Prenatal Nutrition in Team-Based Care:  
A Qualitative Investigation of Current Practices  
and Opportunities for Optimization of Care

by
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ABSTRACT

PRENATAL NUTRITION IN TEAM-BASED CARE: A QUALITATIVE INVESTIGATION OF CURRENT PRACTICES AND OPPORTUNITIES FOR OPTIMIZATION OF CARE

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This thesis describes the nature of prenatal nutrition care currently provided by Family Health Teams (FHTs) and Community Health Centres (CHCs) in Ontario, from the perspectives of healthcare providers, and identifies opportunities for optimization of team-based prenatal nutrition care. In total, 73 healthcare providers working in FHTs and CHCs participated in ten, one-hour, interdisciplinary focus groups. A semi-structured interview guide was used and thematic analysis was conducted. The structure of each participating team was unique, however it was consistently found that healthcare providers of various disciplines take responsibility for providing prenatal nutrition care. The provisions of diet and excess weight-related education and counselling were minimal. Two great challenges in providing optimal care involved: 1) Inconsistency in the term “high risk pregnancy” and 2) Imbalance between drivers and barriers to discussing excess gestational weight. Data highlighted providers’ dreams and barriers, and identified strategies to optimize prenatal nutrition care in Ontario.
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List of Abbreviations & Acronyms

BMI: Body Mass Index
CCHS: Canadian Community Health Survey
CHC: Community Health Centre
CI: Confidence Interval
CIHI: Canadian Institute for Health Information
C-Section: Cesarean delivery
FHG: Family Health Group
FHN: Family Health Network
FHO: Family Health Organization
FHT: Family Health Team
GDM: Gestational diabetes mellitus
HEI: Healthy Eating Index
IOM: Institute of Medicine
MCP2: Multidisciplinary Collaborative Primary Care Project
MES: Maternity Experiences Survey
NNR: Nordic Nutrition Recommendations
OR: Odds Ratio
RR: Relative Risk
SOGC: Society of Obstetricians and Gynaecologists of Canada
WHO: World Health Organization
Chapter 1: Literature Review

1.1. Importance of nutrition during pregnancy

Pregnancy is a critical developmental life stage when maternal diet quality has a significant impact on both mother and child, during pregnancy and later in life. The relationship between the mother’s diet quality and fetal development has been well established. For example, studies have linked alcohol intake with fetal alcohol syndrome, folate deficiency with neural tube defects, iodine deficiency with stunted growth, and omega-3 fatty acid inadequacy with brain and vision impairments (Barger, 2010; Innis & Friesen, 2008). Current research shows that the mother’s dietary choices can affect the course of pregnancy and predispose mother and child to chronic diseases over their lifetimes.

1.2. Current dietary patterns of pregnant women in Canada

The average Canadian diet is high in processed meat, sugar-sweetened beverages and calorie-dense snacks, while is low in fruit and vegetables (Statistics Canada, 2007). These dietary habits have led to Canadians exceeding the recommended total caloric, fat and salt intakes, while falling short of the recommended fruit and vegetable intake. Pregnant women are not exempt from this inadequacy with respect to meeting the Canadian nutritional guidelines. Three-day dietary recalls of approximately 80 pregnant women living in Central Canada showed that 57% exceeded their calculated
recommended total caloric intake (Cohen, Plourde, & Koski, 2010). Fowler, Evers and Campbell (2012) assessed the diet quality of over 2000 pregnant women living in London, Ontario using the 2007 edition of Eating Well with Canada's Food Guide (Fowler, Evers, & Campbell, 2012). The study showed that the majority of pregnant women did not meet the national nutritional guidelines. Among participating pregnant women, 96.5% did not meet the recommended number of servings for all four food groups, and 15.3% did not meet any of the food group serving recommendations. Food groups that were particularly problematic included the fruit and vegetable and the grain food groups, where 65% and 91.4% of pregnant women did not meet the recommended number of servings, respectively. Similarly, Pick, Edwards, Moreau and Ryan (2005) assessed the diet quality of approximately 50 pregnant women living in Alberta using the Healthy Eating Index (HEI) (Pick, Edwards, Moreau, & Ryan, 2005). Participants were found to have inadequate intakes of fibre, calcium and folate, compared to Health Canada’s recommended nutrient intakes. Furthermore, 79% of pregnant women had a total HEI score that fell into the 'needs improvement' category.

In addition, studies have shown that women do not improve their diet substantially during pregnancy although nutrient needs increase. When Pick et al. (2005) compared overall diet quality of pregnant women to that of non-pregnant women, they found that both groups had comparably lower HEI scores (Pick et al., 2005). Crozier, Robinson, Godfrey, Cooper and Inskip (2009) conducted a food frequency questionnaire with over 12,000 non-pregnant women living in the United Kingdom (Crozier, Robinson, Godfrey, Cooper, & Inskip, 2009). Nearly 5,000 became pregnant in the following years and provided dietary data at least once during their pregnancy. Overall diet quality and
high-energy nutrient-poor dietary patterns were compared at three stages during the pregnancy process: pre-pregnancy, in early and in late pregnancy. The study revealed that overall diet quality did not change from before to during pregnancy. However, women’s high-energy nutrient-poor diet score was 0.07 standard deviations higher, indicating women consumed more cakes and other sweets, processed meats and soft drinks during late pregnancy compared to before pregnancy. These studies emphasize that dietary changes are needed among pregnant women in order to meet Canada's Food Guide food group serving and Health Canada’s nutrient intake recommendations.

1.3. Diet as a predictor of pregnancy complications

Current research shows that various dietary behaviours and components are possible contributors to complications in pregnancy. Nutrition-related pregnancy complications that have been most extensively explored in the current literature include gestational diabetes mellitus, pre-eclampsia, preterm birth and high birth weight.

1.3.1. Gestational diabetes mellitus

Gestational diabetes mellitus (GDM) refers to uncontrolled high blood sugar levels in pregnancy. It is associated with delivering high birth weight infants, preterm birth and greater risk of future type two diabetes in both the mother and child (Mayo Clinic Staff, 2014b; McMahon, Ananth, & Liston, 1998). The 2006 Canadian Institute of Health Information study (CIHI) revealed that maternal diabetes affects 5.1% of live births among Canadian pregnancies, with gestational diabetes alone complicating up to
18% of the total cases of diabetes during pregnancy (Baby Centre Canada, 2014; Canadian Institute for Health Information, 2007). The recent literature proposes possible connections between maternal carbohydrate intake and risk for GDM. Two analyses of the Nurses’ Health Study II provided evidence of the impact of fibre and sugar intakes on GDM risk (Zhang, Liu, Solomon, & Hu, 2006). In the first investigation, fibre intake was prospectively analyzed using food frequency questionnaires from a cohort of over 13,100 women who experienced at least six months of pregnancy, and of which 750 participants developed GDM (Zhang et al., 2006). The researchers found that dietary intake of total, cereal and fruit fibre were all strongly and inversely associated with risk for GDM. A 26% (Relative Risk (RR) = 0.74; 95% Confidence Interval (CI) = 9-49) reduction in risk was associated with each additional ten grams of total dietary fibre intake per day. A 23% and a 26% reduction in risk were associated with each additional five grams of cereal and fruit fibre intake per day, respectively. Glycemic load, which refers to how much a food peaks blood sugar levels, was also found to impact risk. Compared to pregnant women within the lowest quartile of dietary glycemic load, those within the highest quartile had a relative risk for GDM that was 60% higher (RR=1.6, 95% CI=1.02-2.53, p-value=0.03). Compared to pregnant women following a low glycemic load and high cereal fibre diet, those following the reciprocal combination diet had over twice the risk for developing GDM. In the second investigation, sugar-sweetened beverage intake was prospectively analyzed using food frequency questionnaires in a cohort of over 13,400 women who experienced at least six months of pregnancy, and of which 860 developed GDM (Chen, Hu, Yeung, Willett, & Zhang, 2009). A 22% (RR=1.22, 95% CI=1.01-1.47) increase in
risk for GDM was associated with an intake of five or more servings of sugar-sweetened cola beverage per week, compared to those consuming less than one serving.

Diet quality during pregnancy has also been shown to have an effect on risk for GDM. Kieffer, Sinco and Kim (2006) conducted a nation-wide cross-sectional study in the United States to analyze food frequency questionnaires of over 170,000 pregnant women (Kieffer, Sinco, & Kim, 2006). Women with a history of GDM had a 22% reduced odds (Odds Ratio (OR)=0.78, CI=0.63-0.97, p<0.05) of meeting the recommended fruit and vegetable intake, compared to those without a history of GDM. Karamanos et al. (2014) analyzed the relationship between GDM and adherence to the Mediterranean diet, a diet rich in fruits and vegetables and low in processed foods (Karamanos et al., 2014). Over 1,000 pregnant women living in various Mediterranean countries completed a validated dietary questionnaire. Pregnant women with greater adherence to the Mediterranean diet had a 38% reduced odds (OR=0.62, p=0.03) of experiencing GDM, than those in the lowest quartile for diet adherence.

1.3.2. Pre-eclampsia

Pre-eclampsia is a condition characterized by high blood pressure during pregnancy. It is associated with delayed fetal growth, damage to the liver and kidneys of the mother, and future cardiovascular disease risk (Gifford & Roberts, 2000; Mayo Clinic Staff, 2014c; Sibai et al., 1998). Pre-eclampsia affects 7% of pregnant women in Canada and is itself a predominant cause of maternal and fetal complications and deaths (Baby Centre Canada, 2014; Clausen et al., 2001; Englund-Ogge et al., 2014).
The evidence linking maternal diet and pre-eclampsia is often inconsistent in the literature, however stronger evidence is growing. Two Norwegian population-based prospective cohort studies found significant relationships between maternal diet quality and risk for pre-eclampsia (Brantsaeter et al., 2009; Clausen et al., 2001). In the first study, food frequency questionnaires and obstetrical records were analyzed from over 23,000 pregnant women who partook in the Norwegian Mother and Child Cohort Study (Brantsaeter et al., 2009). A plant-based diet was associated with decreased risk and a processed foods diet was associated with increased risk of pre-eclampsia (Brantsaeter et al., 2009). Specifically, women in the highest tertile for adhering to a diet high in vegetables and vegetable oils has a 28% reduced odds (OR=0.72, 95%CI=0.62-0.85) of experiencing pre-eclampsia, compared to those in the lowest tertile. Women in the highest tertile for adhering to a diet high in processed meat, salty snacks and sweet drinks had a 21% increased odds (OR=1.21, 95%CI=1.03-1.42) of experiencing pre-eclampsia, compared to those in the lowest tertile. In the second study, validated food frequency questionnaires and obstetrical records were analyzed from over 3,000 pregnant women (Clausen et al., 2001). Total energy, sugar and polyunsaturated fat intake were all significantly associated with risk for pre-eclampsia. Women with a total energy intake >3,350 kcal/d were 3.7 times more likely to experience pre-eclampsia, compared to those consuming ≤2,000 kcal/d. Women with a sugar intake >25% of their total energy intake were 3.6 times more likely to experience pre-eclampsia, compared to those with a sugar intake ≤8.5%. Women with a polyunsaturated fat intake >7.5% of their total energy intake were 2.6 times more likely to experience pre-eclampsia, compared to those with a polyunsaturated fat intake ≤5.2%.
Calcium is one micronutrient with the most consistent findings in the literature in terms of its link with pre-eclampsia. Hofmeyr, Lawrie, Atallah and Duley (2011) conducted a meta-analysis of twelve randomized trials involving over 15,000 women to explore the relationship between calcium intake and pre-eclampsia risk (Hofmeyr, Lawrie, Atallah, & Duley, 2010). Pregnant women meeting the recommendation through calcium supplementation of 1,500 to 2,000mg/d had, on average, a 30% reduction in pre-eclampsia risk, compared to those who did not meet the recommended calcium intake. Collectively, these studies show that high quality diets with sufficient calcium are important for the prevention of pre-eclampsia.

1.3.3. Preterm birth

Preterm birth, characterized by a gestational period of fewer than 37 weeks, puts the baby at risk for having insufficient time to fully develop and mature in the womb, potentially leading to an array of complications affecting the infant’s cardiovascular, respiratory, gastro-intestinal and immune systems (Collaborative Group on Preterm Birth, 1993). Rates of preterm birth have increased from 7% to 8.2% from 1995 to 2004, and is associated with of over 80% of newborn mortality cases, in addition to hindering neurodevelopment and promoting future obesity and type two diabetes (Public Health Agency of Canada, 2008; White, Fraser-Lee, Tough, & Newburn-Cook, 2006). In 2011, the rate of preterm births in Simcoe County and the District of Muskoka in Ontario was 6.4% (Blair, Hutcheson, & Lamon, 2013).

Maternal diet quality has been shown to impact the risk for preterm birth. In a Scandinavian prospective study, food frequency questionnaires of 66,000 pregnant
women living in Norway were used to analyze overall diet (Englund-Ogge et al., 2014). Women in the highest quartile for following a diet abundant in nutritious fruits, vegetables, oils and whole grains were at a 12% lower at risk for preterm delivery, compared to those in the lowest quartile. A particular dietary habit that appears to increase risk of preterm birth is frequent artificially sweetened soft drink consumption. In another large-scale Scandinavian prospective study, food frequency questionnaires and obstetrical records were analyzed from approximately 60,000 pregnant women who partook in the Danish National Birth Cohort (Halldorsson, Strom, Petersen, & Olsen, 2010). Women consuming more than one serving per day of artificially sweetened carbonated soft drinks were 28% more likely to deliver preterm, compared to those with no intake. This risk was substantially elevated to 78% among women consuming at least four servings of the beverage per day.

1.3.4. High birth weight infant

High birth weight, also known as macrosomia, is characterized by babies weighing more than 4,000g at birth (Mayo Clinic Staff, 2014a). Similarly, large-for-gestational age infants are large, but cut-offs are adjusted to reflect the length of gestation. Such conditions pose risks to both mother and child, including challenges and injury during labour, and predisposition to childhood obesity for the infant. Birth weight has risen across the globe, and in Canada, the rates for macrosomia are 1.9%, 3.2% and 7% among women with no diabetes, gestational diabetes and pre-existing diabetes, respectively (Canadian Institute for Health Information, 2009; Women's Health Data
High total caloric intake and poor dietary quality have been demonstrated to increase the risk for macrosomia and large-for-gestational age infants. In a recent Canadian study, three 24-hour diet recalls and self-reported infant birth weight were collected from 60 pregnant women attending prenatal classes in Ontario and Quebec. Energy intake had a positive correlation with infant birth weight, accounting for 32% of variability (r=0.32, p<0.05) (Montpetit, Plourde, Cohen, & Koski, 2012). In an Australian study, a validated New South West Health Survey questionnaire was conducted through face-to-face interviews with approximately 370 pregnant women in order to analyze the impact of energy-dense nutrient-poor diet on risk for high birth weight in offspring (Wen, Simpson, Rissel, & Baur, 2013). The study controlled for maternal weight status and gestational age. Women with a high junk food diet, defined as a high intake of soft drinks, fast food, processed meat and/or chips, had a significant 64% increased likelihood (OR=0.36, 95%CI=0.14-0.91, p=0.03) of delivering a macrosomic child. Fibre intake has also been shown to have a relationship with high birth weight outcomes in pregnancy. In a randomized controlled trial, approximately 60 Australian women at between 12 and 16 weeks gestation were followed until delivery (Moses et al., 2006). Participants were provided with dietary fibre and glycemic index counselling, an educational booklet of food choices and serving sizes, and a monthly hamper of key foods related to the counselling topics. Half of the women were assigned to follow a low-glycemic/high fibre diet and half were assigned to follow a high glycemic/low fibre diet throughout their pregnancy. The prevalence of large-for-gestational age infants was
approximately 30% lower (3.1% compared with 33.3%, p=0.01) among the low glycemic/high fibre diet group, compared to the reciprocal diet group.

1.4. Pre-existing obesity and excess prenatal weight gain

Both pre-existing obesity and excessive weight gain can lead to poor health outcomes during pregnancy and can increase risk of GDM, pre-eclampsia, c-section births and other long and short term health effects in both the mother and infant. Poor diet quality can lead to maternal overweight status and excess gestational weight gain. According to The World Health Organization (WHO), obesity is the number one global health threat, where pregnant women in Canada are not excluded from this concern (Guelinckx, Devlieger, Beckers, & Vansant, 2008; Guelinckx, Devlieger, Mullie, & Vansant, 2010).

1.4.1. Current rates of maternal overweight and obese statuses in Canada

The Executive and Council of the Society of Obstetricians and Gynaecologists of Canada (SOGC) recommends women should enter pregnancy with a Body Mass Index (BMI) between 18.5kg/m² and 24.9kg/m² (Davies et al., 2010). Canadian pregnant women are not meeting this pre-pregnancy weight guideline. According to the 2004 Canadian Community Health Survey (CCHS), 11% to 21% of Canadian women of child-bearing age are estimated to be obese, and those who were less active and consumed fewer fruits and vegetables had higher rates of obesity (Davies et al., 2010). According to the more recent 2006-2007 Canadian Maternity Experiences Survey (MES), 33% of
Canadian women were overweight or obese pre-pregnancy (Health Canada, 2010; Saskatchewan Prevention Institute, 2010). Maternal obesity in Canada is on the rise, with more than a three-fold increase in rate from 1988 to 2002 (Davies et al., 2010). Ontario is also experiencing high rates of maternal overweight and obesity. The 2011 CCHS estimated that approximately 45% of Ontario women 18 years and older were classified as overweight or obese. In Simcoe Muskoka district of Ontario, women aged 15-44 years reported an overweight or obesity rate of 46% (Blair et al., 2013).

