weight decreases, with the average cost per Canadian newborn in 2005-2006 ranging from approximately \$1,000 for newborns who weighed 2,500 grams or more to more than \$117,000 for newborns weighing less than 750 grams (Canadian Institute for Health Information, 2009). The number of low birth weight babies born in Canada is on the rise. According to the Canadian Institute for Health Information (2007), since 2001, the percentage of low birth weight babies has risen from 5.7% to 6.2% of all live births. As with preterm birth, most researchers agree that assisted reproductive technology is thought to account for some of this rise.

Rate of Low Birth Weight Babies in Saskatchewan

In 2013/2014, 5.9% of livebirths in Saskatchewan were of low or very low birth weight with 4.6% of singletons born with low or very low birth weight and 48.5% of multiples born with low or very low birth weight (Huang et al., 2015).

3.4 Breastfeeding

The benefits of breastfeeding to both mother and baby are well established (Canadian Paediatric Society, 2014; La Leche League Canada, n.d.) Breastfeeding decreases the incidence of many infectious diseases affecting infants, including bacterial meningitis (Cochi et al., 1986; Istre, Conner, Broomme, & Hightower, 1985), bacteremia (Istre et al., 1985; Takala et al., 1989), diarrhea (Dewey, Heinig, & Nommsen-Rivers, 1995; Howie, Forsyth, Ogston, Clark, & Florey, 1990; Lopez-Alarcon, Villalpando, & Fajardo, 1997; Popkin et al., 1990), respiratory tract infections (Bachrach, Schwarz, & Bachrach, 2003; Lopez-Alarcon et al., 1997; Oddy et al., 2003), otitis media (Aniansson et al., 1994; Dewey et al., 1995; Duncan et al., 1993), and urinary tract infections (Marild, Hansson, Jodal, Oden, & Svedberg, 2004; Pisacane, Graziano, Mazarella, Scarpellino, & Zona, 1992). Breastfeeding has also been found to decrease the risk of Sudden Infant Death Syndrome (Venneman et al., 2009) and increase performance on neurocognitive testing (Anderson, Johnstone, & Remley, 1999; Horwood & Fergusson, 1998; Kramer et al., 2008; Mortenson, Michaelsen, Sanders, & Reinisch, 2002). A study conducted in Spain found that for each additional month of exclusive breastfeeding, hospital admissions were reduced by as much as 30% in the first year of life (Paricio Talayero et al., 2006). In a meta-analysis of 33 studies examining hospital admissions in developed countries, formula-fed infants experienced three times more severe respiratory illnesses compared with infants who were exclusively breastfed (Bachrach et al., 2003). Researchers have also studied benefits to the breastfeeding mother and have found it to decrease the incidence of ovarian cancer (Rosenblatt & Thomas, 1993) and breast cancer (Collaborative Group on Hormonal Factors in Breast Cancer, 2002; Newcomb et al., 1994), as well as assist with postpartum weight loss (Dewey, Heinig, & Nommsen, 1993).

Rate of Breastfeeding in Saskatchewan

In 2013/2014, 86.4% of mothers who delivered in a Saskatchewan hospital were breastfeeding at discharge (Huang et al., 2015). Mothers with Registered Indian status had lower rates of breastfeeding at discharge than non-Indigenous mothers (72.4% vs 89.8%) (Huang et al., 2015).

The Canadian Paediatric Society recommends exclusive breastfeeding for the first six months of life. At around six months, babies are ready for other foods, but mothers are encouraged to continue breastfeeding until two years of age and beyond (Canadian Paediatric Society, 2014). According to Statistics Canada, the number of women exclusively breastfeeding in Saskatchewan at six months in 2012 was 36.6% (Statistics Canada, 2014).

4. Improving Infant Health Through Prenatal Care

Prenatal care is recognized internationally as an important determinant of infant health. The U.S. Centers for Disease Control and Prevention (CDC) (2011) estimate that:

Up to one half of pregnancy-related deaths could be prevented. An important element for decreasing infant mortality is to prevent low birth weight. Early prenatal care can provide necessary information to the mother and effect changes for nutrition-related and behavioural risk factors impacting the mother and baby (para.5).

According to the United States Department of Health and Human Services:

Nearly one million American women deliver babies without receiving adequate medical attention. Babies born to mothers who received no prenatal care are three times more likely to be born at low birth weight, and five times more likely to die, than those whose mothers received prenatal care (U.S. Department of Health and Human Services, n.d. , para.1).

In the SOGC's Healthy Beginnings: Guidelines for Care During Pregnancy and Childbirth (1998), it states that the goal of prenatal care is to "assist the pregnant woman in ways that reduce perinatal mortality and morbidity, while supporting the woman's medical, social, and psychological needs" (p.4).

In the Medical Health Officer Report: Reducing Infant Mortality in Saskatoon Health Region (2012), lack of adequate prenatal care and testing during pregnancy is recognized as a risk factor for infant mortality. The report concludes with recommendations to prevent and reduce the incidence of infant mortality. One of the recommendations is to expand access to prenatal care through targeted outreach and interventions, stating:

The timing and quality of prenatal care that a woman receives during her pregnancy has a critical impact on the infant's health and survival. Late or no entry into prenatal care is associated with adverse pregnancy outcomes, such as increased risk of low birth weight, premature birth, and neonatal and maternal mortality. Targeted outreach and interventions should focus on high risk populations, such as teenagers, Registered Indian Status, and low socioeconomic status populations (p.57).

5. Origin and Philosophy of the Group Prenatal Care Model

There is a growing body of research suggesting that the health outcome of mother and baby is affected by the way in which prenatal care is delivered (Allen, Gamble, Stapleton, & Kildea, 2012). In an effort to increase the effectiveness of prenatal care, new models of delivery are being implemented and evaluated. One of these models is GPC.

In 1998, Sharon Schindler Rising, a Yale-educated Certified Midwife and Nurse, stated the need for changes to the current healthcare system that allow healthcare providers to provide quality service that is efficient and economical. Schindler Rising developed an innovative alternative to

one-on-one prenatal appointments to promote peer support among mothers and allow physicians more time with their prenatal patients (Schindler Rising, 1998). Sharon's model of GPC is widely known today as CenteringPregnancy™ and is promoted through the Centering Healthcare Institute in Boston, Massachusetts. Like other models of group prenatal care, in Centering, eight to twelve women of similar gestational age meet as a group with their healthcare provider for 90-120 minutes for ten regularly scheduled appointments, starting in their second trimester and continuing throughout pregnancy (Centering Healthcare Institute Inc, 2009-2014). During these appointments, each woman has a brief individual physical assessment with the healthcare provider, is encouraged to partake in or lead self-care activities (i.e., measuring and recording blood pressure, weight, and urine tests), and then participates in a group discussion led by a healthcare provider (Centering Healthcare Institute Inc, 2009-2014). All prenatal care is provided in this group setting, combining the usual physical assessment with peer support and increased time (12-20 hours of care in group setting compared to an estimated 1.5 to 7 hours during individual prenatal care [IPC]) for education about healthy pregnancy, childbirth, and early parenting, which is theorized to improve birth outcomes for mother and baby (Catling et al., 2015). For a comparison of how IPC and GPC differ in terms of delivery of care, content of care, and a number of other factors, see Appendix I. Women with high-risk pregnancies attend concurrent one-on-one appointments with a specialist obstetrician or physician in addition to attending CenteringPregnancy™ group sessions (Catling et al., 2015). According to the Centering Healthcare Institute, CenteringPregnancy™ is an evidence-based redesign of healthcare delivery that helps to promote:

- safety
- efficiency
- culturally appropriate patient-centred care
- effectiveness
- timeliness
- more equitable care

Centering is a model of group healthcare, which incorporates three major components: assessment, education, and support...Centering promotes greater patient engagement, person empowerment, and community building. The 13 Essential Elements of Centering secure these benefits:

- 1) Health assessment occurs within the group space.
- 2) Participants are involved in self-care activities.
- 3) A facilitative leadership style is used.
- 4) The group is conducted in a circle.
- 5) Each session has an overall plan.
- 6) Attention is given to core content, although emphasis may vary.
- 7) There is stability of group leadership.
- 8) Group conduct honours the contribution of each member.
- 9) The composition of the group is stable, not rigid.
- 10) Group size is optimal to promote the process.

- 11) Involvement of support people is optional.
- 12) Opportunity for socializing with the group is provided.
- 13) There is ongoing evaluation of outcomes (Centering Healthcare Institute Inc, 2009-2014).

The Centering Healthcare Institute trains healthcare professionals to use CenteringPregnancy™ with prenatal patients, certifies implementation sites, and measures outcomes. The term CenteringPregnancy™ is copyrighted and in order for a site to be defined as CenteringPregnancy™, a series of guidelines including requirements for training and ongoing development and evaluation is required. The site must also follow the 13 Essential Elements of Centering as listed above (Catling et al., 2015).