1.4.2. Current rates of excess gestational weight gain in Canada

Health Canada uses the 2009 Institute of Medicine (IOM) recommendations for gestational weight gain, which are based on the Body Mass Index (BMI) (Health Canada, 2010). The recommendations state that pregnant women with a BMI less than 18.5kg/m² (underweight category) should have a total weight gain of 12.5kg to 18kg, a BMI between 18.5-24.9kg/m² (normal weight category) should gain between 11.5kg and 16kg, a BMI between 25.0-29.9kg/m² (overweight category) should gain between 7kg and 11.5kg, and a BMI greater or equal to 30kg/m² should gain between 5kg and 9kg.

The 2006 Canadian Census revealed that 42% of pregnant women gained excess gestational weight, and only 36% gained within the 1999 IOM gestational weight gain recommendations (Lowell & Miller, 2010). Rates of excess weight gain are high across Canada. In the East coast, a 2007 population-based cohort of pregnant women living in Newfoundland and Labrador found that 52% gained above the national gestational weight gain recommendations, and only 20% gained within the recommendations (Crane, White, Murphy, Burrage, & Hutchens, 2009). In Central Canada, the MES reported that 41% of
normal weight, and the majority of overweight or obese pregnant women living in Ontario surpassed their recommended gestational weight gain (Blair et al., 2013). In Western Canada, a large-scale prospective cohort of pregnant women living in Alberta found that 71% of the women exceeded Health Canada’s 2010 gestational weight gain guidelines (Begum, Colman, McCargar, & Bell, 2012).

1.5. Weight-related predictors of birth, prenatal and postnatal complications

1.5.1. Pre-pregnancy overweight predisposes excess gestational weight gain

Pre-pregnancy overweight and obesity are strong predictors of excess gestational weight gain. A prospective cohort of 600 women in Alberta found that pre-pregnancy overweight and obesity were associated with a 5.5 and 6.5-fold increased likelihood of gaining weight beyond the national guidelines, respectively (Begum et al., 2012). An Icelandic-based observational study of approximately 500 pregnant women found that a pre-pregnant overweight status was associated with seven times the likelihood of gaining beyond the national guidelines, compared to a pre-pregnant normal weight status (Olafsdottir, Skuladottir, Thorsdottir, Hauksson, & Steingrimsdottir, 2006). An American-based prospective cohort of approximately 600 pregnant women found a significant relationship between BMI in early pregnancy and risk for excess gestational weight gain (Olson, Strawderman, Hinton, & Pearson, 2003). Compared to women at normal weight, those who were overweight or obese early in pregnancy were almost five and two times more likely to gain above the national guidelines, respectively (Olson et
A contributing factor to the association between pre-pregnancy excess weight status and excessive weight gain during pregnancy is that overweight and obese women are recommended to gain less weight than those who are in the normal weight range when entering pregnancy.

1.5.2. Pre-pregnancy overweight & birth complications

Maternal weight is an important determinant of birth outcomes, increasing risk of miscarriage, stillbirth, perinatal death, cesarean delivery, neonatal intensive care unit admission and high birth weight infant. A retrospective study compared birth outcome between 75 normal weight (BMI 19-24.9kg/m²) and 25 overweight (BMI 25-27.9kg/m²) pregnant women. Those who were overweight had a significantly greater prevalence of miscarriage compared to those who were normal weight during pregnancy (60% compared with 27%, p<0.05) (Hamilton-Fairley, Kiddy, Watson, Paterson, & Franks, 1992). Two prospective studies compared risk of stillbirth among over 24,000 Danish pregnancies and over 25,000 Finnish pregnancies using self-administered questionnaires and hospital records (Kristensen, Vestergaard, Wisborg, Kesmodel, & Secher, 2005; Raatikainen, Heiskanen, & Heinonen, 2006). Maternal obesity was associated with more than twice the likelihood of both stillbirth delivery and perinatal death compared to normal weight pregnancies.

The relationship between maternal weight and risk for cesarean delivery has been extensively studied in recent research. Cohort studies around the world have shown that obese women are 1.6-2.5 times more likely to have a c-section compared to normal-weight women (Callaway, Prins, Chang, & McIntyre, 2006; Doherty, Magann, Francis,
Morrison, & Newnham, 2006; Gaillard et al., 2013; Graves, DeJoy, Heath, & Pekow, 2006; Jensen et al., 2003; Raatikainen et al., 2006; Seligman et al., 2006). The risk for having an infant requiring neonatal intensive care has also been shown to markedly increase with greater maternal weight. A retrospective comparison of 14,000 Australian showed that maternally obese women were 2.7 more likely to have an infant admitted to an intensive care unit, than women with a normal pre-pregnancy BMI (Callaway et al., 2006). Similarly, another retrospective comparison of 130 American pregnant women showed that maternally obese women were 3.5 times more likely to have an infant admitted to an intensive care unit, than women with a normal pre-pregnancy BMI (Galtier-Dereure, Boegner, & Bringer, 2000). Furthermore, a prospective comparison of over 25,000 Finnish pregnant women showed that maternally obese women had a 38% increased likelihood of delivering an infant who was admitted to the intensive care unit, than women with a normal pre-pregnancy BMI (Raatikainen et al., 2006).

Recent literature has investigated the relationship between the mother’s weight during pregnancy and delivery of a high birth weight infant (Gaillard et al., 2013; Jensen et al., 2003). A Netherland-based prospective study reported that risk for large-for-gestational-age was nearly three times more among obese compared to normal weight pregnant women (Gaillard et al., 2013). A Denmark-based retrospective cohort found similar yet more modest trends with overweight and obese pregnant women being 20% and 60% more likely to have a large-for-gestational-age infant, respectively, compared to normal weight pregnant women (Jensen et al., 2003).
1.5.3. Excess gestational weight gain & birth complications

Excessive gestational weight gain is an important determinant of birth outcomes, with the strongest evidence being for risk of cesarean delivery and high birth weight infant. Studies from around the world have reported a 26-44% increase in c-section risk among women with excess gestational weight gain (Gaillard et al., 2013; Haugen et al., 2014; Seligman et al., 2006). Heude et al. (2012) collected pre- and post-natal weights of nearly 1900 pregnant women living in France (Heude et al., 2012). After controlling for gestational diabetes and hypertension, women who had a high net gestational weight gain (more than 16kg) were twice as likely to deliver a large-for-gestational-size infant compared to women who gained within the guidelines (3kg to 12kg). According to the 2006 Canadian Census, the prevalence of delivering a macrosomic baby was 28% higher among women who gained above the recommendation compared to pregnant women who gained within the recommendations (Lowell & Miller, 2010). A Newfoundland and Labrador-based cohort of women who had a normal BMI pre-pregnancy found that excess gestational weight gain was associated with a 21% increased risk for macrosomia (Crane et al., 2009). A Netherland-based prospective cohort found that women who exceeded their recommended gestational weight gain were more than twice as likely to deliver a large-for-gestational-age infant (Gaillard et al., 2013).

1.5.4. Pre-pregnancy overweight & prenatal complications

The relationship between maternal overweight and risk for prenatal complications has recently been explored by the scientific community, with the strongest evidence linking pre-pregnancy overweight and obese status with gestational diabetes, pre-
eclampsia and gestational hypertension. Studies from around the world have consistently reported that women entering pregnancy with an overweight and obese weight status are two to ten times more likely to develop gestational diabetes, when compared with normal weight pregnant women (Castro & Avina, 2002; Chu et al., 2007; Dietl, 2005; Kieffer et al., 2006; Radesky, 2008; Saldana, Siega-Riz, Adair, & Suchindran, 2006; Sarwer, Allison, Gibbons, Markowitz, & Nelson, 2006; Saskatchewan Prevention Institute, 2010; Sebire et al., 2001). Pre-pregnancy weight may also be a predictor of pre-eclampsia. Studies reviewed by authors (Guelinckx et al., 2008) consistently reported that overweight and obese pregnant women were approximately two to three times more likely to develop pre-eclampsia compared to normal weight pregnant women (Doherty et al., 2006; Graves et al., 2006; Guelinckx, Devlieger, Beckers, & Vansant, 2008; Jensen et al., 2003). A similar relationship was seen in a study where obese pregnant women living in the Netherlands were three and a half times more likely to experience pre-eclampsia compared to normal weight pregnant women (Gaillard et al., 2013). A large-scale prospective cohort of Swedish pregnant women explored behavioural risk factors of pre-eclampsia. An 8% elevation in pre-eclampsia risk was observed per unit rise in pre-pregnancy BMI (Frederick, Rudra, Miller, Foster, & Williams, 2006). Furthermore, compared to normal weight pregnant women living in the Netherlands and Spain, obese pregnant women were approximately four to six times more likely to develop gestational hypertension (Bautista-Castaño et al., 2013; Gaillard et al., 2013).
1.5.5. Excess gestational weight gain & prenatal complications

The prenatal health repercussions associated with excess gestational weight gain are significant. There is evidence of increased risk of GDM with higher gestational weight gain (Gibson, Waters, & Catalano, 2012; Hedderson, Gunderson, & Ferrara, 2010; Herring et al., 2009; Saldana et al., 2006). American observational studies found that, after controlling for pre-pregnancy BMI, women in the highest tertile for gestational weight gain were two-and-a-half times more likely to develop impaired glucose tolerance (an indicator of pre-diabetes) and 74% more likely to develop GDM, compared to those in the lowest tertile for gestational weight gain (Hedderson et al., 2010; Herring et al., 2009). Other American observational studies found that, after controlling for pre-pregnancy BMI, women with GDM experienced significantly higher gestational weight gain compared to women without GDM (Gibson et al., 2012; Saldana et al., 2006). There is some evidence of increased risk of gestational hypertension with higher gestational weight gain. A Newfoundland and Labrador-based cohort found that excess gestational weight gain was associated with a 27% increased likelihood of developing gestational hypertension among women entering pregnancy at normal weight (Crane et al., 2009). A Netherlands-based cohort of approximately 1,500 pregnant women found that excess gestational weight gain was associated with twice the risk for gestational hypertension, compared to those who had appropriate weight gain (Gaillard et al., 2013).

1.5.6. Long term effects of pre-pregnancy overweight and excess gestational weight gain

Maternal overweight and excessive weight gain are important determinants of the future health of the mother and child, including postpartum weight retention, future
obesity and future type 2 diabetes. Numerous researchers have found compelling evidence supporting the relationship between long-term health outcomes and pregnancy-related weight however, findings are not yet conclusive and further investigation is warranted. Much of the current literature is limited by drawing purely associations using observational data, and large-scale randomized clinical trials are needed to determine causality with greater confidence.

1.5.6.1. Long-term health effects of excess weight during pregnancy in the child

Studies suggest that intrauterine exposures, including maternal diet, maternal pre-pregnancy weight and gestational weight gain, can not only affect the pregnancy phase but may also program for future offspring weight (Oken, Taveras, Kleinman, Rich-Edwards, & Gillman, 2007). In particular, studies also propose that the intrauterine environment may work in combination with genetic factors to program obesity and chronic disease in offspring (Delisle, 2002; Gaillard et al., 2013; Oken et al., 2007; Whincup, Cook, & Papacosta, 1992).

Two five-year large-scale cohorts support that an obese pre-pregnancy BMI is a risk factor for obesity in offspring. A Dutch prospective cohort found that, compared to normal weight women, obese pregnant women were five times more likely to have a child who was obese at four years of age (Gaillard et al., 2013). An American retrospective cohort found that, compared to normal weight women, obese pregnant women were more than twice as likely to have a child who was obese at age two to four years of age (Whitaker, 2004). A systematic review by Brisbois, Farmer and Mccargar (2012) reported that maternal pre-pregnancy body mass index is a strong predictor of
adulthood obesity in offspring (Brisbois, Farmer, & McCargar, 2012). One study collected maternal pre-pregnancy body mass and adiposity in daughter data from the Nurses’ Health Study II and the Nurses’ Mothers Cohort questionnaires distributed in 2001 (Stuebe, Forman, & Michels, 2009). This large-scale retrospective cohort showed that daughters were more than six times as likely to be obese at 18 years of age if their mother had a pre-pregnancy BMI of 29kg/m^2 (bordering obese class) as oppose to 21kg/m^2 (normal weight class).

In addition to pre-pregnancy BMI, studies have reported that excess gestational weight gain may predict obesity in childhood. A retrospective cohort study of over 10,000 American pregnant women found that women who gained beyond the recommendations were 48% more likely to have a child who was overweight at seven years of age (Wrotniak, Shults, Butts, & Stettler, 2008). Most published studies of prenatal predictors of offspring obesity are limited by retrospective data however, the authors Oken et al. (2007) uniquely conducted a large-scale prospective cohort of pregnant women living in the United States and their children (Oken et al., 2007). Total gestational weight gain had a significant direct relationship with child adiposity at three years of age. For every 5 kg increase in total gestational weight gain, there was a 1.12 unit increase in BMI z-score and a 0.26mm increase in subscapular and triceps skinfold thickness, common indicators of fat mass. Compared to women who gained less than the recommended total weight gain, women gaining more than the recommendations had more than a four-fold increased likelihood of having a child who was overweight at three years of age. The impact of excess gestational weight gain has also been shown to carry through to adulthood in the systematic review by Brisbois et al. (2012) (Brisbois et al.,
One particular reviewed study found an excess gain between 9kg and 13kg was associated with a 30% increase in likelihood of having an offspring who was obese at 18 years of age. Furthermore, an excess gain greater than 18kg was associated with twice the likelihood of their offspring being obese in adulthood (Stuebe, Forman, et al., 2009).

Studies are also solidifying the link between maternal weight and risk for future chronic disease in offspring. Authors Mingrone et al. (2008) compared insulin resistance, a risk factor for type 2 diabetes mellitus, between infants of obese and normal-weight mothers (Mingrone et al., 2008). Infants of obese women were significantly more insulin resistant than those of normal weight mothers in pregnancy.

1.5.6.2. Long-term effects of excess weight during pregnancy in the mother

Weight status before and during pregnancy can have long lasting effects on the mother’s health. As previously discussed, maternal overweight status may promote weight gain beyond Health Canada’s 2010 gestational weight gain guidelines. Current research suggests that pre-pregnancy overweight and excess gestational weight gain predispose mothers to postpartum weight retention. Unsuccessful or insufficient return to pre-pregnancy weight can lead to overweight or obese status post-pregnancy, and in turn, further predispose women to weight-related chronic diseases, such as type 2 diabetes mellitus and cardiovascular disease. Several researchers have linked excess gestational weight gain with greater postpartum weight retention. A large scale prospective cohort of pregnant women living in Alberta found that those exceeding the recommended weight gain guidelines were significantly more likely to retain a higher body weight three months after giving birth (Begum, Colman, McCargar, & Bell, 2012). An Ontario and
Quebec-based study of sixty pregnant women showed that self-reported gestational weight gain significantly predicted 72% of the variability in postpartum weight retention (Montpetit et al., 2012). Similarly, an American study of over 200 pregnant women reported three-fold increased odds of retaining 4kg at one year postpartum, if they gained beyond their recommended weight gain during pregnancy (Olson et al., 2003).

Postpartum weight retention can lead to overweight and obesity in years following pregnancy, and in turn, promote weight-related chronic diseases later in life. A United Kingdom-based prospective cohort found that pregnant women who gained above the recommendations were three times more likely to be overweight or obese at sixteen years postpartum, compared to women who gained within the recommendations (Fraser et al., 2010). These women who excessively gained weight during pregnancy also had a greater waist circumference (5.84cm increase) and higher systolic blood pressure (2.87mm Hg increase); two risk factors for cardiovascular disease. O’Sullivan (1994) found that pre-pregnancy obesity combined with gestational diabetes was associated with a 40% increase in prevalence of developing type 2 diabetes at fifteen years postpartum, compared to normal-weight women with gestational diabetes (Guelinckx et al., 2008; O'Sullivan, 1994).
1.6. Maternal dietary behaviours driving excess weight in both mother and child

1.6.1. Dietary predictors of excess gestational weight gain

Excessive gestational weight gain increases risk of GDM, pre-eclampsia and other short and long term health outcomes of both the mother and infant (Hedderson, Gunderson, & Ferrara, 2010; Mayo Clinic Staff, 2014d). Current studies have reported various dietary habits of pregnant women to be significant predictors of excess gestational weight gain. Such dietary patterns and diet components positively associated with inappropriate gain include high intakes of total energy, fat, protein, fried foods, sugar, and low intakes of fruits and vegetables. Adhering to a vegetarian diet has been shown to be protective against excessive weight gain.

Total energy intake during pregnancy has been the most extensively examined dietary predictor of weight gain. Cohort studies have shown a strong connection between caloric intake and weight gain in women around the world. One prospective cohort of nearly 7,000 Dutch pregnant women found that those with a higher total energy intake (563 kcal more) had a 13% (OR=1.13; 95% CI= 1.03-1.23) greater likelihood of gaining beyond the recommendations (Gaillard et al., 2013). A second prospective cohort analyzed food frequency questionnaires, self-reported pre-pregnancy weight and latest clinically recorded prenatal weight of over 1,000 pregnant women living in Massachusetts (Stuebe, Oken, & Gillman, 2009). Women who had a higher total energy intake (500 kcal more) had a 10% (OR=1.10; 95% CI = 1.00-1.22) greater likelihood of gaining beyond the recommendations. A third prospective cohort analyzed food frequency questionnaires and medical records of over 200 pregnant women living in
Boston (Lagiou et al., 2004). A higher total energy (0.9 kg/d more) was significantly linked with increased maternal weight gain. A fourth prospective cohort of approximately 500 pregnant women living in Iceland showed that those who self-reported consuming a higher total energy intake in late pregnancy compared to prior to conception were associated with twice the risk of gaining excessive total weight, compared to those who consumed the same amount of energy pre- and post-pregnancy (Olafsdottir et al., 2006).

Macronutrient intake during pregnancy and its potential effect on gestational weight gain is also documented in the scientific literature. The risks associated with total protein and select types of fat intakes were analyzed in a large-scale American cohort (Stuebe, Oken, et al., 2009). The percentage of energy intake from monounsaturated fats, such as vegetable oils, nuts and seeds, was associated with a 37% (OR= 0.63; 95% CI= 0.40-0.99) reduced risk of excess gestational weight gain. Protein and other types of fats were not significantly related to risk for excessive weight gain. However, an Icelandic-based study showed that higher protein (3.1kg/d more) and animal-based fat (2.6kg/d more) intakes were each significantly linked with increased maternal weight gain (Olafsdottir et al., 2006).

In addition to total energy intake and macronutrient intake, diet quality during pregnancy has also been linked with excess gestational weight gain. In a sample of 1,000 pregnant women living in Massachusetts, there was a three and a half fold greater likelihood of excess weight gain during pregnancy per increased daily serving of fried foods (Stuebe, Oken, et al., 2009). In contrast, women who identified as following a vegetarian diet during their first trimester of pregnancy were approximately half as likely
to have gained beyond the recommendations. Among 600 pregnant women living in New York, those who reported consuming less than three servings of fruits and vegetables per day had a 10% greater prevalence of excess gestational weight gain, compared to those who self-reported consuming three or more servings per day (Olson et al., 2003). Among 500 pregnant women living in Iceland, those who self-reported consuming more sweets in early pregnancy than prior to conception had two and a half times greater risk of gaining excessive weight than those who self-reported consuming the same amount of sweets pre- and post-pregnancy (Olafsdottir et al., 2006).

1.6.2. Dietary predictors of postpartum weight retention

Few studies have explored prenatal dietary determinants of postpartum weight retention, however those that do exist have found that overall diet quality and intake of several individual dietary components are associated with weight retention after giving birth. As part of the Norwegian Mother and Child Cohort Study, national data was analyzed to explore the relationship between adherence to the national food guidelines and postpartum weight retention at six month postpartum (von Ruesten et al., 2014). Food frequency questionnaires were conducted at four to five months of pregnancy to calculate Healthy Eating Index (HEI) scores, a measure of overall diet quality, to measure adherence to the Nordic Nutrition Recommendations (NNR). After controlling gestational weight gain, NNR adherence was significantly inversely associated with postpartum weight retention. Single nutrients contributing to the overall HEI score were also significantly related to weight retention at six months after giving birth. After adjusting for gestational weight gain, diets high in fish and monounsaturated fatty acids
were independently associated with less postpartum weight retention, and diets high in total fat and added sugar were independently associated with more postpartum weight retention. Additionally, there was a trend for increased postpartum weight retention with lower intakes of fibre and higher intakes of sodium. Fat intake as a predictor of postpartum weight retention was also supported by authors Oken et al. (2007) who prospectively analyzed trans fat intake among 900 pregnant women living in Massachusetts (Oken et al., 2007). Women who had a higher intake of trans fat (per increase of 0.5% of total energy intake) were 33% more likely to retain at least 5kg of weight at one year postpartum.

1.6.3. Maternal dietary predictors of overweight and obesity in the child

There is growing interest in exploring the potential relationship between maternal diet during pregnancy and the health of the next generation, with particular emphasis on prenatal diet as a contributing factor to the obesity epidemic. Numerous animal studies have demonstrated the link between maternal diet and offspring weight and similar findings are now being seen in human studies. Emerging human evidence suggests that risk for overweight and obesity in childhood may be impacted by prenatal carbohydrate and fat intakes of the mother, in particular, by sugar and omega-3 fatty acid intakes. One study of Irish mothers showed that high sugar intake during pregnancy was associated with greater risk of overweight and obesity in children five years of age (Murrin, Shrivastava, & Kelleher, 2013). Using pre- and post-pregnancy food frequency questionnaires of 585 mother-child pairs, this study showed that women in the highest quartile for energy intake derived from sugar had four and a half times greater likelihood
of having an overweight or obese child at five years of age (Murrin et al., 2013). A prospective cohort of 1,120 mother-child pairs living in Massachusetts showed that high intakes of omega-3s during pregnancy contributed to the prevention of child overweight and obesity (Donahue et al., 2011). Higher intakes of DHA and EPA were linked with a significantly lower subscapular and triceps skinfold thickness of the child at the age of three, where skinfold measurements decreased 0.31mm for every standard deviation increase in omega-3 intake. Additionally, this increase in omega-3 intake was associated with a 32% reduced risk for child obesity at three years of age (OR=0.68, 95% CI=0.50-0.92). The limited human data warrants further research to investigate prenatal exposure to dietary components and its potential influence on fat deposition and contribution to childhood overweight and obesity.

1.7. Definitions of normal-risk & high-risk pregnancy

Normal-risk pregnancy is when the mother or child is not considered at increased risk of negative health outcomes as a result of complications during the prenatal, delivery or postnatal period (National Institutes of Health, 2013). Such risk factors may pertain to maternal age, weight, lifestyle choices, medical history or presence of existing acute or chronic health conditions (National Institutes of Health, 2013).

High-risk pregnancy is when the mother or child is at increased risk of negative health outcomes as a result of complications during the prenatal, delivery or postnatal period (National Institutes of Health, 2013). Notable factors characterizing a high-risk pregnancy include, but are not limited to: maternal age, weight, lifestyle, medical history and existing acute or chronic health conditions (National Institutes of Health, 2013).
Specifically, the National Institute of Health (NIH) defines the high risk population as having a maternal age of less than 15 years or over 35 years; being under or overweight prior to conception; making lifestyle choices such as smoking cigarettes, drinking alcohol or using drugs; having experienced pregnancy complications in a previous birth such as cesarean section, low birth weight, preterm birth, perinatal death or genetic abnormalities; or having an existing acute or chronic health condition such as anemia, obesity, diabetes, high blood pressure or pre-eclampsia (National Institutes of Health, 2013). These factors may be a reflection of many of the social determinants of health, with the scientific literature emphasizing the roles of socioeconomic status, education, food insecurity and race (Glazier, Zagorski, & Rayner, 2012).

1.8. Economic Burden

1.8.1. Cost of high-risk pregnancies

Apart from concerns at the individual level, prenatal nutritional status imposes great impact at a societal level. Malnutrition, higher weight status and excess weight gain during pregnancy lead to high-risk pregnancies, which then increases costs to the health care system. Predominant cost drivers for maternal care include preterm delivery, caesarean delivery, gestational diabetes, pre-eclampsia and length of stay in hospital (Saskatchewan Prevention Institute, 2010).

Costs of prenatal and postnatal care in hospital are higher for women who are overweight compared to women who are at normal weight. A European retrospective
cohort observed a five to sixteen fold increase in prenatal care costs for overweight mothers compared to normal weight mothers, with respect to the severity of overweight status (Galtier-Dereure et al., 2000; Galtier-Dereure, Montpeyroux, Boulot, Bringer, & Jaffiol, 1995). In a case-control study in France, hospitalization records were analyzed to compare costs of pregnancy between normal weight and obese pregnant women (Galtier-Dereure et al., 2000). Total cost, cost of prenatal care, duration of nighttime hospitalization and duration of daytime hospitalization were all significantly higher in pregnancies of obese women compared to normal weight women. Prenatal care costs were on average five times higher among obese compared to normal weight pregnant women. Duration of day and night hospitalizations were approximately four and six times longer, respectively, for obese pregnant women. Women who were obese pre-pregnancy spent on average four more days in hospital than women who were at normal weight entering pregnancy. The significantly longer hospitalizations post birth were often a result of the increased frequency of c-sections and other maternal obesity-related complications. The proportion of infants admitted to the intensive care department was three-and-a-half times higher in cases of maternal obesity than in normal weight women. Such results show that high-risk pregnancies related to poor nutrition and excess weight are costly to the health care system.

1.8.2. Rising cost of maternal care in Canada

The cost of maternal care in Canada is significant. One in ten dollars of the inpatient health care budget is spent on mothers and their infants (Canadian Institute for
The cost of prenatal care alone in Canada is $25 million (Canadian Institute for Health Information, 2006).

Costs increase dramatically for high-risk pregnancies. Cost of prenatal care per patient admitted to hospital is estimated to be $700 more for pregnancies complicated by a diagnosis than the average care cost (Canadian Institute for Health Information, 2006). Statistics Canada's 2006-2007 Canadian Vital Statistics System found that preterm and low birth weight infants alone are responsible for a disproportionately high annual toll of on the health care system (Canadian Institute for Health Information, 2009). The hospital cost for preterm labour admission is estimated to be $4,600 per patient, approximately 70% more than a birth with no complications (Canadian Institute for Health Information, 2006). Delivery of a low birth weight infant can cost over $100,000 more than the average delivery cost for normal birth weight infants (Canadian Institute for Health Information, 2006). Preterm and low birth weight infants are more prone to require admission to a neonatal intensive care unit (NICU), one of the largest child health care expenditures. In 2002, the average hospital in Canada spent $9,700 per infant on admissions to a NICU. Unfortunately, these admission rates are on the rise as a result of high-risk pregnancies (Canadian Institute for Health Information, 2006). The rising rates of primary c-sections beyond WHO's recommended rate of 15% has imposed an additional $25 million burden on Canada's health care budget (Canadian Institute for Health Information, 2010). The cost per person of c-sections is 1.7 times greater than the cost for vaginal deliveries with no complications (Canadian Institute for Health Information, 2006). C-sections are also associated with longer lengths of stay in hospital. In Canada, the average hospital stay for a c-section delivery is twice the duration for
regular vaginal deliveries (Canadian Institute for Health Information, 2006). Prenatal care could minimize rising rates of complications and associated costs.

1.9. Pregnant women are a motivated population for dietary behaviour change

There is opportunity for the dietary quality of Canadian pregnant women to be enhanced and thus improve the health of both mother and child. Studies have shown that many pregnant women experience heightened motivation to adopt healthier nutritional habits at this pivotal life stage. Pregnancy not only serves as a unique opportunity to promote an optimal start for the newborn but, also serves as a catalyst for a healthy restart for the mother, which can be continued post-natally.

Evidence of this increased motivation is seen in the nutritional information seeking patterns of these pregnant women. Szwajcer, Hiddink, Koelen and Woerkum (2005) conducted two complementary qualitative studies among 60 Dutch women who were equally categorized into five different stages of pregnancy: pre-conception, first, second and third trimester of first pregnancy, and first trimester of second pregnancy. The first study showed that pregnancy promotes higher levels of nutrition awareness and adoption of nutrition-related information-seeking behaviours (Szwajcer et al., 2005). Pregnant women reported seeking out nutrition information more than women who had not yet conceived, improving their nutrition awareness through the internet, books, health care professionals and friends. The second study found that the health of the child was the greatest motivator for integrating nutrition awareness and behaviours in their lives (Szwajcer, Hiddink, Koelen, & van Woerkum, 2005). Women pregnant with their second child described the adoption of nutrition-related behaviours as becoming habits,
suggesting healthy habits formed during pregnancy may continue post-natally, and thus minimizing their risk for chronic diseases later in life. Similarly, Wilkinson and Tolcher (2010) conducted a survey revealing that 20.7% of pregnant women desired further nutritional advice, particularly in the topics of healthy eating during pregnancy and appropriate weight gain and loss during and after pregnancy (Wilkinson & Tolcher, 2010).

This population is receptive of nutritional advice and corresponding dietary behaviour change. Although there are conflicting findings in the literature, there is some evidence of improved diet quality among pregnant compared to non-pregnant women. For example, the authors Pick et al. (2005) found that pregnant women had a significantly better diet quality, consuming more milk, fruit and grains, compared to non-pregnant women living in Alberta (Pick et al., 2005). Additionally, this population usually accesses the health care system frequently during pregnancy as they attend periodic prenatal care visits and could receive nutritional advice during these visits. Therefore, pregnant women are a motivated population for positive dietary behaviour change, which can dually serve to improve their health as well as be role models for their growing family.
1.10. Team-based primary health care reform in Canada

1.10.1. History of the reform

The Canadian primary health care system is challenged with the increased time, financial and human resource demands needed to deal with our aging population and the current climate of declining economic status (Levesque et al., 2012). Primary health care faces shortages in family doctors, insufficient funding and lack of coordination with the rest of Canada’s health care system (Levesque et al., 2012). Shortages in family medicine emerged in the 1980s when family physicians expressed concerns for quality of care and work-life balance. Specialist referral rates rose to free time spent on complex patients, retirement rates climbed as family doctors aged, and the proportion of Ontario graduates entering family medicine declined, from half of all graduates to a quarter in 2004 (Levesque et al., 2012).

In response to the unsustainable trend in primary health care, the principal initiative for reform has been the introduction of interdisciplinary team-based care models across Canada. Interdisciplinary teams refer to the collaboration of health care professionals of a variety of disciplines, from doctors and nurses to dietitians, social workers and others to establish evidence-based practice protocols and patient care plans. In 2000, federal investments, namely the $800 million Primary Health Care Transition Fund, have jump-started the adoption of various comprehensive team-based primary care models across Canada (Levesque et al., 2012). In 2002, national reports by Romanow and Kirby highlighted the pitfalls of standard care models and clarified the direction of new innovative models. Identified challenges included inefficiency in use of health care
providers, disintegration in care services, lack of access to care for high-risk populations, and limited emphasis on chronic disease management, disease prevention, and health promotion.

Ontario is a leading province driving the Canadian primary health care reform; leaving behind the standard solo or small-group physician-centred fee-for-service practices and welcoming the evolution of interdisciplinary team-based care models. These transitional models include Community Health Centres, Family Health Networks, Family Health Groups, Family Health Organizations and Family Health Teams.

Community Health Centres (CHC) have existed in Ontario since 1979. However in 2004, the government announced their expansion with the aim to improve accessibility for high-risk populations, cost-effectiveness, and coordination of care through the newly promoted interdisciplinary care approach (Levesque et al., 2012; Shah & Moloughney, 2001). This community-governed model involves the collaboration of medical doctors, nurse practitioners, health promoters, nurses, social workers, counsellors and dietitians. Capitation programs were introduced as the alternative method of remuneration for family physicians. The overall aim of CHCs is to serve the most vulnerable populations and high-risk community members through addressing social determinants of health (Health Force Ontario, 2014). The Institute for Clinical Evaluative Sciences reviewed Ontario demographic reports from 2008 to 2010 and found that CHCs typically serve lower income neighbourhoods, immigrants, and those experiencing mental illness or chronic disease (Glazier et al., 2012).

Family Health Networks (FHN), Family Health Groups (FHG) and Family Health Organizations (FHO) were established over the few years following the year 2000 federal
investments (2001-2006) (Health Force Ontario, 2014; Levesque et al., 2012). These organizations aimed to meet the government’s goal of improving health care for Canadians and facilitate control and prediction of annual health care costs for budgeting purposes. These models took a step towards implementation of the team-based approach by introducing physician collaboration to the traditional models of care. The overall aim of these models is to provide accessible and comprehensive primary health care to the community.

In 2005, Family Health Teams (FHT) were introduced (Health Force Ontario, 2014; Levesque et al., 2012). This model adds the interdisciplinary aspect of CHCs and pioneers a blended pay of capitation and incentives. It involves the collaboration of physicians with allied health care professionals, including nurse practitioners, registered nurses, dietitians, pharmacists, social workers and physiotherapists. The overall aim of FHTs is to provide ongoing comprehensive primary health care that is tailored to the needs of the whole community. The Institute for Clinical Evaluative Sciences reviewed Ontario demographic reports from 2008 to 2010 and found that FHTs typically served those living in higher income neighbourhoods, having not recently immigrated to Ontario and having lower comorbidities (Glazier et al., 2012).

CHCs and FHTs are the forerunners of comprehensive interdisciplinary team-based care reform as they are population-focused, offer improved access through extended hours and walk-in clinics, and provide a range of services which emphasize chronic disease management, prevention, and continuity of care (Levesque et al., 2012).

Ontario has undergone a significant transition in primary health care delivery. Currently, there are approximately 100 CHCs throughout the province. Since 2005, the
government has granted approval of over 200 FHTs in Ontario, involving more than 1700 family doctors and 1400 other health care professionals. Associated economic investment in 2011-2012 alone was $347 million. Today, 68% of Ontarians have transitioned from standard care to a newer care model, with 2.7 million in FHTs (Levesque et al., 2012; Maxwell, Jackson, & Legowski, 2002). Additionally, Canadian attitudes towards such reform are positive. A nation-wide study exploring Canadians’ perspectives on health care reform found that nearly 80% of participants supported collaborative interdisciplinary care for themselves and their family (Maxwell et al., 2002).

1.10.2. CHCs & FHTs support Ontario’s primary health care reform strategies

Community Health Centres (CHC) and Family Health Teams (FHT) are proposed to be an advancement of the standard care model. The structure and aims of these interdisciplinary models are aligned with the Ontario Action Plan for Health Care. Ontario’s striving motto is “the right care, right time, right place”, expressing the goal to improve access, quality and cost-effectiveness of primary health care delivery (Levesque et al., 2012; Ontario Ministry for Health and Long-Term Care, 2012).

The ‘right care’ emphasizes quality of care. The collaboration with allied health care professionals ensures availability of a range of services and supports the reception of care by the most appropriate provider. Team meetings allow interdisciplinary input to optimize evidence-based management protocols and patient care plans. The team-based approach maintains patient-centred care.
The ‘right time’ emphasizes access to care. CHCs and FHTs promote 24/7 access through evening and weekend clinics with after-hours on-call systems. The shared responsibility of patient care relieves family physicians of on-call periods and time-consuming practices, such as dietitian-led nutritional counselling. This allows for longer patient visits and improves physician work-life balance.