Although the Centering Healthcare Institute's CenteringPregnancy™ program is the most commonly used model of GPC in the United States, other locally adapted GPC models, in addition to CenteringPregnancy™, are gaining traction and emerging across Canada. Perinatal Services BC uses the term Connecting Pregnancy to describe "a model of maternity care promoting birth as a community-based and peer-supported program" (Perinatal Services BC, 2015). Similar to CenteringPregnancy™, the model integrates assessment, education, and support into a group setting with women of similar gestational age. Perinatal Services BC promotes the model of care by providing a webpage with published research and resources to be used by facilitators (Perinatal Services BC, 2015).

There are over 425 active CenteringPregnancy™ sites in the United States today, serving about 50,000 women annually. This does not include the number of sites that are offering GPC and not using the CenteringPregnancy™ model. The GPC model of care is slowly growing across Canada with approximately 14 active sites in the country, with one site offering GPC for more than ten years (Appendix II). In a survey sent to healthcare settings that currently provide GPC in Canada, of the seven sites that responded, two stated that they are using the CenteringPregnancy™ module, two are using Connecting Pregnancy, and three sites are using locally adapted versions of either CenteringPregnancy™ or Connecting Pregnancy modules (Appendix II).

6. Group Prenatal Care Literature Review and Environmental Scan

This section examines current research on GPC care to assess if there is an improvement in birth outcomes and breastfeeding rates associated with using this model of care compared to IPC. Birth outcomes examined in this paper are gestational age at birth, preterm birth, and low birth weight. As mentioned previously, although there is research on many other potential outcomes of GPC, it was decided to focus primarily on these topics in order to keep the review manageable and within the mandate of the Prevention Institute – to reduce the occurrence of disabling conditions in children. Breastfeeding and the birth outcomes of focus all have strong evidence for their impact on long-term health outcomes for children and this evidence was reviewed briefly above.

This report also outlines where, in Canada, GPC has been implemented. An environmental scan was completed through distribution of a survey to healthcare settings currently or previously administering GPC in Canada. Survey respondents' experiences, views, and recommendations for clinics wanting to implement the group care model into their practice will be summarized in this report.

Much research has been done on GPC that is beyond the scope of this paper. Researched topics include weight gain during pregnancy, readiness for labour and delivery, maternal prenatal knowledge, satisfaction with care, and appointment attendance. Healthcare providers' views of delivering the model of care in terms of personal satisfaction, caseload, time spent with patients, and other such topics have also been examined in literature. Although these outcomes are not the focus of this literature review, many of the studies included in this review also reported findings in these areas, in addition to their focus on preterm birth and/or low birthweight, and/or breastfeeding. A summary of research findings on the above topics are summarized in Appendix III. This is not a comprehensive review of the literature on these topics, but simply a summary of findings available from when researchers included these topics in their research, in addition to breastfeeding rates and birth outcomes.

The goal of this literature review and environmental scan is to produce a current, evidence-based report on the topic of GPC to contribute to an understanding of whether this model of care is logistically and feasibly a good fit to improve birth outcomes in Saskatchewan.

Following the literature review focusing on birth outcomes and breastfeeding, consideration is given to the cost of GPC and to populations in Saskatchewan that may particularly benefit from such a model of care; specifically youth and Indigenous women. The evidence of the effectiveness of GPC in addressing their particular challenges is examined.

7. Methodology

7.1 Literature Review

In scientific literature, the terms 'group prenatal care', 'centeringpregnancy', 'centering pregnancy', and 'connecting pregnancy' are all terms used to describe prenatal care provided to a group of women at one time. In this report, the term 'group prenatal care', abbreviated GPC, is used and is inclusive of research done using any of the above mentioned terms.

A search of the following public and academic databases was completed: Clinical Evidence, Dynamed, Stat!RefPier, UptoDate, Guideline Advisory Committee (GAC), National Guidelines Clearinghouse (NGC), Turning Research into Practice (TRIP) Database, Health Evidence, Center for Reviews and Dissemination, Evidence-Based Nursing, Evidence-Based Medicine, Evidence-Based Mental Health, American College of Physicians Journal Club, Health Evidence, CDC Guide to Community Preventive Services, The Centre for Reviews and Dissemination (CRD), McMaster Health Knowledge Refinery (McMaster Plus), EPPI-Centre,

Cochrane Collaboration, Trials Register of Promoting Health Interventions (TRoPHI), and PubMed. All databases were searched using the keyword terms “group prenatal care”, “group antenatal care”, “centering pregnancy”, “centeringpregnancy”, “connecting pregnancy”. Reference sections were reviewed for relevant articles.

A significant amount of research has been completed on GPC. The Centering HealthCare Institute has a bibliography on their website with 77 published research studies on their specific model alone (Centering Healthcare Institute Inc, 2009-2014). To narrow the number of articles included in this literature review and in an attempt to include only high quality research evidence, only published systematic reviews were analyzed and included for the discussion of regular GPC. In reviewing evidence for an enhanced model of GPC, which has not been the subject of a systematic review, results from randomized control trials (RCT) are discussed.

It is widely accepted that systematic reviews are a more reliable, higher level of evidence, followed by evidence from RCTs, and then cohort studies. See Appendix IV for a definition of systematic reviews and meta-analyses.

Four systematic reviews (two of which did a meta-analysis) were found to compare GPC with IPC in terms of pregnancy outcomes and were, thus, included in this report (Catling et al., 2015; Lathrop, 2013; Ruiz-Mirano, Lopez-Yarto, & McDonald, 2012; Sheeder, Weber Yorga, & Kabir-Greher, 2012). The findings and conclusions in these reviews will be summarized in this report. All reviews used quality assessment methods to establish inclusion criteria to determine which articles were included in the review. Three of the systematic reviews included both randomized and non-randomized control trials, and one limited their scope to RCTs and quasi-randomized control trials (used a quasi-random method of allocation such as alternation or date of birth) only. RCTs are considered the gold standard to avoid self-selection bias, but only three articles that compare birth outcomes and breastfeeding rates between GPC and IPC have been identified in literature that fit this criterion. When doing research on GPC, if women are not randomly assigned to a model of care, then those women in GPC were volunteers; a group typically noted for their high motivation, which can introduce selection bias into the trial. This self-selection bias makes it difficult to determine if the improvement in birth outcomes is caused by the model of care or patient characteristics.

It is important to acknowledge the overlap of some studies being used in multiple systematic reviews. For example, Ickovics et al. (2007) was used in all four systematic reviews. This study was described by Ruiz-Mirano (2012) as a “well-designed, high-quality study with low risks of selection, performance, attrition, detection, and reporting bias” (p. 226). In total, there were 12 articles used in the four systematic reviews comparing birth outcomes between mothers that received GPC and mothers that received IPC. It should be noted that the majority of the studies were carried out in high-risk minority groups which include young mothers, women of low socioeconomic status, African American, and

Hispanic women. This may impact the ability to generalize the results of the research to all women, but provides some evidence for whether this model of care is effective for reducing risks for high-risk populations.

For a summary of the studies used in the systematic reviews, see Appendix V.

7.2 Environmental Scan

There is minimal information in the literature on the logistics of how the GPC model is run in terms of staffing, curriculum used, additional time/work required, and any associated challenges. To fill this gap, the environmental scan (i.e., survey) was completed. Surveys were sent to 17 healthcare settings (e.g., clinic, hospital, centre) in Canada identified to currently offer or previously offer GPC. Of the 17 surveys sent out, nine healthcare settings responded for a response rate of 53%. For a full report of the survey, see Appendix II. Survey results are summarized below:

Many healthcare settings rely on a multidisciplinary team to contribute to GPC with midwives, childbirth educators, family physicians, doulas, and administrative assistants being the most commonly noted contributors.

The majority of healthcare settings reported additional work required when providing GPC as compared to IPC. Organization and preparation of the GPC sessions, as well as development of the curriculum, were noted as activities requiring additional work.

Challenges identified with GPC included those associated with administrative work, and facilitating a group discussion, as opposed to providing IPC. Further, a few respondents identified the difficulty of managing time within a group setting. Other challenges identified included: working extended/evening hours, low healthcare provider buy-in, and ensuring the availability of knowledgeable facilitators who provide consistent messaging. The challenges of providing GPC led to two clinics discontinuing GPC being offered at their clinic with reasons including healthcare provider dissatisfaction, financial reasons, insufficient staffing, and extended work hours.

Respondents were asked to identify the biggest benefits associated with providing GPC and who experiences these benefits. Many respondents discussed how GPC allows the pregnant women and their partners to build connections with other women and families in similar situations and receive support from these women/families. Several also noted that GPC leads to both patient and provider satisfaction. Specific factors that may contribute to provider satisfaction include: a reduction in repetitive one-to-one discussions, increased efficiency (e.g., seeing multiple women in a 90-minute session), and the group dynamic creating a challenging, yet enjoyable experience.

Other benefits identified by respondents included: clients gaining knowledge (from both healthcare providers and other pregnant women), women being better prepared for labour and delivery, and women being empowered to make their own choices regarding care.

Respondents were asked which model they prefer based on several different variables. Almost 95% of respondents preferred GPC with respect to patient knowledge and understanding of prenatal information. Further, over three-quarters of respondents preferred GPC with respect to patient satisfaction and nearly three-quarters of respondents preferred the GPC model with respect to provider satisfaction. With respect to building rapport with patients, over one-half of survey respondents preferred IPC.