The ‘right place’ emphasizes adaptable settings. The flexibility in size, location and services provided by the practice allows for tailoring to community needs and available resources, and facilitates access closer to home. The blended funding promotes flexibility in on-site or home care, through face-to-face individual or group visits, and telephone or e-mail contact with team members.

1.10.3. Team-based maternal care in Canada

Prenatal care is one of the most used preventative services in health care as it is used not only to achieve optimal birth outcomes but also to minimize predispositions to health risks later in life (White et al., 2006). There is consensus among Canadian health care professionals on a need for prenatal care delivery reform. This demand is in response to the health care workforce crisis caused by the decline in obstetric doctors and rise in birth rate (Martin & Kasperski, 2010). The strain is evident as the Canadian MES, conducted by the Public Health Agency of Canada as part of Statistic’s Canada’s 2006 Canadian Census, reported that the primary reason for lack of early initiation to prenatal health care was ascribed to the unavailability of doctors and allied health care professionals in Canada (Public Health Agency of Canada, 2009).
A recent national step towards this reform was Health Canada's 2002 Multidisciplinary Collaborative Primary Maternity Care Project (MCP2), which aims to promote the implementation of collaborative interdisciplinary maternity care models in Canada. Several provincial committees across Canada have undertaken the national initiative, including British Columbia’s Maternity Care Enhancement Project and The Maternity Care Expert Panel of Ontario. Specifically, the Ontario committee aims to increase the number of maternal care providers, retain patient-centred care, improve access to care and adopt a collaborative interdisciplinary structure to care (Ontario Women’s Health Council, 2006). Their promotion of CHCs and FHTS in maternal care appears to be key in realizing these goals. The manageable workload found in FHTs and CHCs is attractive to medical graduates. The flexibility in sites and services promotes access to care closer to home and addresses the specific needs of high-risk populations. The shared responsibility in care between allied health care professionals encourages patient empowerment through choice in birthplace and in primary care provider, such as physician or midwife.

1.10.4. Preliminary observations of team-based maternal care in Canada

A leader in the primary care reform for prenatal health care in Ontario is the Maternity Centre of Hamilton. As with most regions in Canada, Hamilton faced a shortage in family physicians and physicians working in obstetrics. The transition to an interdisciplinary team-based care model in 2001 has shown to be an effective move to address this stress on the health care system. The team involves the collaboration of family physicians and nurse practitioners with allied health professionals, including
public health nurses, social workers, lactation consultants, dietitians and physiotherapists. The practice offers a wide range of maternal care services, including prenatal visits, specialist referrals, prenatal classes, and prenatal and postnatal hospital care. According to The Better Outcomes Registry and Network, the rate of prenatal care visits within the first trimester of pregnancy is nearly 10% higher than the average for Ontario (Ontario Women’s Health Council, 2006). Further evaluation of Hamilton’s new care model was conducted using hospital records pre and post model establishment, as well as physician and patient satisfaction questionnaires for nearly 400 deliveries (Price et al., 2005). The new care model was found to improve access of care, patient empowerment, and physician work efficiency and work-life balance. Upon implementation of the team-based approach, 300 more deliveries were made using an equivalent number of doctors. Over 80% of pregnant women reported acceptable wait times and over 90% reported having adequate time per visit, opportunity to pose questions and skilled staff caring throughout their pregnancy process. Over 80% of women reported opportunity for choice in their health care provider. There was a high rate of patient satisfaction among women receiving care from the interdisciplinary model. Over 90% of women reported they would choose the interdisciplinary care model again for future pregnancies. Over 85% of women reported good or excellent care before, during and after birth. In addition, there was a complementary high rate of physician satisfaction upon transitioning to the team-based care approach to maternity care. Satisfaction with transitioning to a shared-call system rose from 45.5% to 63.6% after one-year of joining the new model. Over 80% of physicians reported improvements in their own lifestyle. However, the impact of this transition in care in the long-term has yet to be investigated.
Team-based prenatal care was also shown to improve quality of care in Western Canada. Harris et al. (2012) evaluated the South Community Birth Program, an interdisciplinary maternity care model in Vancouver (Harris et al., 2012). This shared-care model involves the collaboration of family physicians, midwives, community health nurses and doulas to provide a tailored service to a multi-ethnic, low-income community. Compared to the standard care cohort, pregnant women receiving team-based care were 24% less likely to undergo caesarean delivery, 17% less likely to be induced for labour, and both mother and child had a significantly shorter length of stay in hospital. In addition, the workload of family physicians was minimized. In the new care model, midwives carried out 34.5% more births compared to the standard care model (Harris et al., 2012).

A team approach to primary health care appears to be positive however, it should be noted that the current evidence might be underrepresenting the quality of standard care models and overemphasizing the quality of team-based care models. There are a few potential explanations for this discrepancy. Firstly, findings may not purely reflect higher quality of care, but instead higher quality of service and outcome documentation by team-based care models. These models have greater means (with the extra nursing and clerical staff) and higher incentives (with government funding increases when providers document meeting performance targets) than standard care models (Health Force Ontario, 2014). Secondly, findings are limited by the lack of long-term studies as the existence of FHTs and the abundance of CHCs on which to conduct evaluative studies have been so recently introduced to Canada. Thirdly, there is great variation in the structure and practice of team-based care models so inconsistencies in outcomes may be expected.
when comparing to standard care models. Fourthly, misleading terms and language may be applied by funding bodies in support of the transition to a team-based approach to care. For example, the government only grants ‘comprehensive care capitation payments’ as a bonus to members joining the new team-based care models. This is provided without assessment of comprehensiveness of the new team practice and regardless of the fact that standard care models are also capable of providing comprehensive care to the community (Health Force Ontario, 2014). So with the current evidence, how these two modes of care truly compare is inconclusive, and there remains uncertainty in discerning the superior method of primary health care.

1.10.5. Prenatal care and prenatal nutrition care reform in Canada

Very little research exists describing prenatal care in Canada and even less research explores prenatal nutrition care in Canada. Research has shown that the roles of health care professionals, and how prenatal care and prenatal nutrition care are managed vary greatly between primary care models, with respect to competencies of the team members, resources available and population served (Hutchison, Abelson, & Lavis, 2001); Levesque et al., 2012). Research has also shown that current standard health care does not meet optimal prenatal nutrition care goals. A multisite study in Alberta revealed that a third to over half of pregnant women reported receiving no counselling on half of the advised health education areas defined by the standard clinical practice guidelines (White et al., 2006). Particularly, 36% of pregnant women reported receiving no advice on appropriate gestational weight gain. Similarly, a mere 12% of pregnant women in Hamilton prenatal clinics were advised of the 2009 gestational weight gain guidelines
(McDonald et al., 2011). However, health care professionals have expressed interest in enhancing nutritional care to pregnant women (Bonilla, 2013). The features of prenatal nutrition care delivered in team-based primary care settings are unknown.
Chapter 2: Rationale & Research Questions

2.1 Rationale

Pregnancy serves as a unique life stage where diet has significant impact on both the immediate and future health of both mother and child. Optimal maternal diet reduces the risk of pregnancy complications, excess gestational weight gain and future adverse health outcomes in both mother and child. Canadian research shows that pregnant women are not meeting the national recommendations for optimal dietary quality, and are exceeding the national recommendations for appropriate pre-pregnancy weight status and weight gain during pregnancy. High rates of pregnancy complications, obesity and chronic disease are straining Canada’s monetary and human resources for maternal care. These trends can be, in part, attributed to the fact that current standard health care does not meet optimal prenatal nutrition care goals. There are gaps in prenatal health education, there is limited counselling on appropriate weight gain during pregnancy, and there is a lack of knowledge of the prenatal nutrition care currently delivered to pregnant women in health care settings. Fortunately, pregnant women serve as a niche population with many women having a unique sense of motivation to adopt healthier dietary behaviours for the benefit of themselves and their child. Therefore, there is need and an opportunity for improved prenatal nutrition care in Canada.

The goal of this research was to promote high-quality interdisciplinary prenatal nutrition care for all pregnant women living in Ontario. The aim of this study was to conduct an in-depth exploration of the process of prenatal care and prenatal nutrition care currently delivered to normal-risk and high-risk pregnant women in Family Health Teams.
(FHTs) and Community Health Centres (CHCs) in Ontario. It described how, when and by whom prenatal care and prenatal nutrition care are delivered to pregnant women and how pregnant women respond to that care, from the perspectives of primary health care providers. It identified gaps, challenges and potential for improvement in prenatal care and prenatal nutrition care for both normal-risk and high-risk pregnant women.
2.2 Research Questions

1. What is the process of **prenatal care** delivered in FHTs and CHCs in Ontario, with respect to the care that is provided and the roles of various health care providers?
   a. For normal-risk pregnancies
   b. For high-risk pregnancies

2. What is the process of **prenatal nutrition care** delivered in FHTs and CHCs in Ontario, with respect to how, when and by whom prenatal nutrition care is delivered to pregnant women and how pregnant women respond to that care, from the perspectives of primary health care providers?
   a. For normal-risk pregnancies
   b. For high-risk pregnancies

3. How do primary health care professionals **define ‘high-risk pregnancy’**, based on their experiences within their FHT or CHC in Ontario?

4. What are the current gaps, challenges and possible improvements of prenatal care and prenatal nutrition care for both normal-risk and high-risk pregnant women, with respect to the experiences of primary health care professionals in FHTs and CHCs in Ontario?
Chapter 3: Methods

3.1. Justification of Methodological Choices

3.1.1. Qualitative Research

Qualitative research methods are commonly chosen as the most appropriate approach to conduct explorative research, as these methods are highly informative for new areas of study (Neuman & Robson, 2011). Little is known about the nature of prenatal nutrition care delivered in team-based primary care models and the perspectives of health care professionals with regard to optimizing such practices in Ontario. Therefore, a qualitative research approach was applied to conduct this exploratory study. Specifically, thematic analysis was the chosen method due to its ability to answer a wide range of exploratory research questions, and its potential to describe and interpret in depth a health-related phenomenon.

3.1.2. Focus Groups

Three predominant methods of data collection applied in qualitative research are one-on-one interviews, observations and focus groups (Neuman & Robson, 2011). One-on-one interviews provide in-depth individual perspectives and experiences, where the research team is directly involved with participant interaction. Observations capture social interactions in a natural setting, where the research team is minimally involved in the participant interactions. Focus groups are more complex as they incorporate the depth of information gathered from one-on-one interviews yet provide insight into
interactions among the participants. Focus groups were chosen for this research, as they allow researchers to investigate interdisciplinary communication between various health care providers. Past research supports the effectiveness of focus groups in investigating team-based care models. Sargeant, Loney and Murphy (2008) used interdisciplinary focus groups to successfully gather perspectives of health care providers to describe effective teamwork and to identify opportunities for improvement in services. Soklaridis, Oandasan and Kimpton (2007) used interdisciplinary focus groups to gather perspectives of health care providers to identify barriers to successful collaborations within Family Health Teams (Soklaridis, Oandasan, & Kimpton, 2007). Bonilla (2013) used this data collection technique to effectively explore dietary assessment practices of health care providers within Family Health Teams (Bonilla, 2013).

3.2. Ethical and institutional approval

An application requesting ethical approval was sent to the University of Guelph’s Research Ethics Board (REB). Certification of ethical approval for research involving human participants was obtained on July 22nd, 2014 with the confirmation number 14JL001. For the ethical approval letter, see Appendix A. Institutional research approvals were sought by Family Health Teams and Community Health Centres, and appropriate changes in study protocols, information letters and consent forms were made prior to participation.
3.3. Participants

We conducted 10 interdisciplinary focus groups. Family Health Teams (FHTs) and Community Health Centres (CHCs) were eligible to participate in the study if a minimum of four health care professionals with a collective minimum of three different professions agreed to partake in the focus group interview. Past qualitative research investigating health care teams shows that saturation in data collection can be reached with 8-10 focus groups each consisting of 3-12 participants (Bonilla, 2013; Sargeant, Loney, & Murphy, 2008; Soklaridis et al., 2007). For example, a Nova Scotia study investigating perceptions of primary health care teams on educational needs reached saturation at nine focus groups of 4-11 participants in each (Sargeant et al., 2008); An Alberta study investigating education needs for asthma management reached saturation at seven interdisciplinary focus groups of five participants each (Davies et al., 2010); An Ontario study exploring current use of electronic dietary assessment tool by various health care professionals reached saturation by eleven focus groups with 3-11 participants in each (Bonilla, 2013).

Interdisciplinary focus groups not only provided a cross-section of perspectives, but also provided further insight into collaboration techniques and team dynamics through observation and reflection on interactions during the interviews. Health care professionals that contributed towards these interdisciplinary focus groups included family doctors, nurse practitioners, midwives, nurses, practical nurses, dietitians, social workers, pharmacists, health promoters, support staff, students, and associated public health care providers. Interviews were conducted in both FHTs and CHCs with five focus groups being conducted in FHTs and five in CHCs. Both CHCs and FHTs were
used as the two primary care models differ in structure and target population. FHTs include a variety of governance models, such as physician-led or nurse-practitioner-led practices, whereas CHCs are solely governed by community members (Association of Family Health Teams of Ontario, 2014; Association of Ontario Health Centres, 2014). FHTs aim to provide care to the entire community while CHCs target the high-risk and vulnerable members of the community. We aimed to achieve a sample population representing a variety of characteristics and experiences in prenatal nutrition care. Diversity in sample population enhanced the scope and depth of description of the nature of team-based prenatal care in Ontario. Diversity was achieved by including FHTs and CHCs of varying sizes (serving small and large communities), target populations (serving a range of socio-economic status, levels of education, ethnicities), structures (physician-led, nurse practitioner-led, community member-led models) and care practices (clinics having formal and informal prenatal care programs).

3.4. Recruitment Method

A purposive sampling technique was applied to recruit FHTs and CHCs for the focus group interviews. This approach was chosen to achieve a sample of FHTs and CHCs practicing a variety of approaches to prenatal nutrition care (Soklaridis et al., 2007).

The recruitment strategy for this study was based on a previously successful recruitment effort to investigate FHTs in Ontario (Bonilla, 2013). Contact information of FHTs and CHCs was provided through our collaboration with the Association of Family Health Teams of Ontario (AFHTO) and the Association for Ontario Health Centers
(AOHC). Only sites within a two-hour drive from the University of Guelph were eligible to participate in order to control travel expenses. AFHTO and AOHC were contacted by email to confirm acceptability of requesting FHT/CHC teams to participate in this study. Executive directors of FHTs and CHCs were contacted through e-mail invitations and follow-up telephone calls made by the research assistants. To recruit individual health care professionals, study information letters were circulated by interested executive directors to their health care team members. For the study information letter and informed consent form, see Appendix B. For the email invitations to executive directors and members of FHTs and CHCs, see Appendix C.

3.5. Developing and Piloting of Focus Group Interview Guide

A focus group interview guide was developed by the research team. The guide was semi-structured to provide flexibility in the discussions, yet provide organization and consistency to ensure key topics were investigated. Content was initially developed with the aim to fill gaps in published literature regarding prenatal care delivered in team-based models. First, the guide inquired about the processes of prenatal care and prenatal nutrition care delivered in FHTs and CHCs in Ontario. Questions asked participants to describe the types of assessment, education and counselling as well as how, when and by whom that care was delivered to pregnant women. Participants were asked to share their experiences of normal-risk and high-risk prenatal care. The shared stories and built-in prompts provided insight into the gaps, challenges and potential for improvement in the current prenatal process of care. For the interdisciplinary focus group guide, see Appendix D.
Pilot testing was a key element of the data collection phase as it improved the quality of the data collection tool. This step allowed researchers to assess the clarity, flow and conversation generation of the interview questions (van Teijlingen & Hundley, 2002). The pilot focus group was the first focus group conducted by the research team and the same methodologies used for the data collection phase were applied. This ensured that the pilot focus group best mimicked the data collection focus groups. Participant feedback on comprehension of each question, order of the questions, duration of the entirety of the interview guide, as well as researcher assessment of the quality of conversation generated and ideas for future questions were taken into account to make appropriate adjustments to the original focus group interview guide.

3.6. Procedures for Interdisciplinary Focus Group Interviews

Recruited FHTs and CHCs that were eligible for the study were contacted by the research assistant to arrange times and dates to hold the focus group interviews. To maximize participant convenience, focus groups were a maximum of approximately 60 minutes in duration, in alignment with the health care professionals’ lunch break, and were held in a meeting room within their FHT/CHC location. Food was provided in appreciation for their participation.

On the data collection day, the research assistant and hired professional focus group facilitator travelled to the recruited FHT or CHC site. Before the focus group began, the research assistant provided an overview of the study using the information sheet. For the study information letter and informed consent form, see Appendix B. Participants were given an opportunity to ask questions and express concerns relevant to
the study. Written informed consent forms were signed by the participants and gathered by the research assistant prior to data collection. Participants were free to withdraw from the study at any point. A short demographic questionnaire was distributed to gain insight into the relevant characteristics of the sample population. The questionnaire involved five questions regarding participant age, gender, years worked in professional practice, years worked in a FHT/CHC and current health care profession at the FHT/CHC. Participants may also have chosen to include their contact information with this questionnaire if they wanted to receive preliminary study results. For the interdisciplinary focus group demographic questionnaire, see Appendix E. Once consent forms and demographic questionnaires were collected, a trained moderator proceeded to conduct the focus group.

Immediately after completion of the focus group interview, audio-recordings were uploaded to an encrypted laptop for transcription. A professional transcriber was hired to transcribe the audio-recordings to a Microsoft Word document. For confidentiality agreement for transcriber, see Appendix F. After the first focus group had been completed, data collection and analysis occurred concurrently. Data collection continued until saturation was reached, meaning no new data is gathered from further the focus group interviews.

3.7. Thematic Analysis

Thematic analysis was used to examine the results gathered from interdisciplinary focus groups. This analytical technique is commonly used in exploratory qualitative research due to its rich and detailed nature of describing and interpreting data.
Additionally, its flexible approach made it conducive to analyzing a wide scope of health-related phenomenon.

Thematic analysis is a method of pattern recognition whereby coded data extracts are organized into themes. Themes are responses, encompassing words and meanings of experiences and perspectives obtained in the data collection phase. They are characterized by their repetition within a data set, explanation of a phenomenon and contribution to answering a research question. The process of conducting thematic analysis involves a systematic, stepwise approach facilitated through six strategic phases. These phases are: to familiarize with the data, to generate codes, to identify, review and define themes, and finally to produce the report. Following is an overview of the guidelines to conducting thematic analysis developed by Braun and Clarke (2006), and a description of how the researcher team conducted each step in this current study (Braun & Clarke, 2006).

3.7.1. Phase 1: Familiarization with the data

Verbal data collected through interdisciplinary focus groups were transcribed in a Word document. To further familiarize themselves with the data, research assistants repetitively and actively read through transcripts of each focus group and searched for important ideas. At the end of this stage, researcher assistants produced a list of potential patterns and meanings that facilitated the generation of codes in the proceeding stage.
3.7.2. Phase 2: Generation of initial codes

Research assistants began to form a coding manual that served to facilitate the generation of themes in the following stage of thematic analysis. Codes were assigned to words and phrases represented in the previously generated list of important ideas. The qualitative analysis software program NVIVO was used to assist in identifying and organizing codes. Codes were reviewed and revised to ensure appropriate naming of codes, distinction between codes, and minimal overlap of supportive transcript extracts corresponding to multiple codes.

3.7.3. Phase 3: Searching for themes

In the third phase, analysis began as researcher assistants searched for themes. Codes were differentiated or combined to form overarching themes and sub-themes.

3.7.4. Phase 4: Reviewing the themes

The revision stage involved the refinement of the initial themes. This phase was conducted in two steps. The first step involved reviewing the original set of coded extracts and the second step involved reviewing the entire transcripts to ensure that codes were appropriately generated, accurately assigned and that coded phrases fit within the final themes. This process required new coding, as well as addition, reorganization and elimination of previously identified themes.
3.7.5. Phase 5: Defining and naming the themes

The fifth stage of thematic analysis involved explicitly defining and titling the final themes. Concise names were chosen to ensure immediate understanding of the theme by the reader. The meaning of each theme was described in detail, including clarification of the sub-themes that make up the overarching themes.

3.7.6. Phase 6: Producing the report

In the last stage, the final product of thematic analysis was written up in the research report. Themes that answer the research question were described and supported using the coded data extracts.

3.7.7. Procedures for ensuring scientific rigor

Several strategies were applied to ensure scientific rigor of this study. The research team encompassed a variety of research expertise, including experience applying qualitative methods and investigating nutrition-related topics, to provide diverse opinions and to ensure methods are properly conducted. The focus group interview guide was developed based on previous literature and was pilot tested to ensure that it is appropriate for the target population, generated adequate discussion and answered the study’s research questions. During the recruitment phase, a purposive sampling technique was applied to attain diversity among the sample population in order to improve the representativeness of prenatal nutrition care currently delivered in Ontario. During the data collection phase, a trained focus group facilitator conducted the interdisciplinary
focus groups to ensure consistency and thoroughness. Audiotapes ensured that the data was collected objectively. Detailed transcriptions were generated by a professional transcriber to improve their accuracy. Expert and member checking were conducted, as needed, to confirm accuracy of interpretation of data. During the analysis phase, two research assistants independently coded and identified themes for comparison and contrast of findings in order to improve reliability of the data analysis.
Chapter 4: Results

4.1. Demographic data of focus group participants

During the recruitment phase, 70 FHTs and 16 CHCs were invited by email to participate in the study. In total, ten interdisciplinary focus groups (5 in CHCs and 5 in FHTs) were conducted with seventy-three health care providers working in FHTs and CHCs. The duration of the interviews ranged from 40 to 70 minutes in length, with an average of 53 minutes. Each focus group included three to eleven team members with a minimum of three different health care professions. Three participating FHTs and two participating CHCs were located in rural areas. As shown in Table 1, four participating teams had no formal prenatal care program in place, while the remaining six teams offered at least one prenatal care program, defined as an affiliated obstetrical clinic, a general prenatal care program or a specialized prenatal care program.
Table 1 Range of prenatal care practices of participating FHTs and CHCs

<table>
<thead>
<tr>
<th></th>
<th>Obstetrical Clinic</th>
<th>General Prenatal Care Program&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Specialized Prenatal Care Program&lt;sup&gt;3&lt;/sup&gt;</th>
<th>No prenatal program</th>
</tr>
</thead>
<tbody>
<tr>
<td>FHTs &lt;sup&gt;1&lt;/sup&gt; n=5</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>CHCs n=5</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<sup>1</sup> All values are number of participating teams  
<sup>2</sup> General prenatal care program refers to those open to all pregnant patients  
<sup>3</sup> Specialized prenatal care program refers to those specifically geared towards teenage or immigrant populations  
<sup>4</sup> Some teams fell under more than one category
The demographic characteristics of participating health providers are presented in Table 2. It was observed that participants tended to be young females, with 45% being under the age of 35 and 89% being female. Participants were diverse in terms of years worked in professional practice; 17% of participants had worked for less than 3 years and 15% worked for over 25 years in their profession. The majority of participants had recently started working in a team-based practice, with 60% reporting working in a FHT or CHC for less than six years.
Table 2 Summary of demographic data of participating health providers

<table>
<thead>
<tr>
<th></th>
<th>FHT n = 31*</th>
<th>CHC n = 39</th>
<th>TOTAL n = 70</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENDER</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>36</td>
<td>65</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td><strong>AGE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;35</td>
<td>15</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>35-44</td>
<td>9</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>45-54</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>55-64</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td><strong>YEARS IN PRACTICE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>3-5</td>
<td>5</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6-9</td>
<td>3</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>10-25</td>
<td>10</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>&gt;25</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td><strong>YEARS IN FHT/CHC</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td>13</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>3-5</td>
<td>8</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>6-9</td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>10-25</td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
</tbody>
</table>

*All values are numbers of participants
Table 3 shows the distribution of health professions of the study participants. Each focus group included a minimum of one primary caregiver, one dietitian and one other allied health care professional. Of the total participants, 36% were primary caregivers and 45% were team-based allied health care professionals.
Table 3 Distribution of health professions of participants

<table>
<thead>
<tr>
<th>PROFESSION</th>
<th>FHT n=31*</th>
<th>CHC n=39</th>
<th>TOTAL n=70</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary caregiver</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family Doctor</td>
<td>4</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Nurse Practitioner</td>
<td>2</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Midwife</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Allied health care provider</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>6</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Registered Practical Nurse</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Registered Dietitian</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Social Worker</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Physiotherapist</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Health Promoter</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Respiratory Educator</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Support Staff</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Executive director</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Medical office assistant</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
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<tr>
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*All values are numbers of participants*
4.2. Prenatal Care Process

4.2.1. Structure of team

4.2.1.1. Introduction

Participating care providers unanimously described Family Health Teams (FHTs) and Community Health Centres (CHCs) as primary health care models comprised of interdisciplinary team members who collaboratively provide patient care. To illustrate the structure of team-based prenatal care models, data were organized into a multilevel model involving three spheres of influence on the provision of team-based prenatal care: the individual providers, the team and the community. Refer to Figure 1 for a visual representation of the three spheres of influence.
Three Spheres of Influence
Structure of Team-based Care

Individual Provider
- Primary caregiver
  - Family Physician
  - Nurse Practitioner
- Allied provider
  - Nurse
  - Dietitian, Pharmacist, Social worker
- Other
  - Receptionist, Student

Team
- Coordination of individual providers:
  - Interdisciplinary (collaborative)
  - Multidisciplinary (independent)
  - Combination (inter/multi-disciplinary)

Community
- Primary caregiver
  - Midwife, Obstetrician
- Normal risk support
  - Public Health
- High risk support
  - Hospital diabetes clinic
  - Other services
  - Food security
  - Translator

Figure 1 Spheres of influence on team-based prenatal care
4.2.1.2. First sphere of influence - The individual providers

The individual providers are the first level of influence on the provision of team-based prenatal care. Participants of both FHTs and CHCs unanimously described their team as comprising of primary caregivers, allied health care professionals and other team members. However, there was no standard number or set of professions that constituted an interdisciplinary team. The following is an overview of individual team members’ roles in the prenatal care process.

4.2.1.2.1. Primary caregivers in prenatal care

Team-based primary caregivers included family doctors and nurse practitioners. These professions held the greatest responsibility for patient care, and were reported as the primary point of contact between the patient and the health care services. The balance between the physicians and the nurse practitioners with respect to delivering prenatal care differed from team to team: in some teams the nurse practitioner played a greater role, in others the family physician played a greater role, and in some teams both professions were equally responsible for delivering prenatal care. Key responsibilities of primary caregivers that were consistently reported during focus group discussions were: confirming conception, discussing optional prenatal care routes, completing health records and physical examinations, promoting prenatal programs, making referrals to allied care providers, and addressing any health concerns, including prenatal nutrition, that arise during the prenatal period.
4.2.1.2.2. Allied health care professionals in prenatal care

Registered nurses were consistently reported by all teams to be involved in prenatal care. Nurses were often the first point of contact between the pregnant patient and the primary health care system. Their responsibilities often overlapped with that of primary caregivers, whereby the nurse would start patient health records and the primary caregiver would complete them during prenatal visits.

Although all participating teams had a registered dietitian, the role of the dietitian in prenatal care differed greatly from team to team. Some dietitians were not involved at all, as they specialized in an area of health care that excluded serving the pregnant population. Some dietitians were routinely involved, as tailored nutrition care was a routine component of their team’s prenatal care process. Many dietitians were conditionally involved, as they received referrals only if a nutritional concern arose during pregnancy. Of the dietitians who were involved in prenatal care, possible responsibilities included one-on-one or group sessions to provide nutritional assessment, education and counselling to pregnant patients.

Other allied health care professionals reported by some participating FHTs and CHCs to be involved in prenatal care included: registered practical nurses, pharmacists, social workers, mental health workers, certified respiratory educators and health promoters. Registered practical nurses were described to play a similar role as registered nurses. Pharmacists provided prenatal vitamin supplements as well as nausea and vomiting medications upon primary caregiver request. Social workers were responsible for addressing “relationship issues, stress issues, parenting challenges” (FG4 FHT) and other barriers to prenatal care. Mental health workers were described as playing a similar
role among teams lacking a social worker. One team’s respiratory educator, on occasion, promoted smoking cessation among pregnant patients. Another team’s health promoter reported that, on occasion, they addressed eating disorders among the prenatal patients.

4.2.1.2.3. Other team members in prenatal care

Other members of team-based prenatal care included executive directors, medical office assistants, family programs resource workers, reception workers, and students in training to become health care professionals. A medical office assistant was identified as being a component of prenatal care by only one team. However, this member was described by the FHT as “our hub” (FG1 FHT), playing a central team role of booking and triaging patients, which involved coordinating the schedules and managing the workload of the interdisciplinary team members. Some teams explained that receptionists played a key role in connecting pregnant patients to available resources and services. For instance, one participant described the responsibilities of her team’s receptionist in the following comments: “If the patient discloses at reception that they’re pregnant… reception offers the prenatal dietitian… reception will tell them [prenatal patients] about the - our services and programs” (FG8 CHC). A family programs resource worker was also identified as being a component of prenatal care by one team. This CHC team member described her role as fulfilling the team’s health promotion mandate by developing and delivering prenatal programs, such as prenatal classes and the Eating For Two Prenatal Nutrition Program.
4.2.1.3. Second sphere of influence – The team

The second level of influence on the provision of team-based prenatal care encompasses the nature of how individual team members worked and communicated to care for a shared patient. Analysis of the data revealed two main approaches: Interdisciplinary care and multidisciplinary care. Participating FHTs and CHCs fell along a continuum between these two approaches, from team members who worked collaboratively (interdisciplinary) to team members who worked independently (multidisciplinary), to assess, educate and counsel patients throughout the pregnancy. Refer to Figure 2 for a detailed summary of this sphere of influence on team-based prenatal care.

Among teams who took a more multidisciplinary care approach, there was less communication between team members and more reliance on the patients to make connections with allied team members. Providers in these teams reported referring their patients to other team members to seek additional expertise, and expressed limited awareness of the roles of fellow team members in the overall prenatal care process. This is illustrated by the words of a family physician: “They’ll [the patient] schedule a follow-up full prenatal, which frankly I rarely do. It’s usually done by the nurse practitioners really” (FG7 CHC).

Among teams who took a more interdisciplinary care approach, there was more consultation among team members, and scope of practice overlapped across health disciplines. To facilitate interdisciplinary collaboration, participants described charting in electronic medical records, case conferencing, instant messaging and emailing as key modes of reinforcing a shared patient care plan.
Among teams whose care approach fell in the middle of this continuum, individual providers routinely worked independently yet, periodically collaborated to set and achieve a project-based goal. For instance, participants described holding team meetings to create a standard prenatal care package.
<table>
<thead>
<tr>
<th>INTERDISCIPLINARY CARE</th>
<th>MULTIDISCIPLINARY CARE</th>
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<tbody>
<tr>
<td>Worked collaboratively</td>
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<td>Represented by</td>
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<td>One team</td>
<td>Most teams</td>
</tr>
<tr>
<td>• Informal and formal</td>
<td>• Periodic team</td>
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<tr>
<td>communication</td>
<td>meetings</td>
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<td>• Aware of other team</td>
<td>• Collaborated for one-</td>
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<td>member’s roles</td>
<td>time projects</td>
</tr>
<tr>
<td>• Overlapping scope of</td>
<td></td>
</tr>
<tr>
<td>practice</td>
<td></td>
</tr>
<tr>
<td>• Shared care plan</td>
<td></td>
</tr>
</tbody>
</table>

“[The nurses] give nutrition advice everyday and do an amazing job.”

“Whatever I [dietitian] say or do and I’ve charted... the physician or the resident will be reinforcing that, so it’s a loop.”

“When I started, two doctors and [name], who’s the lead nurse here, and myself in an informal committee... get sort of a [prenatal care] package together”

“No one other than an RD can provide medical nutrition therapy.”

“It’s... me [the dietitian] case managing then... until the nutritional issues are resolved.”

Figure 2 Team sphere of influence on team-based prenatal care
4.2.1.4. Third sphere of influence – The community

The community in which the interdisciplinary care team was situated is the third level of influence on the provision of team-based prenatal care. Participants perceived community outreach as a fundamental component of the team’s prenatal care process. Participants identified several reasons for which their team accessed community resources: to coordinate an alternative primary prenatal caregiver, such as a midwife or an obstetrician; to refer to the hospital for specialized care, such as a gestational diabetes clinic; to promote supplementary ways of receiving prenatal care, such as public health’s prenatal care classes; and to overcome patient barriers, such as dealing with food insecurity by “tapping into food banks” (FG10 CHC) and overcoming language barriers by hiring translators during prenatal visits. In addition, some teams collaborated with public health nurses, dietitians and social workers with the aim of developing the care available to the pregnant population in the community.

4.2.2. Accessing team-based care

Participants of FHTs and CHCs unanimously identified patient rostering as a key component of accessing services provided by the primary health care team. Rostered patients are those who are formally registered with one of the team’s primary caregivers, either the family physician or nurse practitioner, whereby both the patient and provider have agreed to participate in an ongoing health care relationship. Only rostered patients can access the team’s services, with the exception of group programs and “emergency” type situations. For example, several participants shared experiences whereby pregnant women having greater gestational age or higher risk pregnancy will take precedent in
filling roster openings of primary caregivers, as shown in the statement, “they are jumped up the cue to be seen in a timely fashion” (FG3 CHC).