How healthcare settings bill for and fund GPC was explored in the survey. A number of recommendations were also offered for others considering implementing GPC in their healthcare setting.

For a full summary of the survey, see Appendix II.

8. Summary of the Evidence

As mentioned previously, four systematic reviews (two which are also meta-analyses) that compare the effects of GPC and IPC on birth outcomes and breastfeeding rates will be summarized, in order of publication date. Results from the systematic reviews that did meta-analyses will be displayed differently than the studies that did not do meta-analyses. When discussing the systematic reviews, the results of individual studies are summarized in a table unlike meta-analyses where the results from each study have been statistically combined and are, therefore, not individually summarized.

The first systematic review and meta-analysis to be considered, completed by Ruiz-Mirano et al. (2012), included eight studies and 3,242 women (Alexander & Kotelchuck, 2001; Bloom, 2005; Ford et al., 2002; Grady & Bloom, 2004; Ickovics et al., 2007; Ickovics et al., 2003; Klima, Norr, Vonderheid, & Handler, 2009; Robertson, Aycock, & Darnell, 2009). The objective of the review was to compare the effects of GPC and IPC on the birth outcomes, preterm birth, and low birth weight, as well as breastfeeding. RCTs and cohort studies that assessed maternal or infant health outcomes were included in this review. There were no language restrictions, with studies written in any language accepted. Studies were excluded if they assessed only psychosocial outcomes, were published only as abstracts, review articles, or case studies. The study quality of included studies was evaluated. Research findings were separated by the type of study (i.e., two meta-analyses were done by separating the RCTs from the cohorts). Most of the studies included in the systematic review were carried out in high-risk minority groups (i.e., adolescents and women of low SES). Ruiz-Mirano et al. (2012) provided data in crude and adjusted¹ format. For purposes of this report, only adjusted data will be provided when available.

¹ The crude rate is a ratio of the total number of people in which an event happens to over time to the size of the population who may experience this event during the same time period. The adjusted rate is the statistically adjusted rate that accounts for variables, such as age or sex, to allow for unbiased comparisons between groups having different compositions with respect to these variables.

The authors found women randomly assigned to GPC to have a significant reduction in the prevalence of preterm birth (RR 0.71, 95% Confidence Interval (CI) 0.52, 0.96, 2 trials, n = 1621), but no statistically significant differences were found in the cohort studies (RR 0.74; 95% CI 0.42, 1.31, 4 trials, n = 1023). In the RCTs, GPC had no effect on rates of low birth weight (RR 0.91, 95% CI 0.65, 1.27, 2 trials, n = 158), but in the cohort studies, the risk of low birth weight was decreased in women who chose GPC (RR 0.53, 95% CI 0.34, 0.83, 3 trials, n = 755). Rates of breastfeeding were significantly higher in women who were randomly allocated to GPC for both initiation (RR 1.08, 95% CI 1.02, 1.14, 2 trials) and mean duration (RR 1.10, 95% CI 1.07, 1.13, 1 trial), but no differences in breastfeeding rates were found in the cohort group.

The researchers acknowledged limitations to their review, which included finding only two high quality RCTs, with the remaining studies being of low quality. The majority of studies used in this review did not assess women's attendance at IPC appointments, so researchers were unable to determine how much information the mothers actually received. Few studies reported on the same outcomes, restricting the evidence base. In conclusion, the researchers highlight the two high quality RCTs and their findings, which were decreased preterm birth and increased breastfeeding rates. The importance of more high quality research to determine if GPC is an effective method of improving birth outcomes is encouraged.

The second systematic review to discuss was completed by Sheeder et al. (2012). The objective was to review research findings to determine if differences exist between mothers who receive GPC and those who receive IPC on the following topics: patient participation, attendance, satisfaction, knowledge, pregnancy and birth outcomes, and program cost. The review included 11 studies, but only six examined birth outcomes and breastfeeding rates and are, therefore, relevant and included in this report (Bloom, 2005; Grady & Bloom, 2004; Ickovics et al., 2007; Ickovics et al., 2003; Klima et al., 2009; Robertson et al., 2009). Studies were included if they were published in a peer-reviewed journal prior to 2010. Descriptive, cross-sectional, cohort, and RCTs that assessed GPC were included in the review. Studies were identified as being non-experimental (no control group), quasi-experimental (non-randomized control group), or experimental (RCT). A number of the pregnancy outcomes relevant to this report were examined in more than one study. A summary of the results from randomized and non-randomized studies are summarized in Table 2.

Table 2. Summary of Findings Regarding Selected Pregnancy Outcomes in GPC Versus IPC (Sheeder et al., 2012).

Outcome Measured	Results
Preterm birth	<ul style="list-style-type: none"> • One study found lower rates of preterm birth for GPC participants. • Three studies found no significant difference in preterm birth.
Birth weight	<ul style="list-style-type: none"> • One study found higher birth weights for babies born to women in GPC. • One study found lower rates of low birth weight babies for GPC participants. • Two studies found no significant difference in birth weight rates of babies. • Three studies found no significant differences for mean birth weight.

Outcome Measured	Results
	<ul style="list-style-type: none"> • One study found birth weights of the preterm birth babies to be higher for GPC infants.
Gestational age	<ul style="list-style-type: none"> • One study found greater average gestational age for GPC participants. • One study found no significant differences for mean gestational age.
Breastfeeding	<ul style="list-style-type: none"> • Two studies found increased rates of breastfeeding for GPC participants at hospital discharge. • Two studies found increased initiation of breastfeeding rates for GPC participants. • One study found no significant differences for breastfeeding rates.

Sheeder et al., (2012) summarizes that GPC shows promise, with women who attend GPC appearing to give birth to babies with some improved outcomes. The review authors acknowledge the reliability and strength of their findings being limited by the low number of high quality studies on this topic. The authors caution readers of the difficulty in linking knowledge to behaviour change and birth outcomes. GPC models are set up to facilitate conversation between women in order to share common experiences. The model also promotes improved provider/patient interaction with the idea that groups function to improve provider satisfaction and, therefore, increases their efficiency in the delivery of care. Both of these are theorized to contribute to increased knowledge among pregnant women; however, it is pointed out that the effect of this model of care can only be assessed when the improved outcome can be directly linked to a change in behaviour. The following example is provided:

...low birth weight is an outcome frequently reported in group care studies. However, there is no description of the process by which group care may directly affect the primary predictors of low birth weight such as prenatal smoking or gestational weight gain. While it is important to report that patients who receive group prenatal care may have improved outcomes, it is important to understand the underlying mechanism of how these improved outcomes are achieved. Systematic description and measurement of important mediating factors of maternal and child outcomes must be conducted to better understand the direct effect of these group care processes. Improved understanding of these mediating factors will increase the plausibility of the group care findings (Sheeder et al., 2012, p. 185).

The researchers note that the majority of studies involve young women of low SES status and that study results cannot be generalized to other populations. In non-randomized controlled trials, women who choose GPC tend to be older (>20 years), nulliparous, and of ethnic minority. There has been limited research evaluating differences in women who choose GPC, as well as the aspects they find appealing in GPC. Knowledge of those factors could be used to promote ongoing participation in the model of care. The authors disagree with many articles' conclusions that GPC is a better option of prenatal care for all mothers. Sheeder et al., (2012) argue that what works for some, does not work for all, and that women should be offered equally appealing and effective options of prenatal care. Like Ruiz-Mirano et al.(2012), Sheeder et al. reiterate the importance of more high quality research to determine if GPC is an effective method of improving outcomes.

The third systematic review was completed by Lathrop (2013). There were three objectives of the Lathrop systematic review. The first was to list current healthcare challenges such as racial and ethnic disparities with regard to birth outcomes and access to prenatal care. The second was to describe the research findings comparing birth outcomes and patient satisfaction between mothers who had received GPC and those who had received IPC. The third objective was to list the limitations of current research and to identify future research needs in this area. Both randomized and non-randomized trials comparing pregnancy outcomes and/or maternal satisfaction between GPC and IPC were included by the author of the review. Studies were excluded from the review if they did not have a defined comparison group and were published before December 2011. The review included 12 studies, but only eight examined birth outcomes and were, thus, relevant to this report (Ford et al., 2002; Grady & Bloom, 2004; Hoyer, Jacobson, Ford, & Walsh, 1994; Ickovics et al., 2007; Ickovics et al., 2003; Klima et al., 2009; Robertson et al., 2009; Trudnak, 2013)². A number of pregnancy outcomes were examined in more than one study, with the results summarized by Lathrop, as seen in Table 3.

Table 3. Summary of Findings Regarding Selected Pregnancy Outcomes in GPC Versus Individual Prenatal Care (Lathrop, 2013)

Outcome Measured	Results
Preterm birth	<ul style="list-style-type: none"> • Two studies found decreased incidence of preterm birth among women in GPC. • Four studies found no significant difference.
Birth weight	<ul style="list-style-type: none"> • One study found increased birth weight among preterm infants born to women in GPC. • One study found lower rates of low birth weight infants among women in GPC. • Five studies found no significant difference.
Gestational age	<ul style="list-style-type: none"> • Two studies found no significant differences in gestational age.
Breastfeeding initiation	<ul style="list-style-type: none"> • Three studies found higher breastfeeding rates among women in GPC. • One study found no difference. • One study found increased odds of formula-only feeding among women in GPC.

Lathrop (2013) makes the conclusion that GPC appears to produce comparable, if not improved, pregnancy outcomes when compared to IPC. The model of care is believed to present an opportunity to increase prenatal care utilization and improve birth outcomes. The author believes that the evidence supports the notion that GPC decreases the risk of low birth weight babies and promotes breastfeeding. The majority of studies included in this review focused on high-risk populations (adolescents, low income women, African-American, and Hispanic women) and like Sheeder et al. (2012), it is noted that GPC may be a promising model of care for at-risk populations. Increased emphasis on education and social support within GPC might counteract existing racial and ethnic disparities in birth outcomes. Future research evaluating

² In 2013 when the Lathrop (2013) systematic review was published, the Trudnak (2013) study was a 2011 thesis and was later published in the Journal of Midwifery & Women's Health in 2013.

the benefits of GPC and the impact of GPC on ethnic and racial birth outcome disparities is advocated for; acknowledging that one model of care might be effective in improving birth outcomes in one population but not meet the needs of another. It is suggested that GPC content be customized to the patient population, with certain high-risk pregnancies benefiting from a mixed approach, including one-on-one patient visits being incorporated into the patient's care. Similar to systematic reviews summarized above, small sample size and lack of RCTs are again noted as limitations to the data. Acknowledging the additional time GPC requires of the patient, the researcher states that it is vital that patients are satisfied with the model of care and find the experience valuable and worthwhile. An important point, and one not found elsewhere in literature, is the notion that GPC educational content should be evaluated. In addition, although the CenteringPregnancy™ manual appears to be thorough, covering essential topics, it is unknown to what extent these topics are covered in sessions, as well as how effective group facilitators are at delivering the information in these research studies.

The fourth and most recent systematic review and meta-analyses to be discussed was completed by Catling, Medley et al., (2015). This review included four studies and 2,350 women (Andersson, Christensson, & Hildingsson, 2013; Ickovics et al., 2007; Jafari, Eftekhari, Fotouhi, Mohammad, & Hantoushzadeh, 2010; Kennedy et al., 2011). There were two objectives of this review. The first was to compare the effects of GPC versus IPC on psychosocial, psychological, labour, and birth outcomes for mothers and their babies. The second objective was to compare the care provider's satisfaction with providing GPC versus IPC. All identified published and unpublished randomized and quasi-randomized controlled trials were included in this review.

The authors found no statistically significant differences between mothers who received GPC and those who received IPC for preterm birth (relative risk (RR) 0.75, 95% CI 0.57, 1.00, three trials, n = 1888) or low birth weight babies (RR 0.92, 95% CI 0.68, 1.23, three trials, n = 1935). There were no differences in initiation of breastfeeding rates between the two groups (average RR 1.10, 95% CI 0.83, 1.46; three trials; n = 1733).

As in the previously summarized systematic reviews, the authors acknowledged their review was limited by finding only three RCTs and, thus, restricting the evidence base for the GPC intervention. It is also mentioned that the review was limited by the number of mothers included in the studies, with one study contributing 42% of the mothers and most analyses being based on this single study. Catling, Medley et al., (2015) reiterate the importance of additional research in order to understand the research trend towards women in GPC giving birth to fewer preterm birth and low birth weight babies. Studies were cited that have found group programs to be more effective than individual weight management interventions, and so further research into the benefits of GPC for specific health issues is encouraged. The authors conclude that although there has been a limited number of RCTs completed and therefore a limited evidence base on GPC, evidence suggests adequacy of prenatal care should be considered when designing future prenatal care programs.

As mentioned earlier in the report, the Strong Start for Mothers and Newborns initiative funds research on three enhanced prenatal care approaches, one of which is GPC. It is a large scale evaluation involving multiple states, with a budget of \$41.4 million and a target to include up to 50,000 American women. The goal is to improve maternal and infant outcomes which will ultimately result in cost savings for health insurance companies. Findings from the first and second year of the evaluation are promising and indicate that mothers who receive GPC have higher breastfeeding rates and lower preterm birth rates than the national average. There are a number of other outcomes evaluated in this study which include C-section rates, level of satisfaction, and others (Centers for Medicare & Medicaid Services, 2016). More information on the Strong Start for Mothers and Newborns initiative and evaluation reports to date can be found at <https://innovation.cms.gov/initiatives/Strong-Start/index.html>. Although there is yet to be published research from results of this study, healthcare providers considering GPC are encouraged to follow the study's progress.

The focus of much of the research conducted on GPC to date appears to suggest that this model is particularly appropriate for higher-risk populations. Along this line, the Centering Healthcare Institute has developed an enhanced model of CenteringPregnancy™, called CenteringPregnancy™ Plus. There have yet to be systematic reviews completed on this enhanced model; however, RCTs have found young mothers who have received the CenteringPregnancy™ Plus have improved birth outcomes which will be discussed in more detail below in Section 10.1.

9. Cost of Group Prenatal Care

There is limited research on the financial costs of running a GPC program, but in the systematic review previously discussed by Sheeder et al. (2012), two American articles examining the cost of running the program were reviewed. Sheeder et al. (2012) conclude that the cost of GPC is essentially equivalent to the cost of IPC. They also summarize that when certified nurse midwives facilitate the GPC program, the delivery of care is more efficient and costs less than when physicians facilitate the program.

In a more recent American study, GPC was found to be financially sustainable with the potential to provide a small net income for outpatient clinics (Rowley et al., 2015). Adjusted revenue per pregnancy was \$989.93 and \$1,080.69 for IPC and GPC respectively (Rowley et al., 2015). Cost neutrality for GPC was achieved when an average of 10.652 women were enrolled in a group and the program was staffed with two registered nurses and a nurse practitioner. When groups were staffed by a single nurse and single clinician (as suggested by CenteringPregnancy™) for pregnancy assessments, and formal childbirth education and diaper bag incentives were eliminated, cost neutrality was reached when the group enrolled 4.801 women (Rowley et al., 2015).

10. Saskatchewan Populations that could Particularly Benefit from GPC

Mothers are more likely to experience poorer birth outcomes and have higher infant mortality rates than the general public if they are young, from minority groups, experience domestic violence or mental illness, have substance abuse problems, or are of low socio-economic status (Hollowell, Oakley, Kurinczuk, Brocklehurst, & Gray, 2011). As mentioned previously, mothers who are young, have lower educational levels, or are living in a household at or below the low income cut-off, are less likely to report that their prenatal care meets their needs, noting inadequate information about pregnancy-related topics as one of the reasons for their discontent. People's satisfaction with healthcare influences their further use of that healthcare system and as women from these populations are already less likely to receive regular prenatal care, finding ways for prenatal care to address their needs is a high priority. The majority of research studies completed on GPC involve women who are young, from minority groups, and/or are of low socioeconomic status as seen in Appendix V.

10.1 Young Mothers

In Saskatchewan, adolescent (between the ages of 12 and 20) pregnancy rates are among the highest in Canada and the developed world (Saskatchewan Prevention Institute, 2014). The range of age-specific fertility rates by Canadian provinces are seen in Table 4.

Table 4. Adolescent Pregnancy Rates, Canada, Provinces and Territories, 2011 (Statistics Canada, 2015a).

Province/Territory	Fertility Rate per 1,000 Females < 19 years
Newfoundland & Labrador	17.7
Prince Edward Island	16.6
Nova Scotia	17.3
New Brunswick	21.3
Quebec	9.2
Ontario	9.8
Manitoba	28.9
Saskatchewan	32.5
Alberta	17.3
British Columbia	8.5
Yukon	16.2
Northwest Territories	33.5
Nunavut	108.0
Canada	12.6

A literature review by Allen et al., 2012 examined whether or not the way in which prenatal care is provided affects maternal and neonatal outcomes for young women. The researchers referenced literature that has found pregnant adolescents to be at an increased risk of adverse pregnancy outcomes which includes anaemia, antepartum

haemorrhage, pregnancy-induced hypertension, preterm birth, low birth weight, small for gestational age, low Apgar scores, neonatal death, and longer and more frequent stays in the NICU (Chen et al., 2007; Koniak-Griffin & Turner-Pluta, 2001; Lewis, Hickey, Doherty, & Skinner, 2009; Smith & Pell, 2001; Van der Klis & Westenberg, 2002). Pregnant adolescents are more likely to book their first prenatal appointment at a later gestation, attend fewer appointments, or receive no prenatal care at all (Chen et al., 2007; Fahy, 1996; Imamura et al., 2007; Klima, 2003; Koniak-Griffin & Turner-Pluta, 2001; Lewis et al., 2009; Raatikainen, Heiskanen, & Heinonen, 2007; Smith & Pell, 2001; Van der Klis & Westenberg, 2002). In addition, teen parents are at risk of repeat pregnancies in their teen years. In one U.S. study involving 50 states, 18.3% of teen births were repeat births (Centers for Disease Control and Prevention, 2013). Repeat teen pregnancies further inhibit a mother's ability to succeed in her education and employment (Centers for Disease Control and Prevention, 2013). The CDC stresses the need for evidence-based approaches to reduce repeat adolescent pregnancies (Centers for Disease Control and Prevention, 2013). Hoyer et al., (1994) mentions the large body of research that documents the importance of peer support for adolescents when discussing their prenatal care. Peer acceptance plays a large role from childhood through adolescence and into young adulthood. Group programs that facilitate relationship building, a sense of belonging, and the development of individual identity can be beneficial when providing healthcare to pregnant adolescents (Hoyer et al., 1994). GPC is theorized to be more relevant to young women, providing opportunities for healthcare providers to engage them in discussions on health promotion strategies and interventions to address modifiable risk factors such as sexually transmitted infections, anaemia, domestic violence, smoking, drug and alcohol use, poor nutrition, stress, unstable housing, and inadequate social support (Allen et al., 2012).