4.2.3. Deciding route of prenatal care

Deciding on who the primary prenatal caregiver will be was a principal step in the prenatal care process. Healthy and newly pregnant patients were routinely offered the choice between three routes of care: the shared care within the team, a midwife or an obstetrician in the community. Factors described to influence patient preference were: guidance from their health care provider, proximity of provider’s services, previous pregnancy experiences and recommendations from friends and family. Team-based primary caregivers expressed responsibility during the first prenatal visit to ensure their patients made tailored and informed decisions about their prenatal route of care. Key distinctions reviewed between the care routes were: midwives offered home deliveries and tended to allow for longer prenatal visits, only the midwives and teams delivered postpartum care, and only the team provided a comprehensive shared care approach throughout the pregnancy. The obstetrical route was often discouraged as participants remarked “OBs are pretty busy” (FG7 CHC). The chosen route was primarily based on patient preference, but in some cases, overriding factors eliminated this freedom. For example, the obstetrical route was required if prenatal assessments suggested a high-risk pregnancy and the midwife route was often unavailable if the patient presented pregnancy at a late gestational age. One care provider explained, “They [midwives] want to follow them [pregnant women] through the whole pregnancy” (FG8 CHC).
4.2.4. Providing care via team route

The process of prenatal care is described in detail in the following sections and is summarized in Figure 3.
Figure 3 Process of team-based prenatal care
4.2.4.1. Prenatal visits – Timing

The timing of routine pregnancy care consisted of the preconception period, the first prenatal visit and follow-up prenatal visits to term. Preconception care was not a routine procedure for participating FHTs and CHCs, however some primary caregivers shared experiences of initiating prenatal counselling during the planning stage of pregnancy. Routine prenatal visits were unanimously described to start at approximately 10 weeks gestation; however, this timing varied from patient to patient. Participants shared experiences of pregnant patients who sought primary care prior to 10 weeks gestation, as soon as the patient self-reported as possibly pregnant, as well as patients who did not seek primary care until well after 10 weeks gestation, when the patient was in her second or third trimester. Late presentation was more frequently experienced among participants working in CHCs. The timing of follow-up prenatal visits was determined based on gestational age, whereby pregnant patients were “seen according to the protocol, whether it be monthly or every two weeks or every week, depending on how far they are in their pregnancy” (FG1 FHT). A longer duration of time between visits during the first trimester was common to all teams, as rationalized by one participant, “You wanna make sure you get through that early miscarriage phase, and so we don’t want to get them too excited about the pregnancy” (FG8 CHC). Most primary caregivers described providing monthly prenatal visits throughout the second trimester, until approximately 28-30 weeks gestation. Bi-weekly visits were scheduled until 35-36 weeks gestation, followed by weekly visits until term. More frequent follow-up prenatal visits were experienced when addressing a high risk pregnancy, as clarified by one nurse practitioner, “Certainly when we have those issues… we try to get them to come in,
maybe in between standard appointments for additional follow-up” (FG10 CHC). A postnatal visit was routinely conducted approximately six weeks after delivery.

4.2.4.2. Prenatal visits – Assessment, education & counselling

Prenatal care visits were routinely conducted by the primary caregiver with the aide of a prenatal nurse. Assessments during the first prenatal visit involved confirming pregnant status, completing Antenatal Records 1 and 2, updating a Pap smear test as needed, conducting urine and blood tests, ordering an ultrasound, and conducting a physical examination of the patient. Participating primary caregivers and nurses described the Antenatal Record 1 as a summary of the patient history, and the Antenatal Record 2 as a summary of the current patient information. Near the end of the first trimester or early in the second trimester of pregnancy, primary caregivers offered an optional genetic screening to assess for birth defects such as Spina Bifida and Down Syndrome. Following this procedure was a routine anatomy ultrasound at around 18 weeks gestation.

At each follow-up prenatal visit, health records were updated and prenatal concerns were re-evaluated by the primary caregiver and allied health care professionals. Specifically, weight, blood pressure, fetal heart rate and urine analysis were routinely recorded at each prenatal visit, and care was tailored to suit each patient’s identified needs. During the third trimester, primary caregivers routinely offered another optional screening for patients wishing to test for Group B Streptococcus Disease. At 28-30 weeks gestation, the pregnant patients were referred to an obstetrician for shared care if the team-based primary caregiver was not specialized in low-risk deliveries.
4.2.5. Providing care via midwife route

Participants shared different experiences of connecting patients to a midwife to initiate the midwifery route of prenatal care. Some team-based primary caregivers reported that connecting patients to an affiliated group of midwives was part of their role and expressed responsibility to “help them organize it” (FG10 CHC). In contrast, most team-based primary caregivers reported that their patients self-referred, and the teams were only notified of the pregnancy upon a midwife’s request for the patient’s health records. The limited communication between teams and midwives is shown in the comments of two team-based providers: “Usually the patient finds a midwife and they just go to the midwife” (FG9 FHT) and “They [the patients] usually bypass us [the team] totally” (FG1 FHT).

The shared experiences and perceptions of participating team-based providers and midwives suggest that routine processes were similar between the team and midwife care routes. During the first prenatal visit, midwives reported ordering an ultrasound if pregnancy was not already confirmed by the team. Like the team route, midwives reported completing Antenatal Records 1 and 2, however clinical assessments varied depending on the midwife’s available resources. Typically the midwife gained patient consent to request access to health records and lab results from the team. However, one midwife explained that her clinic was equipped with their own means of collecting clinical data in her statement, “We’re fortunate in that we can do most of our lab stuff here… we can do their blood draws. We can even do oral glucose challenge test, all in the clinic, and then we send them out for ultrasounds, but most of the lab work we can actually do” (FG7 CHC).
Health concerns unrelated to the pregnancy continued to be addressed by the primary care team, however routine prenatal visits were provided by the midwife independent from the team. Team members were rarely “provided with ongoing information of their [patient] care once they’ve been transferred to the midwives” (FG8 CHC), and when prenatal concerns arose, midwives were “more likely… to consult with obstetricians than family doctors” (FG7 CHC). The majority of team-based providers perceived limited collaboration with midwives throughout the pregnancy. Participants shared feelings of unease, disconnect and frustration with respect to their perceived reduced opportunities to build patient rapport and be actively involved in ensuring optimal care of their patient. These attitudes are supported by focus group comments such as “They get lost to us” (FG8 CHC), “There is no interface” (FG8 CHC) and “You have no clue how the pregnancy went or what the issues were” (FG6 CHC). Although this perspective was more common across participating FHTs and CHCs, it was not unanimous. One team’s branch location reported, “They [the midwife clinic] are next door from us, and we have a good relationship, so we communicate and we share clients” (FG6 CHC). Participants of this team expressed a positive perception of the current communication between caregivers, explaining that, “If the midwife had a concern then they’re more than welcome to phone us” (FG10 CHC).

4.2.6. Providing care via obstetrician route

To initiate the obstetrician route of prenatal care, team-based primary providers sent written referral letters through fax. Similar to the midwifery prenatal care route, communication between the team and the patient or obstetrician throughout the
pregnancy was rarely experienced. As well, health concerns unrelated to the pregnancy continued to be addressed by the team. From the perspectives of team-based care providers, little is known about the process of prenatal care delivered through this route. Since postpartum care was not a routine component of the obstetrician care route, team-based primary caregivers strongly encouraged their patients to immediately return to the team upon delivery. This is demonstrated by a nurse practitioner’s comment: “If they’re [prenatal patients] going the OB Gyne route, I always talk to them about the fact that after the baby’s born, that’s it. You come back in here right away, a day or two after the baby’s born, we want to see you, we want to provide support”.

### 4.3. Prenatal Nutrition Care Process

#### 4.3.1. Team care route

#### 4.3.1.1. Introduction

Prenatal nutrition care was a component of the routine care process provided by all participating teams. It was consistently described to be initiated at the first prenatal visit, which occurred at around ten weeks gestation, and periodically monitored throughout the pregnancy. However, the most responsible provider of prenatal nutrition care and the emphasis on the components of this care in the overall prenatal care process ranged across teams.

#### 4.3.1.2. Who was responsible for delivering prenatal nutrition care
The health care provider identified as having the greatest responsibility in delivering prenatal nutrition care varied depending on whether the team practiced a multidisciplinary or an interdisciplinary approach to care.

Among teams that appeared to lean towards practicing a multidisciplinary approach to care, either the primary caregiver or registered dietitian independently played the role of delivering prenatal nutrition care. Primary caregivers of some FHTs and CHCs provided basic nutrition assessment and education, and only referred to the dietitian if the patient self-requested or was identified as high risk nutritionally. Dietitians of other FHTs and CHCs were highly integrated in the routine prenatal care process as time was allotted in their daily schedule for prenatal referrals. Members of these teams perceived that dietitians served as the sole profession with adequate expertise to deliver this care.

Among teams that appeared to lean towards an interdisciplinary approach to care, the primary caregivers, allied providers and students were all described to share responsibility for providing prenatal nutrition care. Primary caregivers and nurses reported providing basic nutrition assessment, education and counselling of patients, and reported consulting with the dietitian for nutritional expertise. Team members shared experiences of encouraging overlap in scope of practice and working together to achieve a shared goal. Some examples are: A dietitian taught prenatal nutrition assessment and education to medical residents and student nurses, with the goal of empowering future physicians and nurses to take responsibility in the provision of prenatal nutrition care; During routine prenatal care visits, primary caregivers and nurses reinforced key nutritional messages electronically charted by the dietitian; Team members of various
Disciplines collaborated to develop a standard prenatal care package for all prenatal patients; And similarly, team members of various disciplines collaborated to develop a nutrition care pathway for patients diagnosed with gestational diabetes.

### 4.3.1.3. Components of prenatal nutrition care

Overall, team-based prenatal nutrition care involved three main components:

- Verbal communication during prenatal visits
- Take-home prenatal care package
- Connection to additional prenatal nutrition care programs and services

The components of prenatal nutrition care are summarized in **Table 4** and described in detail in the following sub-sections.
Table 4 Summary of components of prenatal nutrition care

<table>
<thead>
<tr>
<th>Care Components</th>
<th>Types of Care</th>
<th>Emphasized Topics</th>
<th>Details</th>
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</thead>
</table>
| Verbal communication during prenatal visits | Assessment Education Counselling | • Public health concerns  
• Presence of dietary restriction  
• Morning sickness  
• Social determinants of health | • Prenatal supplementation, food safety, micronutrient adequacy  
• Harmful lifestyle choices (use of alcohol, cigarettes, drugs)  
• Food insecurity, low socio-economic status, depression etc. |
| Take-home prenatal care package        | Education                          | • Public health concerns  
• Healthy eating                                                                 | • Prenatal supplementation, food safety, harmful lifestyle choices  
• Canada’s Food Guide  
• Healthy weight gain and physical activity recommendations |
| Connection to additional prenatal nutrition care programs and services | Assessment Education Counselling | • Referral to team members  
• Public health programs  
• Hospital services  
• Food security programs | • Team’s dietitian  
• Hospital’s gestational diabetes clinic  
• Public health’s prenatal classes  
• Community-based food banks, Sobey’s grocery store Baby-Be-Healthy program |
4.3.1.3.1. Verbal communication during prenatal visits

Verbal communication about prenatal nutrition was a routine component of prenatal care reported by all participating teams. Primary caregivers reported that the antenatal record forms included a checklist to serve as their guide to nutrition assessment, education and counselling during prenatal visits. Providers supplemented the antenatal record prompts with their own patient questions. In total, nutrition assessments included: the use of prenatal vitamins, signs of morning sickness, inappropriate gestational weight gain, clinical nutrition-related diagnosis (predominantly diabetes), dietary restrictions (including vegetarian, vegan, no-dairy, fasting, or caloric restriction for weight management) and social determinants of health. The social determinants of health commonly reported to be assessed during prenatal visits include: harmful lifestyle choices (the use of alcohol, cigarettes or drugs), low socioeconomic status, food insecurity, low English literacy, limited transportation, depression, and unsupportive family or partner relationship.

Key nutritional education and counselling included: the importance of prenatal supplements, food safety, substance abuse, morning sickness, general healthy eating and healthy body weight. Overall, a greater emphasis was placed on prenatal supplements, food safety and substance abuse during pregnancy. In contrast, little emphasis was placed on general healthy eating and healthy gestational weight gain during pregnancy. Few primary caregivers reported verbally counselling on balanced meals, portion sizing, dietary sources of micronutrients, or reviewing Canada’s Food Guide during prenatal visits. For example, a nurse practitioner mentioned, “Folic acid, calcium, and making sure they’re at the minimum, but I don’t look much into their diets, as to what they are
and aren’t eating” (FG7 CHC). Few primary caregivers reported verbally counselling on excess gestational weight gain during prenatal visits. For example, one participant described addressing excess prenatal weight via more frequent assessment as oppose to verbal counselling, in her comment: “It’s not about a diet at all… we are monitoring her weight every time she comes in, and I tell her how she’s doing in terms of you know the [gestational weight gain] guidelines that we’re supposed to be following. Really that’s all it is though.” (FG2 FHT). Alternatively, verbal counselling on inadequate gestational weight gain was more commonly reported by participating primary caregivers, particularly those working in CHCs. Counselling was described to first involve asking patients questions that could lead to identifying the cause of inadequate weight gain, such as “Is it a food issue? It is still nausea and vomiting?” (FG10 CHC). In addition, practitioners reported that less time was spent on providing nutrition education and counselling for second- or third-time moms than for first-time moms. Overall, verbal communication during routine prenatal visits on nutrition assessment, education and counselling was kept to a minimum. Opportunity for further nutritional expertise was offered via the two subsequently described components of team-based prenatal nutrition care.

4.3.1.3.2. Take-home prenatal care package

4.3.1.3.2.1. Logistics of use

Prenatal care packages were described to be either ordered from public health or developed by the team. Pregnant patients received the care package during their first prenatal visit from the primary caregiver, prenatal nurse or receptionist. Teams differed
in how they used this print resource. Some teams routinely provided a standard prenatal care package to all of their prenatal patients, some teams put together written handouts on the fly either right before or during a first prenatal visit, and some teams either did not use or did not know if their team used a prenatal care package. Among teams that did not routinely provide care packages, participants described a lack of written communication and a dependence on verbal communication, as illustrated in one primary caregiver’s comment: “I probably don’t utilize written information enough, I do a lot of explaining… I tend to go over a lot of things verbally with them” (FG7 CHC). Providers were uncertain of how their pregnant population responded to the care package, having minimal patient feedback at follow-up visits.

4.3.1.3.2.2. Content

The source of the individual handouts comprising the prenatal care package were consistently described to be from a combination of federal, provincial and regional organizations; namely Health Canada, The Public Health Agency of Canada, Eat Right Ontario and Wellington-Dufferin-Guelph Public Health. As well, some teams collaboratively created their own handouts to include in their care package. For example, one primary caregiver shared, “We actually recently developed a pamphlet for exercises in pregnancy and we have this part of our package” (FG8 CHC).

Key nutrition education handouts that were reported by all teams to be included in their care package were: Eating Well with Canada’s Food Guide and educational handouts covering eating for two, prenatal supplements, food safety, exercise and substance abuse during pregnancy (Health Canada, 2011). The perceived importance of
the national dietary guidelines is emphasized in a primary caregiver’s comment: “Canada’s Food Guide… this is the most important thing” (FG4 FHT). Other nutrition education handouts mentioned by some teams were: Osteoporosis Canada’s calcium calculator, Health Canada’s gestational weight gain calculator, and local public health’s listings of prenatal class schedules (Health Canada, 2014; Osteoporosis Canada, 2015).

In addition to the written handouts, some team members included educational fridge magnets and visual diagrams in their care package. For example, one team reported including picture-based printouts in their prenatal care package to educate healthy gestational weight gain: “We have resources… really good pictures… about what is the weight gain, how much is actual baby, how much is fat, how much is water, the breasts… stuff like that that I find over the years I found to be very practical and work really well” (FG6 CHC). No teams reported the use of an electronic version of the care package, however some teams mentioned including reputable websites for prenatal patients to refer to on their own time.

4.3.1.3.2.3. Perceived benefits and pitfalls

Many teams perceived their prenatal care package to be highly comprehensive and used descriptive phrases such as, “We have a pretty extensive booklet” (FG8 CHC) and “A wonderful prenatal package” (FG1 FHT). Team members benefited from certain ordered resources being available in several different languages.

Participating providers identified four main pitfalls of the prenatal care package: The information was not sufficiently updated, the package was not culturally inclusive, the format was not user-friendly, and there was concern for paper waste. When
discussing the content of the prenatal care package, one team member expressed, “It’s hard to keep up… to stay up to date” (FG6 CHC), and explained that more frequent revisions of the provided information is required to keep up with latest research findings. Team members perceived they would benefit from culturally tailored versions of the care package when serving pregnant newcomers. Team members struggled with the multiple tear-pads of individual handouts, and perceived patients would benefit from a condensed format with bottom-line practical information. One primary caregiver expressed her frustration in the following comment: “It’s just really outdated and I’m scratching off numbers and stuff on them, and I’m giving them bits and pieces of stuff… I’m doing the tear off sheet for this one, and the tear off sheet for this one, rather than just sort of all together” (FG6 CHC). Similarly, another primary caregiver said: “I find sometimes in the middle of an appointment, you step out of the room, run into the hall and you’re looking around for fliers” (FG10 CHC). Finally, participants raised concerns that print handouts may not be an effective mode of delivering educational information, and perceived that an electronic version may reduce paper waste and increase patient reception of the information.

4.3.1.3.3. Connection to additional prenatal nutrition care programs and services

The third component of team-based prenatal nutrition care encompasses connecting patients to additional programs and services offered within and outside the team. This was meant to supplement the prenatal nutrition care provided through the previously described prenatal visits and care packages.
Team members shared experiences of promoting comprehensive team-based care through directing patients to allied health care professionals. For example, primary caregivers referred patients to the team’s dietitian to directly overcome nutritional inadequacy through tailored nutrition care. Alternatively, they referred patients to the team’s social worker to overcome barriers to nutritional adequacy through a harm-reduction approach. In the words of a nurse practitioner: “It’s often a prioritization, you know, if their issue is like, you know, they use a shelter to get away from their abusive boyfriend, then that’s the priority” (FG6 CHC), before the team can address poor eating behaviours.

Team members shared experiences of community outreach, reflecting the third sphere of influence on the provision of prenatal care. This primarily included promotion of public health care, involving programs and services offered through the Canadian Prenatal Nutrition Program and other community-based initiatives. Examples discussed include: general prenatal classes, the Leap program for pregnant teenagers, Healthiest Babies Possible for those at risk of low birth weight, Healthy Babies Healthy Children for disadvantaged mothers, and the Gesundheit program for mothers who self-identify as “low German speaking and from that community” (FG7 CHC). In addition to public health care, participants reported referring patients to hospital-based programs, primarily gestational diabetes clinics, to address patients who are high risk nutritionally and require nutritional care beyond the scope of the team. Participants also reported promoting different community groups that address food insecurity. They described promoting certain programs based on the incentives included, such as food vouchers, transportation tokens, free prenatal vitamins and free meals. Shared examples are: One team reported
promoting their community farmer’s market as it included food vouchers; One team mentioned promoting their community’s collective garden; And several teams reported promoting Sobey’s grocery store’s Baby-be-healthy program as it offered free samples and education on prenatal supplements.