CenteringPregnancy™ Plus

A systematic review found that 19-39% of pregnant adolescents tested positive for an STI during pregnancy and 14-39% tested positive for an STI six to ten months postpartum (Meade & Ickovics, 2005). Pregnant adolescents were also five times less likely to use a condom compared to non-pregnant adolescents. CenteringPregnancy™ Plus (CP+) is a modified CenteringPregnancy™ Program that integrates STI and HIV prevention into the care model. CP+ has the same structure and time commitment as CenteringPregnancy™ but has three, 40-minute sessions devoted to STI/HIV prevention information (Kershaw, Magriples, Westdahl, Schindler Rising, & Ickovics, 2009). The CP+ program aims to reduce the risk of HIV and other STIs, as well as improve other health outcomes in young pregnant women (Kershaw et al., 2009).

One RCT found young women assigned to the CP+ program significantly less likely to have a repeat pregnancy at six months postpartum (OR 0.49, CI 0.27, 0.91, $p = 0.02$), have increased condom use at six months postpartum ($F = 7.45$, $p = 0.007$) and 12 months postpartum ($F = 3.93$, $p = 0.04$), as well as decreased unprotected sexual intercourse at 12 months postpartum ($F = 3.78$, $p = 0.04$) (Kershaw et al., 2009). Participants also had more

communication about safer sexual activity with their partners during the third trimester of pregnancy ($F = 25.98$, $p = 0.001$) and at 12 months postpartum ($F = 4.54$, $p = 0.03$) (Kershaw et al., 2009).

In a more recent RCT that compared a number of outcomes between female adolescents who received CP+ and IPC, favourable birth, neonatal, and reproductive outcomes were observed in the CP+ group (Ickovics et al., 2016). For reproductive outcomes, women who attended at least 50% of CP+ group sessions were significantly less likely to have a preterm birth (4.1% vs 12.0%) or low birth weight baby (5.2% vs 10.7%), and had babies who spent fewer days in the NICU (mean +/- SD = 0.91 +/- 2.44 days vs 1.99 +/- 9.51 days) (Ickovics et al., 2016). These women were also significantly less likely to have a repeat pregnancy within 12 months (16.9% vs 29.4%), engage in fewer acts of unprotected sex (mean +/- SD = 6.75 +/- 14.14 vs 7.55 +/- 13.00), and were more likely to use condoms more frequently (mean +/- SD = 50.30% +/- 40.43% vs 39.84% +/- 39.83%) (Ickovics et al., 2016).

The CDC recommends that health departments and community-based organizations implement evidence-based interventions. The CDC's HIV/AIDS Prevention Research Synthesis (PRS) Project uses information gathered from quality evidence to identify evidence-based interventions, best practices, and public health strategies to reduce HIV transmission and infection. Strategies are classified as either *Best* evidence or *Good* evidence. The review team frequently updates the Risk Reduction Chapter which houses all the strategies identified as best evidence or good evidence. CP+ has been identified by the PRS as a *Best* evidence strategy based on results from the Kershaw et al., 2009 RCT study (Centers for Disease Control and Prevention, 2015).

10.2 Indigenous Mothers

There are gaps in infant mortality and birth outcomes between Canada's Indigenous population and the non-Indigenous population. The Public Health Agency of Canada reports that Indigenous Canadians face higher risk of adverse pregnancy and infant health outcomes (Public Health Agency of Canada, 2005). The infant mortality rate among Indigenous infants is twice that of the general Canadian population, with an increased risk of preterm birth (Public Health Agency of Canada, 2005). Saskatchewan has one of the highest young Indigenous populations in Canada with a median age of 20 years compared to the median age of 41 years for the non-Indigenous Saskatchewan population (Statistics Canada, 2015b).

In the National Aboriginal Health Organization's poll of Indigenous health and healthcare in Canada, information on Indigenous Peoples' views and opinions regarding certain health and healthcare issues was collected across Canada. Information was collected from those living on or near an Indigenous community. These responses were compared to those received in the Canadian Community Health Survey. Indigenous respondents were more likely than the Canadian population, in general, to have experienced an occasion in

the previous year in which they did not receive needed healthcare (18% vs 12.5%). Reasons for not receiving needed medical care included availability and lack of culturally appropriateness of care. The quality of healthcare received was rated lower among Indigenous population than the Canadian population in general (67% vs 84%), with 31% of Saskatchewan Indigenous people rating the healthcare system as “fair” or “poor”. When asked if they used traditional healers and natural medicines, 38% of Saskatchewan respondents said “yes”. When asked for ideas on how to improve Indigenous health, 80% of Indigenous respondents believe there is a need to develop culturally-relevant/responsive healthcare programs, 75% believe in a revival of Indigenous cultures and traditions, 72% would like increased use of Indigenous language, and 67% would like a return to Indigenous medicines and healing practices (National Aboriginal Health Organization, 2003).

GPC provides a unique opportunity for healthcare providers to incorporate culturally-appropriate care. This model of care would allow healthcare providers to focus on the specific needs and risk factors of Indigenous women.

11. Discussion

The goal of every pregnancy is a healthy full-term baby. A healthy start for a baby can make a big difference at the individual, family, and societal level. During pregnancy, there is much for mothers to learn, and Saskatchewan women report their most useful source of pregnancy-related information as their healthcare provider. Economic and time pressures influence the quality of care that prenatal patients receive. Hectic schedules and large numbers of patients limit healthcare providers’ time with patients. Healthcare providers need to continue to adapt in the changing environment, exploring innovative ways to meet patients’ needs. Many birth outcomes are influenced by risk factors that can be modified by a mother during pregnancy, if she is aware of these risk factors and feels supported. GPC started in the 1990’s in the United States and has since then spread overseas and into Canada. With approximately 14 active sites in Canada today, the model of care has been gradually expanding across the country. GPC can provide mothers with the opportunity to connect and form a community with other women, in addition to receiving more time intensive and responsive support from healthcare providers. The involvement of the woman in her assessment and the relationships she forms may contribute to her feeling more involved in her care, ultimately increasing her satisfaction with care. Higher satisfaction with the care a woman receives may increase the number of prenatal care appointments she attends.

There is a significant amount of published research and websites that claim that the GPC model improves birth outcomes and breastfeeding rates. The quality of this information varies, so this report focuses on the highest levels of evidence available; systematic reviews evaluating the evidence of the impact of GPC on birth outcomes and breastfeeding rates and RCTs examining the impact of the enhanced GPC model, CP+.

Although the research findings from each of the four systematic reviews examining traditional GPC are not consistent, many statistically significant improvements for different birth outcomes were found. In three of the four systematic reviews, researchers found women who received GPC to have higher rates of breastfeeding. In one systematic review, researchers found decreased rates of preterm birth and in another review, decreased rates of low birth weight. Researchers from all four systematic reviews state the limited amount of quality research on this topic as a study limitation and highlight the importance of more quality research to determine if GPC is an effective method of improving outcomes. Overall, it appears that GPC produces comparable, if not improved, birth outcomes. Results from the RCTs that have studied the outcomes of young mothers who received the modified GPC curriculum, CP+, are more promising and have been sufficient for the CDC to recommend the model of care as an evidence-based intervention to reduce HIV transmission and infection. Study results have found favourable birth, neonatal, and reproductive outcomes in mothers who receive the modified GPC curriculum, CP+. This enhanced model should be considered for Saskatchewan in light of the province's high levels of teen pregnancy and HIV rates. Young mothers and Indigenous mothers are two Saskatchewan populations at an increased risk of adverse pregnancy and infant health outcomes and could potentially benefit from GPC. The group care model has the potential to help create an environment more relevant to the participants, including being supportive of local culture.

A gap in GPC research, identified through completion of this report, was the lack of evaluation of how effective GPC facilitators are in delivering the information to mothers. There was also no research or evaluation found on who facilitated the sessions and the logistics of running the program. Prior to considering implementing GPC into their practice, Saskatchewan healthcare providers should be aware of factors that have led to the success or demise of GPC programs in Canada. The GPC survey of Canadian healthcare providers attempted to fill some of these research gaps (Appendix II). The survey was sent to healthcare providers who currently work, or have previously worked, in a Canadian healthcare setting that provides or provided GPC. The majority of survey respondents consider GPC to require additional work to organize, implement, and sustain the model of care. Despite the extra efforts required, virtually all of the respondents reported a preference for GPC with respect to patient knowledge and understanding of prenatal information. Furthermore, the majority of respondents preferred GPC with respect to patient and provider satisfaction. Other noted benefits included the connections built between other women and families. The benefits noted by survey respondents likely contribute to the continual research, implementation, and expansion of GPC by healthcare providers internationally.

Coinciding with the benefits of GPC noted by healthcare providers responding to the survey, many positive outcomes in addition to birth outcomes and breastfeeding were observed in the research included in the systematic reviews covered in this report (see Appendix III for a table summarizing these additional outcomes). However, healthcare providers are encouraged to view this table with caution, as it is not based on a thorough review of the research on these outcomes.

Preterm birth, low birth weight, and lack of breastfeeding can have lifelong impacts on the individual and pose financial strain on the Saskatchewan healthcare system. Any prenatal intervention that shows promise to reduce preterm birth and low birth weight or improve breastfeeding rates should be further explored and considered for Saskatchewan.

12. Next Steps for the Saskatchewan Prevention Institute

- Assess local healthcare providers' interest in GPC information session/presentation.
- Respond to information needs if clinics are interested in implementing GPC into their practice.

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APPENDICES

Appendix I. Individual Prenatal Care Compared With Group Prenatal Care (Ickovics et al., 2007).

	Individual Care	Group Care
Delivery of Care	<ol style="list-style-type: none"> 1. Accepted model of prenatal care using one-to-one examination room visits. 2. Care is provided by a credentialed prenatal provider. 3. Variable continuity of provider throughout pregnancy. 	<ol style="list-style-type: none"> 1. Prenatal care provided within the group space (community or conference room). 2. Care is provided through a partnership of a credentialed provider and pregnant woman. 3. Continuity of care from a single provider.
Content of Care	<ol style="list-style-type: none"> 4. Physical assessment completed inside an examination room by a provider. 5. Education is provider-dependent and may be random based on time available for education and/or response to patient initiated queries. 6. Few opportunities for women to interact socially with other pregnant women. 7. Care is focused on medical outcomes and recommended testing. 	<ol style="list-style-type: none"> 4. Patient participation in physical assessment (e.g., blood pressure, weight) and documentation. Fundal height and heart rate monitoring occur in a group space. If required, health concerns that require private consultation and cervical examinations are conducted in ancillary visits in a private examination room. 5. Education runs throughout the 10 sessions with trained providers and structured materials. Self-assessment sheets at sessions provide continuous feedback. 6. Opportunities for community building are present throughout prenatal and postpartum period. 7. Care is focused on health outcomes and personal empowerment. Testing, such as blood draw, can be done in group setting.
Patient access to or involvement in care	<ol style="list-style-type: none"> 8. Prenatal care records are maintained by the provider and not shared with the patient unless requested. 9. Provider schedule determines patient appointment dates and times. 	<ol style="list-style-type: none"> 8. Women contribute to their own record by performing their weight and blood pressure as well as documentation. They are encouraged to keep copies of their progress for their personal records. Transparency of the medical chart should contribute to increased safety. 9. Schedule of group visits is available at first session, which occurs at approximately 16 weeks.

	Individual Care	Group Care
	<p>10. Patient services are often fragmented (e.g., smoking cessation and nutrition counseling, WIC, labour preparation).</p> <p>11. Limited opportunity for women to have contact with other women after delivery.</p>	<p>10. Group provides “one stop shopping” with all services available within the group, providing services more efficiently.</p> <p>11. Community building throughout pregnancy often leads to ongoing support postpartum.</p>
Time spent by providers and patients	<p>12. Variable waiting time.</p> <p>13. May be difficult to adapt care to accommodate cultural issues.</p> <p>14. Providers may find the provision of prenatal care to be repetitive and often lack sufficient time to go into more detail regarding specific patient questions or concerns.</p> <p>15. Average visit time is limited by provider schedule.</p>	<p>12. All care, education, and support take place within the 2-hour time period. No waiting room.</p> <p>13. Group can provide a setting that is supportive of cultural and language differences.</p> <p>14. Groups minimize repetition and permit sufficient time for more in-depth discussion.</p> <p>15. Total provider/patient time throughout pregnancy is approximately 20 hours.</p>
Administration and scheduling	<p>16. Efficiency marked by scheduling of patients at 10-15 minute intervals.</p>	<p>16. Within a 2-hour period, 8-10 women can receive total care in a conference or community room. This allows examination rooms to be used for other purposes.</p>
Provider, resident, student education	<p>17. Student education is limited by examination room space and time constraints.</p>	<p>17. Students and preceptors work together within the group, incorporating student education and direct supervision.</p>

Appendix II. Group Prenatal Care Survey: Summary of Results.

The Saskatchewan Prevention Institute implemented an online survey in June 2016, as part of an environmental scan, to assess Canadian experiences with delivering the group prenatal care (GPC) model. The Prevention Institute invited those who currently work, or have previously worked, in a Canadian healthcare setting (e.g., clinic, hospital, centre) that provides GPC, to participate in the survey. It is the intention of the Prevention Institute that the information gathered from this survey will be shared with interested healthcare providers to guide discussions around the appropriateness of this model of care for Saskatchewan.

In the introductory instructions, respondents were asked to submit one survey per healthcare setting; however, in several instances, multiple individuals from the same healthcare setting completed the survey. For some questions, multiple responses from the same location were combined to represent one response per healthcare centre. It is important to note that respondents from the same healthcare setting did not always provide the same answer to a question. If necessary, the Prevention Institute followed-up with the healthcare centre for clarification. However, if responses from the same setting weren't in direct conflict with each other (e.g., one individual included an answer that was not provided by the remaining respondents from that same healthcare setting), the individual responses from one setting were combined into one response.

1. Participants

A total of 18 individuals from nine different settings responded to the survey. The majority of respondents were midwives (77.8%, n = 14), three respondents were family physicians (16.7%) and one respondent was a nurse (5.6%).

2. Experience Working at a Healthcare Setting that Discontinued Providing Group Prenatal Care

Survey respondents were asked if they had ever worked in a Canadian healthcare setting that provided GPC, but stopped offering it at some point. Of the 18 respondents, only four (22.2%) responded 'yes', while the remaining 14 respondents (77.8%) answered 'no'. Of the four respondents who answered 'yes', two of them came from the same healthcare setting. Of the other three healthcare settings who quit providing GPC, one of them is now offering it again. The four participants who responded 'yes' were then asked to identify, from a list of options, what factors contributed to the discontinuation of GPC being offered at the healthcare setting in which they worked (participants were able to choose as many items as apply to their situation). The following reasons for discontinuation were selected: 'healthcare provider dissatisfaction' (n = 1), 'financial reasons' (n = 2), 'workload' (n = 1), 'insufficient staffing' (n = 2), and 'extended work hours' (n = 1). In the 'other' category, one respondent provided the following reason for discontinuation - 'decreased access to care'. Participants were also asked to explain their selections/responses. The respondent who noted that 'decreased access to care' led to a discontinuation of GPC elaborated on his or her response in the following ways. First, it was noted that staff did not want to work evenings, even though evenings may be the best time for patients to attend a GPC session. Second, the respondent highlighted the significant time and effort required of clerical and administrative staff to set-up these group sessions. Third, the respondent recognized that the sessions themselves were insufficiently staffed. Finally, it was noted that staff did not appreciate having to arrange their vacation schedules around group sessions. This respondent did not elaborate on how, for example, a lack of desire among staff to work weekends and disliking having to arrange vacation schedules around group sessions contributed to a decrease in patients' access to care. Another participant highlighted the financial strain that accompanies setting group sessions (e.g., acquiring resources, snacks, and

speakers). One participant simply stated that funding was discontinued. Finally, one participant discussed how there were some challenges with buy-in among administrative staff, which contributed to a discontinuation of GPC being offered at the healthcare setting in which he or she worked.

3. Experience with a Healthcare Setting that Currently Provide Group Prenatal Care

The remainder of the survey questions focused on current experiences with GPC. Respondents were asked whether the healthcare setting, in which they currently work, provides GPC. The majority of respondents (88.9%, n = 16) responded 'yes'. Only two respondents (11.1%) indicated that their current healthcare setting does not provide GPC. These two respondents did not respond to any other questions asking about current experiences with a healthcare setting that provides GPC.

Name and Location of Healthcare Setting Offering Group Prenatal Care

Respondents were then asked to identify the name and location of the healthcare setting in which they currently work that offers GPC. Sixteen respondents worked in a healthcare setting that currently offers GPC, and seven healthcare centres were represented in total:

South Community Birth Program, Vancouver, BC
 Apple Tree Maternity, Nelson, BC
 Maternity Care Westside, Kelowna, BC
 Plum Midwifery, Comox, BC
 Alex Community Health Centre, Calgary, AB
 Lucina Midwives, Lucina Centre, Edmonton, AB
 Blue Heron Midwives, Waterloo, ON

Length of Time Providing Group Prenatal Care

Respondents were asked how long their healthcare setting has been providing GPC. Responses were varied, with healthcare settings providing GPC ranging from just over one year to more than 10 years.