4.3.2. Midwifery care route

Nutrition assessment, education and counselling routinely provided by midwives were described as similar to that provided in team-based prenatal care models. For example, routine care involved completing antenatal records, encouraging the use of prenatal vitamins, and conducting basic prenatal nutrition counselling tailored to each patient’s history, clinical results and current symptoms. Unlike participating team-based providers, one midwife reported the use of three-day food records as routine assessment in her statement: “We often send them home with, we got a sheet of paper that asks them to track their eating for three or four days, and then they bring that back to us, and then we’ll go through that.” (FG7 CHC). The participating midwife perceived that her midwifery clinic attracted “a very privileged group of women” (FG7 CHC) compared to the prenatal population served at the neighbouring CHC. She continued, “Demographically speaking, most of them are doing quite well with their diets, and then it’s just something we revisit all the way through” (FG7 CHC). The midwife described her population as consisting of fewer immigrants and having a higher overall socioeconomic and education level compared to the CHC’s prenatal population, and perceived that less nutritional guidance was required in her practice to ensure a healthy pregnancy for her clients.
4.3.3. Obstetrician care route

Little is known about the prenatal nutrition care process provided by obstetricians from the perspective of participating team-based providers.

4.3.4. Tensions within the processes of prenatal nutrition care

4.2.4.1. Introduction to areas of tensions

When examining opportunities for improving care (research question 4), focus group analysis focused on areas of tension within the prenatal care processes as these were areas where there may be the greatest challenges to providing optimal care. One area of tension identified was due to varying definitions of “high risk” prenatal patients. Another area of tension was between the drivers and barriers to discuss excess gestational weight.

4.3.4.2. Tension due to varying definitions of “high risk” pregnancy

A variety of definitions of “high risk” pregnancy were described. These definitions differed from team to team as well as among individual providers within the same team. Consistencies across the perceived definitions included: teenage or older maternal age, use of cigarettes, alcohol or drugs; history of pregnancy complications in a prior birth, multiple gestations, diagnosed diabetes. Inconsistencies across perceived definitions were most often nutrition-related risk factors. Two examples of times when
different definitions of “high risk” pregnancies caused problems were: excess gestational weight and high blood sugar levels in pregnancy.

A participating midwife shared her experience of tension whereby she perceived a patient with excess weight to be high risk but struggled to transfer the patient to an obstetrician for expertise in high risk prenatal care. She shared, “I think our hardest group of women when it comes to consulting is when we have women with a very high BMI and that’s sort of when we know the outcome may be a little bit more challenging… more high risk, but we don’t have a reason to not take them, and so that’s where we’re sort of painted into a corner a little bit, because you know she’s probably gonna need an induction, she’s probably gonna have some blood pressure problems… but there’s nothing in our scope to protect us from high BMI. So we take everybody up to 40 BMI.” (FG7 CHC). Similarly, a participating team-based primary caregiver shared her experience of tension whereby she perceived a patient with high blood sugars to be high risk but struggled to transfer the patient to a gestational diabetes clinic for expertise in high risk prenatal care. She shared, “There’s the gestational diabetes but there are women who will fail their gestational diabetes screen, but then they don’t fail their confirmatory, so they’re more of an impaired glucose tolerance. And the community [diabetes clinic] referral won’t take those, because they don’t meet the criteria.” (FG4 FHT). However, not all teams experienced the same tension when caring for prenatal patients with high blood sugar levels. For instance, one team-based primary caregiver felt more equipped and confident in her team’s ability to manage patients with this abnormality and stated, “I love that we have a diabetes program here… sometimes I use it to bridge the gap between
them [prenatal patients] going to the [hospital-based gestational diabetes] clinic” (FG6 CHC).

4.3.4.3. Tension between the drivers and barriers to discuss excess gestational weight

As previously mentioned in Section 4.3.1.3.2.2 Contents of prenatal nutrition care, participants consistently reported that they routinely assessed of gestational weight, and saw that excess gestational weight was a common problem, however, few participants reported providing extensive education and counselling for women with excess gestational weight. When asked how team members addressed excess weight gain among their prenatal patients, participants responded, “Poorly, very poorly” (FG5 FHT) and “Not very effectively yet… none of us are probably doing a very good job of it” (FG5 FHT). The overall perception was that their team ineffectively provided this care for their patients. The shared experiences of team-based care providers showed that this is difficult care to deliver, due to tensions between the drivers and barriers of discussing excess weight with prenatal patients.

There were several drivers for team-based care providers to provide education and counselling on excess weight among their prenatal patients. One driver was that team-based care providers expressed feelings of responsibility for providing the best care possible for their patients, and perceived that ensuring a healthy prenatal weight contributed to this optimal care. The perceived benefit of addressing excess gestational weight on pregnancy-related health outcomes can be seen in one participant’s comment, “You’d [primary caregiver] be concerned about gaining too much weight in pregnancy and the outcome on the pregnancy, the delivery.” (FG4 FHT). The shared belief that
addressing excess gestational weight contributes to the quality of patient care is exemplified in one participant’s shared experience where weight management minimized adverse health outcomes in pregnancy, “We can prevent things, especially for our heavier women, we help prevent gestational [diabetes] and for those who have gestational [diabetes] we do an intervention so that they lose [weight]” (FG1 FHT). A second driver was that prenatal patients were reported to have expressed concern and willingness to discuss excess gestational weight with their care provider. For example, when asked if prenatal patients expressed any concerns during appointments, primary caregivers and dietitians responded, “Weight is always an issue… it’s definitely a concern” (FG2 FHT; Primary caregiver) and “I usually get asked at more or less every visit… ‘Did I gain too much weight?’… So a lot of women I’d say are worried about the weight gain aspect and get a bit panicked over it” (FG2 FHT; Dietitian). As well, when asked how prenatal patients responded to counselling on excess weight, a primary caregiver responded, “I know that when I get pregnant clients… they’re very open to recommendations and goal setting and they really appreciate those individualized for them and they have follow-ups and they feel sort of relieved somebody’s giving them a little bit of guidance” (FG9 FHT).

There were numerous barriers for team-based care providers to provide education and counselling on excess weight among their prenatal patients. Perceived barriers included: insufficiency of time, ineffectiveness of weight counselling, inadequacy of nutritional training, unawareness of prevalence of excess weight in own practice, sensitivity of the topic of weight, need to overcome patient’s fear of the dietitian, and need to combat patient’s misconceptions around weight gain in pregnancy. Table 5
provides a summary of perceived barriers to discussing excess gestational weight with supporting comments by team-based care providers.
Table 5 Perceived barriers to discussing excess gestational weight

<table>
<thead>
<tr>
<th>Perceived barriers to discussing excess gestational weight</th>
<th>Supporting comments</th>
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<tbody>
<tr>
<td>Insufficient time</td>
<td>“We’re [primary caregiver] overburdened by it [the demand for nutrition care]… And to just try to get through that information is just… you know, we try, but we need others, too, to be part of it” (FG3 CHC)</td>
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<tr>
<td>Counselling during prenatal phase is ineffective</td>
<td>“It’s actually the preconception time that’s probably the golden egg, so that if you come into pregnancy and you already have a lot of knowledge, and you’re already pretty active and healthy and you have a good diet and are a healthy weight, that’s – you’re head and shoulders above where you would have been had you shown – because really by the time we see – you can imagine right? We see them, they’re 5 weeks pregnant, they show up again, they’re 7 weeks pregnant… nothing’s happening until they’re 12-14 weeks, that’s a third of the pregnancy already gone, and so really if we could get them earlier that’s probably better” (FG5 FHT)</td>
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<td>Lack nutrition training, expertise and supportive resources among non-dietitian providers</td>
<td>“The doctor’s concerned about you know significant weight gain… then that referral would go through to the family health team dietitians” (FG5 FHT)</td>
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<td></td>
<td>“I [primary caregiver] wouldn’t really be familiar [with prenatal nutrition care] to be honest” (FG2 FHT)</td>
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<tr>
<td></td>
<td>“It’s [gestational weight management] very complicated and none of us [team members] are probably doing a very good job of it” (FG5 FHT)</td>
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| Lack awareness of the prevalence of excess gestational weight in practice | “Start to increase our awareness… to really try to get us all into doing a better job… I met with this really high level researcher at Mac, who does high risk pregnancies, it’s all she does, and she was horrified to look at her own stats and see how excess her own patients are actually weight – gaining weight over what they should be. It was really – she was showing me her numbers, which are virtually identical to ours, actually, and yeah, she was
Weight is a sensitive topic; concern for shaming or blaming the patient

“I can definitely see how it could be a bit emotional for someone else to… And it sucks because you’re pregnant and you’re supposed to be gaining weight but there’s such a huge stigma almost, or pressure I would say, to not gain too much, and then to lose it right away” (FG2 FHT)

“I think for me I struggle as well with the whole sort of blame the mom thing… It’s just hard because she’s so excited, and maybe this is the first time in her life that she’s actually not worried about her body and here I’m just gonna make her worry about her body again… you know, it’s your fault. You’re eating too badly, and you’re gonna – and now not only are you gonna put this pregnancy at high risk, you’re gonna make your baby obese down the road… I really struggle with that…It’s hard” (FG5 FHT)

Patient’s fear of the dietitian

“I think a lot of patients, like I tease them that I take my horns down that they’ve got this vision that the dietitian’s gonna come in (makes scary noises), right? Like if... you’re gonna get this big long list of what you can never eat again kind of thing” (FG5 FHT)

Combat patient misconceptions

- Unclear patient handouts
- Inaccurate preconceptions ingrained through culture, media, friends or family

“It’s like in the handouts, eating for two, not eating like two, right?” (FG6 CHC)

“Even from certain cultural backgrounds where they, it’s ingrained that no, no, no, they need to put on weight and that kind of thing” (FG6 CHC)

“Cause you know grandma’s telling them something totally different” (FG6 CHC)

“I think there’s a misconception that you can just eat a ton during pregnancy and you technically should be eating a piece of bread and a piece of cheese more than your daily intake, and women don’t know that that’s kind of the direction that it should be. It’s not eating for two” (FG9 FHT)
4.3.5. Perceived opportunity for optimization of team-based prenatal nutrition care

Participating team members consistently identified a need for change and expressed desire to improve the prenatal nutrition care process within their FHT or CHC.

Most participants perceived that optimization of prenatal nutrition care to be an effective and worthwhile way to prevent future health risks in mother and child. Participants saw opportunity in prenatal patients’ perceived motivation for behaviour change during pregnancy, as well as the increased frequency of interaction with the health care system during this phase. This perspective is summarized in the following participant comment: “I think there’s a lot of potential, I mean pregnant women are definitely - this is time in their life where they’re looking to make changes, they’re accessing the system a lot, we have a lot of opportunity to contact them, and you know, even small changes that are made will have huge impacts down the line” (FG5 FHT). An example of participating team members’ drive to improve their current prenatal nutrition care process can be seen in one FHT participant’s remark: “There’s a bit of a gap here!... Something needs to happen” (FG 4 FHT). Focus group discussions highlighted care providers’ dreams for the future of team-based prenatal nutrition care and their perceived barriers to actualizing these dreams.

4.3.6. “If you were dreaming…”

After discussing the team’s current processes of prenatal nutrition care, focus group participants were asked to share their hopes and dreams for the future of prenatal
nutrition care within their team, and to share their perceptions on ways to optimize team-based prenatal nutrition care in Ontario. Four desired movements were identified:

- Fulfill the team’s prevention mandate
- Empower the individual provider to strengthen the interdisciplinary team
- Empower the patient to facilitate self-care
- Build the patients’ medical home with strong community outreach

4.3.6.1. Fulfill the team’s prevention mandate

This desired movement encompasses the delivery of nutrition care in the preconception and early pregnancy period. Participants believed that this could both reduce strain on primary care providers and facilitate prevention and early management of nutrition-related pregnancy complications. The perceived importance of initiating nutrition care early can be illustrated by the following providers’ comments: “The luxury of knowing… that they’re… planning a pregnancy” (FG10 CHC), “The preconception time, that’s probably the golden egg” (FG5 FHT), “Those golden opportunities of starting early” (FG10 CHC).

Many care providers expressed the desire to capitalize on prevention through administering a validated nutrition screening tool at the first prenatal visit, or by implementing an automatic “alert in the computer system for all women of childbearing age” (FG10 CHC). These tools were described to prompt the use of prenatal vitamins, screen for food insecurity, and promote referral to the team’s dietitian for education on healthy eating and weight in pregnancy.

In addition, many care providers expressed desire to capitalize on prevention
through earlier management of diagnosed pregnancy complications. For example, participants described a gap in service between diagnosis and initiating treatment of gestational diabetes. This can be illustrated by the words of one FHT member: “We were having patients newly diagnosed, but sometimes it would be a week to two weeks before they were being seen in the community by the DEC [Diabetes Education Centre], but the whole time they weren’t sure what they should be doing, eating… they needed to be seen right away” (FG1 FHT).

To reflect the perceived importance of initiating nutrition care early, a few participating teams reported recently developing their prenatal care process. One example was shared by a dietitian working in a FHT who stated: “I created a prenatal, preadmission nutritional screening tool that is to be asked at each first visit… asking, do you skip meals or go extended periods of time without eating, have you ever been told that you need to follow a special diet… have you ever been told that you have… gestational diabetes or elevated blood sugar or diabetes, are you concerned that you cannot afford to eat a balanced meal or diet?” (FG5 FHT). The dietitian explained that if a nutritional risk was identified and the patient expressed desire, the primary caregiver would make a referral to the team’s dietitian. Another example was shared by team members of another FHT, whereby they recently started providing the resources and education required to initiate testing of sugars upon a gestational diabetes diagnosis, in order to speed up the process of seeing an endocrinologist. In the words of the team’s dietitian, “We would give out glucometers, test strips, that they could start testing, start recording what they’re eating… when they went into the community, there was already baseline numbers there… We can have them [seeing an endocrinologist] within a week,
just because they have that information” (FG1 FHT). This FHT perceived their current gestational diabetes care pathway to be beneficial, and the team’s hope for the future was dissemination of their care protocols to other primary care practices.

4.3.6.2. Empower the individual provider to strengthen the interdisciplinary team

This desired movement refers to equipping individual team members of various health disciplines with the competence and responsibility to provide prenatal nutrition care. The overall aim was to encourage interdisciplinary care within the team. Several approaches to achieve this were suggested by participating providers.

One approach was to increase the involvement of the dietitian in routine care. The role of the dietitian could include developing the knowledge, skills and confidence of primary caregivers and nurses to deliver basic prenatal nutrition assessment, education and counselling. The perceived benefit was that patients who do not see a dietitian would still have the opportunity to receive prenatal nutrition assessment and advice from a professional source. Although many providers thought this movement to be a challenge, one participating FHT had successfully “worked really hard to be able to have [the dietitian] fully embedded [into their prenatal care process]” (FG1 FHT). Alternatively, the role of the dietitian could expand by designating time to serve the prenatal population. Providers hoped this would overcome the current barrier of having few openings for patients to be seen early in pregnancy.

A second approach was to encourage interdisciplinary communication. Participants perceived that team members could empower each other through reinforcing key messages that allied providers charted in electronic medical records. Participants
perceived that if key messages are “presented in different ways… if they’re [the patients] receiving the same message from a variety of providers, then they’re more likely to take it in” (FG6 CHC). Furthermore, participants perceived that holding periodic team meetings would allow team members to become acquainted, to gain a better understanding of each member’s role in the overall prenatal care process, and, in turn, facilitate interdisciplinary collaboration for patient care.

4.3.6.3. Empower the patient to facilitate self-care

This desired movement involves balancing the patient-provider power dynamic, whereby the patients are actively involved in their own care. Empowering the patient to make informed decisions is a key component of patient-centred care. To achieve this ideal, several approaches were suggested by participating providers.

One approach was to have an automatic offering of the dietitian’s services, promoting awareness that patients themselves can choose to seek extra care. This was perceived to be feasible by most teams, however a few teams raised concern for lack of dietitian availability. A second approach was to provide validated patient tools to facilitate self-care. For example, a few teams described a prenatal screening tool to be administered by the patient and reviewed together briefly with the primary caregiver during the prenatal visit. Participants thought this tool could help patients raise nutrition-related concerns, such as food insecurity, access to prenatal vitamins, and healthy eating and weight inquiries. In addition, a few teams described overcoming the pitfalls of their current take-home educational resources in order to provide a prenatal care package suitable for various prenatal populations to review on their own time. (For details on the
pitfalls of the prenatal care package, see Section 4.3.1.3.2.3). Participants of one team suggested not only distributing these educational resources during prenatal visits but also having them available at centralized community locations. Stocking hardcopy and/or electronic copies at the grocery store, library or food banks was thought to improve access to self-care. This was one strategy believed to engage populations who do not attend routine prenatal visits. When discussing the feasibility of developing an effective prenatal care package, team members felt that, as health care professionals, they lacked sufficient training to effectively analyze the pros and cons of their own resources. Participants explained that that they did not feel equipped to collect and analyze patient feedback to identify if and why their patients found the resources useful.