Group Prenatal Care Curriculum

Respondents were asked what GPC curriculum their healthcare setting uses. Two centres use Connecting Pregnancy and two centres use CenteringPregnancy™. Further, three centres used a locally adapted version of either Connecting Pregnancy or CenteringPregnancy™.

Health Professionals Contributing to Group Prenatal Care

Respondents were asked to identify the health professionals that contribute to GPC at their current place of employment. There are seven healthcare centres represented in the responses. Eighty-six percent of the healthcare settings (n = 6) had a midwife contribute to GPC, while nearly three-quarters of healthcare settings (71%, n = 5) had a childbirth educator contribute to GPC. Further, over 50% of healthcare settings (57%, n = 4) had a family physician, doula, and administrative assistant contribute to GPC. Other identified health professionals contributing to GPC included: nutritionists, lactation consultants, physiotherapists, a nurse, a Traditional Chinese Medicine (TCM) doctor, and specialty guest speakers.

Table 1. Health Professionals Contributing to GPC.

Response (N = 7)	Percentage	Count
Midwife	86	6
Childbirth educator	71	5
Family physician	57	4
Doula	57	4
Administrative assistant	57	4
Nutritionist	43	3
Lactation consultant	43	3
Physiotherapist	29	2
Nurse	14	1
Obstetrician/Gynecologist	0	0
Social worker	0	0
Addictions worker	0	0
Other (i.e., TCM doctor, speciality guest speakers)	29	2

Facilitators of Group Prenatal Care Sessions

Respondents were also asked to identify who facilitates (leads) the GPC sessions at their healthcare setting. Again, there are seven healthcare settings represented. It is also important to note that, in some settings, a multidisciplinary team facilitates the sessions within the same cohort of mothers, with a different professional leading different sessions. Nearly three-quarters of healthcare settings (71%, n = 5) identified a midwife as a facilitator of their GPC sessions. Further, over 50% of healthcare settings have a childbirth educator as a facilitator. Other facilitators included: family physicians, doulas, a nurse, an administrative assistant, and a lactation consultant.

Table 2. Facilitators of GPC Sessions.

Response (N = 7)	Percentage	Count
Midwife	71	5
Childbirth educator	57	4
Family physician	43	3
Doula	29	2
Nurse	14	1
Administrative assistant	14	1
Lactation consultant	14	1
Obstetrician/Gynecologist	0	0
Nutritionist	0	0
Social worker	0	0
Addictions worker	0	0
Physiotherapist	0	0

Additional Work Required to Provide Group Prenatal Care

Respondents were asked whether additional work is required to provide GPC as opposed to individual prenatal care (IPC). The majority of respondents (87.5%, n = 14) answered 'yes', while only two respondents (12.5%) responded 'no'. Of those who responded 'yes', they were asked to detail the type of additional work needed for GPC. A number of participants highlighted that more work is required with respect to the organization and preparation of the GPC sessions (e.g., administrative efforts to schedule the groups, recruit participants, prepare the educational materials, apply for funding, arrange speakers, follow-up with attendees, etc.). Respondents also highlighted the additional work required to develop curriculum (e.g., topics, activities, group exercises), compared to IPC.

Billing for Group Prenatal Care

Participants were asked how their healthcare setting bills for GPC. Responses were varied and included the use of group care billing codes (available in some provinces), use of regular prenatal care codes, Medical Service Plan, and alternate payment arrangements with their local government.

Funding for the Group Prenatal Care Model

Participants were asked to identify how the GPC model is funded at their healthcare setting. Many of the healthcare settings responded that they do not receive additional funding for GPC. Some of the healthcare settings receive funding through billing the client directly, billing a Medical Service Plan (MSP), or a combination of the two. One of these healthcare centres encourages their clients to donate to their associated foundation (i.e., registered charity), which supports families in need; additional support to these families may include GPC. Further, several healthcare centres receive private funding (e.g., a research grant, a health service grant) in order to cover all or partial costs.

4. Challenges Associated with Providing Group Prenatal Care

Respondents were asked to identify (through an open-ended question) the biggest challenges associated with providing GPC. A number of responses focused on the challenges associated with administrative work, which requires much effort and coordination. Challenges specific to administrative work include: recruitment of patients (e.g., since GPC is a relatively new concept), scheduling of groups (e.g., demand can be high, resulting in wait lists), chart preparation and review, and an overall lengthy preparation time for group sessions.

Other responses focused on the challenges associated with facilitating a group discussion, as opposed to providing one-to-one care. For example, facilitating a prenatal care group can be challenging if there's a difficult group dynamic (e.g., individuals who have poor boundaries, are dealing with stressful life events, or attempt to monopolize on group time). Further, a few respondents identified the difficulty of managing time within a group setting (e.g., keeping individual check-ups brief to allow enough time for group work, while still trying to meet individual needs).

Other challenges identified by respondents included: working extended/evening hours, low healthcare provider buy-in, ensuring the availability of knowledgeable facilitators who provide consistent messaging, and women who decide not to participate in the group because they don't have childcare for their other children.

5. Benefits Associated with Providing Group Prenatal Care

Respondents were asked to identify the biggest benefits associated with providing GPC and who experiences these benefits. Many respondents discussed how GPC allows pregnant women and their partners to build connections with other women and families in similar situations and receive support from these women/families. A number of respondents highlighted that many women and families stay connected with each other far into the post-partum period. Several respondents highlighted the specific benefits to fathers – e.g., allowing them opportunity to further bond with their partner, connect with other dads, etc.

A number of respondents also noted that GPC leads to both patient and provider satisfaction. Specific factors that may contribute to provider satisfaction include: a reduction in repetitive one-to-one discussions, increased efficiency (e.g., seeing multiple women in a 90-minute session), and the group dynamic creating a challenging, yet enjoyable experience.

Other benefits identified by participants included: clients gaining knowledge (from both healthcare providers and other pregnant women), women being better prepared for labour and delivery, and women being empowered to make their own choices regarding care.

6. Preferred Model Based on Several Different Variables

Respondents were asked which model they prefer based on several different variables. Almost 95% of respondents (n = 17) preferred GPC with respect to patient knowledge and understanding of prenatal information. Further, over three-quarters of respondents (n = 14) preferred GPC with respect to patient satisfaction and nearly three-quarters of respondents (n = 13) preferred the GPC model with respect to provider satisfaction. With respect to building rapport with patients, over one-half of survey respondents (n = 10) preferred IPC.

Table 3. Preferred Model Based on Several Different Variables.

Variable	Individual Prenatal Care (one-on-one)	Group Prenatal Care	No Preference	Total Response
Patient knowledge & understanding of prenatal information	0	17 (94.4%)	1 (5.6%)	18
Patient satisfaction	1 (5.6%)	14 (77.8%)	3 (16.7%)	18
Provider satisfaction	3 (16.7%)	13 (72.2%)	2 (11.1%)	18
Building rapport with patients	10 (55.6%)	8 (44.4%)	0	18
Working hours	4 (22.2%)	8 (44.4%)	6 (33.3%)	18
Pay	1 (5.9%)	3 (17.6%)	13 (76.5%)	17
Workload	5 (27.8%)	7 (38.9%)	6 (33.3%)	18
Provider satisfaction	3 (16.7%)	13 (72.2%)	2 (11.1%)	18

7. Recommendations for Others Considering Implementing Group Prenatal Care

Respondents were asked to provide any recommendations for other healthcare settings considering implementing GPC. A number of respondents recommended ensuring that sufficient planning and preparation occur prior to implementing the GPC model (e.g., preparation of session outlines, preparation of materials, adapting materials/information to address local needs, etc.). One respondent noted that although there is a lot of preparation work that goes into organizing GPC, it's also important to allow for flexibility (e.g., allowing the group to take the lead in order to have their needs met). A few survey respondents also highlighted the importance of facilitators being well prepared and comfortable with facilitating group discussions. One respondent highlighted their healthcare centre's success in providing a facilitator training workshop. Another respondent noted that the CenteringPregnancy™ courses are a good way to teach healthcare providers how to facilitate group sessions. Other recommendations included:

- having all the women within the group due within a few weeks of each other
- excluding women who need a lot of care, as the provider typically ends up doing a traditional visit at the end of group sessions with these women
- ensuring that fees and funding needs are determined and appropriate in order to attract practitioners
- inviting women to take turns providing a small healthy snack for each session with a mini potluck for the final post-partum group, as a means to strengthen the bonds between them
- respecting the group dynamics and having the provider listen often, as opposed to the provider always offering advice
- not bringing in guest speakers after the first session is completed in order to create a more comfortable and safe environment to share thoughts and ideas

8. Additional Comments

Finally, respondents were asked to provide any additional comments they have about the GPC model. A few respondents highlighted how the GPC model is a 'great', 'worthwhile', and 'richer model of care'. A number of respondents discussed how although they believe it's a good model of care, it's not for everyone. For example, group sessions can lead to less one-on-one time with a practitioner and some women may feel rushed with one-on-one activities like belly checks in order to permit time for group discussion. With this being said, one respondent noted that even though women may have less one-on-one time with their healthcare provider, they will gain greater support from the group, and that this support could carry on well beyond the time of prenatal care. Because of this, one respondent noted the importance of providing all women with available options for type of care and discussing the pros and cons of GPC versus IPC.

Two respondents highlighted that GPC takes a great deal of time and effort to establish; however, they also highlighted that the endeavour is well worth it. Other comments included: GPC is a challenge for families who don't speak English; GPC requires greater inter-professional collaboration; Canadian fee for service is a barrier; lack of support in resources and funding can be a challenge; and that GPC is a great community endeavour to get other community providers involved.

Appendix III. Additional Research Findings (Beyond Birth Outcomes and Breastfeeding) from the Four Systematic Reviews Summarized in this Report.

Please note, that the findings below were not obtained from a thorough review of the literature on the topics summarized, as was done with birth outcomes and breastfeeding rates. The information included below is provided when the studies included in the four systematic reviews included these topics in their research, in addition to breastfeeding rates and birth outcomes.

	C-Section Rate	Patient Satisfaction	Prenatal Knowledge	Readiness for Labour & Delivery & Infant Care	Prenatal Attendance	Patient Weight Gain
Ruiz-Mirazo, Lopez et al., 2012	Fewer babies born by C-Section to mothers who received GPC.	Satisfaction with prenatal care was increased among mothers who received GPC.	Prenatal knowledge was increased among mothers who received GPC.			
Sheeder, Weber Yorga, & Kabir-Greher, 2012)		Mothers reported GPC was a positive experience and they liked meeting, being with, and talking with other women in a group setting. The majority said they preferred GPC and would choose GPC again in the future.		Mothers who received GPC felt more prepared for labour, delivery, and infant care compared to mothers who received IPC.	Mothers who received GPC attended more prenatal care visits than mothers who received IPC and were less likely to have inadequate prenatal care.	

	C-Section Rate	Patient Satisfaction	Prenatal Knowledge	Readiness for Labour & Delivery & Infant Care	Prenatal Attendance	Patient Weight Gain
Lathrop, 2013			Two studies reported greater pregnancy/ prenatal care knowledge among women in GPC.		One study found mothers in GPC to be less likely to have inadequate prenatal care and two studies found mothers in GPC to attend more prenatal appointments .	One study found significantly greater weight gain for women in GPC, while another found decreased odds of gaining less than the recommended weight among women in GPC.
Catling, Medley et al., 2015		Mean satisfaction with prenatal care among mothers who received GPC was almost 5x greater than those receiving IPC.	Mean level of prenatal knowledge among mothers that received GPC was 2.6x higher than those receiving IPC.	Mean readiness for labour and delivery among mothers who received GPC was 7.6x higher than those receiving IPC.		

Appendix IV. Defining Systematic Reviews and Meta-Analysis.

The Cochrane Collaboration provides the following description of systematic reviews and meta-analyses (Cochrane Collaboration, 2011):

Systematic Review

A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made. The key characteristics of a systematic review are:

- a clearly stated set of objectives with pre-defined eligibility criteria for studies
- an explicit, reproducible methodology
- a systematic search that attempts to identify all studies that would meet the eligibility criteria
- an assessment of the validity of the findings of the included studies, for example, through the assessment of risk bias
- a systematic presentation and synthesis of the characteristics and findings of the included studies

Many systematic reviews contain meta-analyses.

Meta-analysis

Meta-analysis is the use of statistical methods to summarize the results of independent studies. By combining information from all relevant studies, meta-analyses can provide more precise estimates of the effects of healthcare than those derived from the individual studies included within a review. They also facilitate investigations of the consistency of evidence across studies and the exploration of differences across studies (Cochrane Collaboration, 2011).

Appendix V. Summary of Articles used in Systematic Reviews (p values are provided when available).

Author, year, study population	Study design and sample size	Gestational age at birth	Preterm birth	Birth weight	Low birth weight < 2500g	Breastfeeding
Ickovics et al. (2003) Primarily African American and Hispanic, low SES status, age 14-41 (mean 21.6)	Prospective, matched cohort Intervention n = 229 Control n = 229	Intervention 34.8 weeks Control 32.6 weeks p<0.001*	Intervention 9.2% Control 9.6% p=0.83	Intervention 3228.2g Control 3159.1g p<0.01*	Intervention 7% Control 10% p=0.38	
Grady and Bloom (2004) Primarily African American, adolescents, age 11-17 (mean 15.85)	Retrospective cohort Intervention n = 124 Control #1 n = 233 Control #2 n = 144		Intervention 10.5% Control #1 23.2% p<0.02 Control #2 25.7% p<0.05*		Intervention 8.9% Control #1 18.3% p<0.05 Control #2 22.9% p<0.02*	Discharge Intervention 46% Control #1 28% p<.02*
Ickovics et al. (2007) Primarily African American, low SES, aged 14-25 (mean 20.4)	Randomized control trial Intervention n = 623 Control n = 370	Intervention 39.1 weeks Control 38.9 weeks p=0.40	Intervention = 9.8% Control = 13.8% OR 0.67 95% CI 0.44-0.98 p=0.045*	Intervention 3160.6g Control 3111.8g p=0.24	Intervention 11.3% Control 10.7% p=0.90	Initiation Intervention 66.5% Control 54.6% p=0.001*

* Statistical significance

Author, year, study population	Study design and sample size	Gestational age at birth	Preterm birth	Birth weight	Low birth weight < 2500g	Breastfeeding
Klima et al. (2009) African American, age 14-38 (mean 21.8)	Qualitative and quantitative design Intervention n = 61 Control n = 207	Intervention 35.6 weeks Control 34.8 weeks	Intervention 13.1% Control 11%	Intervention 2486g Control 2292g		Initiation Intervention 59% Control 44% p=0.05* Exclusive at hospital discharge Intervention 44.3% Control 31.2% p<0.05* Any at hospital discharge Intervention 59% Control 43.6% p<0.05*
(Robertson, Aycok, & Darnell (2009) Latino, mean age of intervention group = 24.6, control group = 26.5	Non-equivalent, pre-post test Intervention n = 18 Control n = 15	No significant difference	No preterm births	Intervention 7.5 +/-1.5lbs Control 7.3 +/-0.74lbs p=.624		Any breastfeeding in first 6 weeks: Intervention 88.8% Control 86.6% Any breastfeeding at 6 weeks Intervention 61.1% Control 66.6%

* Statistical significance

Author, year, study population	Study design and sample size	Gestational age at birth	Preterm birth	Birth weight	Low birth weight < 2500g	Breastfeeding
Ford et al. (2002) Primarily African American, aged 13-21 (mean 17.6)	Quantitative, randomized, two group comparison Intervention n = 165 Control n = 117				Intervention 6.6% Control 12.5% p = 0.08	
Hoyer et al. (1994) African American, low-middle SES, aged 14-21, (mean 17.9)	Randomized, experimental pretest/post test design n = 65	Intervention 39 weeks Control 37 weeks				
Trudnak (2011) Hispanic, mean age of intervention group = 24.6, control group = 25.9	Retrospective cohort Intervention = 247 Control = 240		Intervention 5.7% Control 2.1% p=0.39	Intervention >4000g = 6.1% 2500-4000g = 87% <2500=5.3% <1500=0.8% Control >4000g=9.2% 2500-4000g=81.7% <2500g = 3.4% <1500g = 1.3% p=0.03*	Formula only Intervention 28.7% Control 7.5% p=0.0* Breastmilk only Intervention 15.4% Control 25% p=0.0	

* Statistical significance

Author, year, study population	Study design and sample size	Gestational age at birth	Preterm birth	Birth weight	Low birth weight < 2500g	Breastfeeding
Andersson et al., (2013)	Randomized control trial Intervention = 228 Control = 179					Women asked if care received was helpful to initiate breastfeeding Intervention: 68.5% Control: 60.5%; p=0.04*
Jafari et al. (2010)	Intervention = 320 Control = 308	Intervention = 39.1 weeks Control = 38.7 weeks p=.16	Intervention = 6.3% Control = 9.7% p=.19	Intervention = 3248.1g Control = 3160.3g p=0.11	Intervention= 6.3% Control = 9.1% p=.21	Initiation Intervention = 97.2% Control = 93.8% p=.31 Exclusive breastfeeding at 2 months Intervention = 65.2% Control = 41.1% p=.001*
Kennedy et al. (2011)	Randomized control trial Intervention = 160 Control = 162	Intervention = 39.2 weeks +/- 1.6 weeks Control = 39.1 weeks +/- 2.5 weeks	Intervention = 7.8% Control = 5.5% p=0.46	Intervention = 3329.2g +/- 598.8g Control = 3397.3g +/- 540.6g p=0.34	Intervention = 4.6% Control = 4.6% p=1.0	Initiation Intervention = 94% Control Intervention = 94%

* Statistical significance

Author, year, study population	Study design and sample size	Gestational age at birth	Preterm birth	Birth weight	Low birth weight < 2500g	Breastfeeding
Bloom (2005) Primarily African American, age 14-18 (mean 15.84)	Nonequivalent control group Intervention = 6 Control = 23		Intervention = 0% Control = 10.34%		Intervention = 0 Control = 1.9%	