4.3.6.4. Build the patients’ medical home with strong community outreach

When discussing building the patients’ ‘medical home’, participants imagined that, from the pregnant patient’s FHT or CHC location, they could access all prenatal expertise offered throughout the community, thus creating a ‘one-stop-shop’ health care environment. Sharing responsibility of prenatal nutrition care with the community was seen as important in this vision, as team-based participants perceived “We’re overburdened… we can’t do it all in primary care” (FG3 CHC). When describing hopes for the future of prenatal nutrition care, participants frequently used phrases such as “more connections” (FG2 FHT), “always communication” (FG8 CHC), “bringing some of those groups together and working together” (FG10 CHC) and “I could see it pairing nicely” (FG3 CHC). Participants discussed pooling resources, sharing strategies and aligning goals with existing initiatives in the community to improve access to prenatal
Participants’ ideas for how to build the patients’ medical home involved collaboration between the team and three different community outreaches: 1) public health, 2) other community-based health initiatives, and 3) alternative routes of prenatal care.

Participants of most teams suggested partnering with public health. One FHT team shared that they had recently taken initiative to hold monthly meetings with team members and public health providers involved in pregnancy care. In the words of one member: “What this group is about, is just trying to sort of have those conversations… face to face… what’s out there, bringing what’s already existing together, and then generating newer programs as needed... fill the gaps that we identify” (FG5 FHT). One CHC team planned to develop a collaborative prenatal program to be held at the team’s location and run by both the team and the public health dietitian together.

Participants of many teams suggested partnering with other community-based health initiatives. One CHC team suggested expanding their existing collaboration with universities to hold student-run education-based presentations at the team’s facility that would be focused on healthy eating in pregnancy. Several teams perceived their care would benefit if grocery store pharmacies consistently supplied free prenatal vitamins for team-based primary caregivers to distribute to disadvantaged prenatal patients. Furthermore, one dietitian suggested collaborating with the food banks to ensure the items donated to pregnant women correspond with the prenatal food safety guidelines advised by the primary care team.

Many teams also felt it would be ideal to strengthen communication between the team and alternative routes of prenatal care: the midwife and obstetrician. Participants
expressed desires for ongoing communication with the midwife throughout the pregnancy, as represented in the following remark: “We would like there to be an interface… that’s not by our choice, that’s just kind of the way it works form the midwife alliance” (FG8 CHC). Participants expressed desires for stronger relationships with obstetricians, in order to facilitate early transition of care among high risk patients, and to strengthen the shared care process until delivery.

4.3.7. Perceived barriers to optimization of team-based prenatal nutrition care

Barriers to improving the current state of prenatal nutrition care were identified through the team-based care providers’ stories of challenges and successes. Table 6 displays participants’ perceived barriers to actualizing their dreams for the future of prenatal nutrition care delivered in FHTs and CHCs.
Table 6 Perceived barriers to optimization of prenatal nutrition care

<table>
<thead>
<tr>
<th>Perceived barriers to optimization of prenatal nutrition care</th>
<th>Examples of supporting comments by team-based primary care providers</th>
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<tbody>
<tr>
<td>Insufficient time</td>
<td>“Our clinic runs really fast” (FG1 FHT)</td>
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<tr>
<td>• During routine prenatal visits</td>
<td>“Busy practice. One dietitian for nine docs, except for diabetes” (FG9 FHT)</td>
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<tr>
<td>• In dietitian’s schedule for referrals</td>
<td>“I’m [dietitian] just part time, three days a week” (FG5 FHT)</td>
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<td>“Scheduling because even me [dietitian] and the other RD, like our schedules are booked for like the next month and a half…. If the person would want to come in like their first trimester, there might not be that availability (for a dietitian consultation) for her until the second trimester” (FG4 FHT)</td>
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<tr>
<td>Inadequate nutritional expertise (insufficient training among non-dietitian providers)</td>
<td>“I [primary caregiver] wouldn’t really be familiar [with prenatal nutrition care] to be honest” (FG2 FHT)</td>
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<td></td>
<td>“It’s [gestational weight management] very complicated and none of us [team members] are probably doing a very good job of it” (FG5 FHT)</td>
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<td>Limited ongoing communication among team members</td>
<td>“Communication between the group… ‘We can accept… to see [prenatal patient] for nutrition counselling’ and just – ‘cause even some of what I [primary caregiver] learned today, I didn’t realize how some of it happened, so maybe better communication between the different groups within the health centre, and outside the health centre. How we can work better together.” (FG7 CHC)</td>
</tr>
<tr>
<td>• Limited understanding of other team members’ roles</td>
<td>“I [primary caregiver] struggle as well with the whole</td>
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<tr>
<td>• Limited interdisciplinary collaboration</td>
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<tr>
<td>Issue</td>
<td>Description</td>
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<td>Addressing sensitive topics among pregnant patients, such as diet and weight</td>
<td>sort of blame the mom thing… I’m just gonna make her worry… I really struggle with that. It’s hard” (FG5 FHT)</td>
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<td>“There’s such a huge stigma almost, or pressure I would say, to not gain too much, and then to lose it right away” (FG2 FHT)</td>
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<tr>
<td>Lack supportive written or electronic nutrition education resources</td>
<td>“What I’d [primary caregiver] like to see is updated resources for patients” (FG6 CHC)</td>
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<td></td>
<td>Refer to Section 4.3.1.3.2.3 Benefits and pitfalls of prenatal care package</td>
</tr>
<tr>
<td>Lack reminders for specific nutrition assessment, education, counselling</td>
<td>“An alert in the computer system for all women of childbearing age, an alert popped up: ‘Are you on folic acid?’” (FG10 CHC)</td>
</tr>
<tr>
<td></td>
<td>“Putting that reminder in the… [electronic medical] chart… it triggers you to remember to do it [specific prenatal nutrition care]” (FG5 FHT)</td>
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<tr>
<td>Lack opportunity for patient-provider interaction</td>
<td>“They [prenatal patients] don’t wanna show up [for routine prenatal visit]” (FG1 FHT)</td>
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<td></td>
<td>“A lot of the ones [prenatal patients] that are high risk just don’t show up [to routine prenatal visits]” (FG3 CHC)</td>
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<td></td>
<td>“Most of my [primary caregiver] struggles are just getting them to show up to their appointment. That’s a huge struggle, is just getting them to show up.” (FG3 CHC)</td>
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Chapter 5: Discussion

5.1 Introduction

This study provides in-depth descriptions of the structures and processes of prenatal nutrition care in FHTs and CHCs. It builds upon our limited understanding of the individual roles of team members and the current state of collaboration in team-based prenatal nutrition care. Findings reveal opportunities, challenges and strategies for optimization of the current prenatal nutrition care in Ontario.

5.2. Prenatal care process

5.2.1. Structure of team-based prenatal care

The structure of team-based prenatal care was conceptualized into three spheres of influence: the individual provider, the team and the community. This study found that multiple disciplines were involved in prenatal care and the roles of each discipline varied from team to team. These findings are important because no other studies provide in-depth description of who is involved in the prenatal care team, their individual roles and how the team connects with the community. Knowledge of the variety of approaches to team-based prenatal care and understanding of these care structures sheds light onto the many strengths to build upon and barriers to overcome in order to optimize team-based prenatal nutrition care. For instance, the identified inconsistency in staffing from team to team may pose a challenge for development of a standard team-based prenatal care
process. As a brief example, the dietitian may be an important component of one team’s prenatal care process, while another team may not have access to this discipline, and thus could not incorporate into their routine care process. Therefore, achieving flexibility in standard prenatal care processes may be necessary in order to accommodate for the current variety in team structures, as well as to benefit from the numerous strengths offered by different care structures.

Further investigation into the structure of care revealed that there are a variety of approaches to team-based prenatal care, ranging from multidisciplinary (team members worked independently) to interdisciplinary (team members worked collaboratively) care. Participating team-based care providers expressed a desire to become more interdisciplinary. Previous research supports that team-based care providers struggle to transition from multidisciplinary to interdisciplinary care (Goldman, Meuser, Lawrie, Rogers, & Reeves, 2010; Sargeant et al., 2008; Soklaridis et al., 2007). For commonly identified barriers to adopting a more collaborative team-based approach to health care, refer to section 5.3.5. Opportunities, dreams and barriers for optimal prenatal nutrition care. The current study fills a knowledge gap by describing the current status of collaboration within team-based prenatal care models in Ontario.

5.2.2. Deciding route of care

This study found that primary caregivers take responsibility in guiding patients to make informed preferences of their prenatal care route, and identified overriding factors influencing the chosen route of prenatal care. Other studies have found similar influencing factors from the patient’s perspective. For instance, an integrative review of
36 studies on women’s experiences with prenatal care identified length of prenatal visits, comprehensiveness of services and ease of transportation to services as key factors influencing patient preference in prenatal care route (Novick, 2009). This study advances our current understandings by examining the process of deciding route of prenatal care from the team-based care provider’s perspective.

5.2.3. Providing care via team, midwife, obstetrician route

This study describes the current processes of prenatal care in a step-by-step manner, and gives an overview of the midwifery and obstetrical routes of prenatal care, from the perspective of team-based caregivers. The in-depth description and visual outline of the care processes offer a new depth to our current knowledge of prenatal care. The finding that there are three distinct care routes is a well-known component of prenatal care. The finding that team-based care providers are concerned about a lack of communication among these care routes is important as this may be a barrier to providing optimal prenatal care for FHT and CHC patients. The lack of communication and interdisciplinary tension that can exist among maternal caregivers has been well documented in previous literature (Munro, Kornelsen, & Grzybowski, 2013). However, recent studies have investigated newer models of care that defy the traditional healthcare structure of three distinct care routes; The South Community Birth Program, established in Vancouver in 2003, and La Maison Bleue, established in Quebec in 2007, both have an interdisciplinary team whereby each patient’s prenatal care is shared among midwives, family physicians, as well as obstetricians if needed (Morgan, Carson, Gagnon, & Blake,
These models shed light onto the feasibility of overcoming the described communication struggles of participating team-based caregivers.

5.3. Prenatal nutrition care process

5.3.1. Who was responsible for delivering prenatal nutrition care

This study found that multiple disciplines were involved in prenatal nutrition care; primary caregivers, nurses, dietitians and students all reported to share responsibility of delivering nutrition assessment, education and counselling to pregnant patients. Teams that appeared to take a more interdisciplinary approach to health care described various collaborations, including interdisciplinary training, shared patient care planning, and collaborative development of standard patient resources and care processes.

The involvement of non-dietitian providers in delivering nutrition care has been recently described in Canadian primary care studies. For example, survey data of 1562 patients in Nova Scotia found that over 35% of respondents reported receiving dietary advice from their family physician (Sinclair, Lawson, & Burge, 2008); and FHT members participating in an interdisciplinary focus group study reported that their team’s nurses and nurse practitioners provided nutrition assessment and advice to patients with specific needs, including prenatal patients (Bonilla, 2013). However, the extent of which non-dietitian providers are involved in prenatal nutrition care has not been previously examined.

These findings suggest that team-based care providers may be interested in a shift towards a more interdisciplinary collaborative approach to delivering prenatal nutrition
Further research is needed to examine how non-dietitian providers can effectively provide nutrition care to pregnant women.

5.3.2. Components of prenatal nutrition care

This study advances our understanding of the mode of delivery and content of prenatal nutrition care by providing an in-depth description of the current processes from the perspectives of team-based care providers. This study categorized prenatal nutrition care into three main components: 1) Verbal communication during prenatal visits, 2) Take-home prenatal care package, and 3) Connection to additional prenatal nutrition care programs and services. Participants described the prenatal care package to be out-of-date, culturally exclusive and not user-friendly. Education and counselling on the use of prenatal vitamins, food safety and social determinants of health were more frequently reported as addressed by the teams, while the amount of education and counselling offered on diet and excess weight in pregnancy was limited.

The reported lack of diet and excess weight education and counselling currently provided by care teams in the present study supports previous findings that few pregnant women receive this type of counselling. Significant numbers of pregnant patients in Alberta hospitals have reported receiving no counselling on half of the advised health education areas defined by the standard clinical practice guidelines (White et al., 2006); for example, 36% reported receiving no advice on appropriate gestational weight gain (White et al., 2006). Similarly, only 12% of pregnant women in Hamilton prenatal clinics reported being advised on the 2009 gestational weight gain guidelines (McDonald
et al., 2011). Previous studies have not investigated the extent to which prenatal nutrition counselling is offered to pregnant women in Canada.

The differences in prenatal nutrition content delivered from team to team identified by the present study are important because they show that FHTs and CHCs are adapting to their communities. In order to preserve this means of patient-centred care, team members must be equipped with resources that can easily be adapted to fit different communities and team members. Furthermore, the identified pitfalls of the prenatal care package reveals a need to have a system whereby resources are updated frequently and versions are developed to accommodate the different populations within each teams’ community.

5.3.3. Tensions within the processes of prenatal nutrition care

This study identified two areas of tension within the prenatal care processes that highlight possible challenges to providing optimal care. First, this study found that there are discrepancies in the term ‘high risk pregnancy’ between the literature’s definition, participating providers’ definitions and the definitions used by the broader medical system (ex. obstetricians). This caused uncertainty about how to care for some high risk patients. Two nutrition-related situations where these differing definitions become problematic include excess gestational weight and high blood sugar levels in pregnancy. Second, this study found that there is tension between the drivers and barriers to discuss excess gestational weight with prenatal patients, whereby the barriers were perceived to outweigh the drivers. Perceived barriers and drivers of weight counselling found in this study were consistent with previous findings in primary care literature. For example,
nurse practitioners, obstetricians and midwives in a multisite San Francisco focus group study identified insufficient training, concern about sensitivity of topic, and perception that counselling is ineffective as key barriers to excess gestational weight counselling (Stotland et al., 2010). The current study expanded this list of perceived barriers to include: insufficiency of time, unawareness of prevalence of excess weight in own practice, need to overcome patient’s fear of the dietitian, and need to combat patient’s misconceptions around weight gain in pregnancy. Previous research has also identified many of the perceived drivers to discuss weight that were identified in the present study. Participants of Stotland et al. (2010)’s study also shared the belief that excess gestational weight gain had important implications on pregnancy-related health outcomes, and shared experiences of their patients initiating weight-related conversations (Stotland et al., 2010).

These findings have important implications in the way our current health care system identifies and addresses nutrition-related risk factors in pregnancy. Findings suggest that there is a need for development of clear guidelines regarding who is to be involved in the care of high risk patients, particularly those with excess weight and/or high blood sugars in pregnancy. As well, there is a need for sufficient training and resources to support these individuals in overcoming the barriers identified in this study that prevent health care professionals from addressing gestational weight.

5.3.4. Opportunities, Dreams & Barriers for optimal prenatal nutrition care

Participating providers perceived a need for improvement in the current team-based prenatal nutrition care process and identified four key dreams for the future to optimize
this care in Ontario. These are: 1) Fulfill the team’s prevention mandate 2) Empower the individual provider to strengthen the interdisciplinary team 3) Empower the patient to facilitate self-care, and 4) Build the patients’ medical home with strong community outreach. Key perceived barriers to actualizing these dreams included: insufficient time, lack of nutritional training and expertise, and lack of confidence in addressing sensitive topics such as diet and weight. The perceived opportunities, dreams and barriers of team-based care providers regarding optimizing prenatal nutrition care are predominantly new findings, however there is growing evidence in the primary care literature to that other health care providers are working towards making similar changes to their prenatal nutrition care processes to increase the quality of care.

For example, intervention trials have shown that automatic prompts in electronic medical records can alter the behaviour of care providers (Filippi et al., 2003), and studies have been done to validate a prenatal nutrition screening tool for use in primary care (Duquette, Payette, Moutquin, Demmers, & Desrosiers-Choquette, 2008). These findings suggest that team-based care providers are recognizing the growing body of literature supporting the benefits of early nutrition intervention and are investigating ways to improve practice. However, the knowledge of nutrition assessment tools has not yet been incorporated into standard clinical practice.

Although previous studies have not specifically explored barriers to improving prenatal nutrition care, some research has explored barriers to improving related aspects of primary health care, including the provision of nutrition care in general and the implementation of a team-based care approach. Perceived barriers reported in these studies were consistent with the current research findings, with emphasis on insufficient
time, inadequate training and limited communication within and outside the team (Sargeant et al., 2008; Soklaridis et al., 2007; Truswell, 2000; Wynn, Trudeau, Taunton, Gowans, & Scott, 2010).

The knowledge of perceived opportunities, dreams and barriers gathered in this study are valuable as they represent the feelings of the core stakeholders who will be administering, developing and improving future prenatal care - the health care professionals. The findings discussed are important as they provide insight into potential strategies to mobilize our current nutritional knowledge into routine prenatal care practice. If changes to team-based prenatal care are to be made, the shared dreams are the routes that new prenatal care processes, programs and services can take that will be supported by health care professionals.

5.4. Methodological strengths & limitations

5.4.1. Representativeness of sample population

To explore the current process of team-based prenatal care, participants included various team-based health care providers, with the addition of a few administrative staff, students in training to become health care providers, public health providers and a midwife. However, these data sources do not capture the process from the care receiver’s viewpoint, as the perspectives of pregnant patients were not collected in this study.
Purposive sampling was chosen in order to recruit a variety of team-based care practices. The use of volunteer sampling may have led to a biased sample population; this method may have resulted in the recruitment of teams with greater interest in the study topic, and thus may not represent all providers involved in team-based prenatal care. However, demographic data of the participants suggest this study had representation from a range of FHT and CHC members, including various individual provider characteristics, team locations, health care disciplines, and prenatal care practices. The distribution of age, gender and years in practice, as well as the inclusion of both rural and urban teams suggest that a range of experiences in FHTs and CHCs in Ontario have been captured. The majority of participants were young, female, and experienced care providers but newer to working in a FHT or CHC. In Ontario, the majority of team-based dietitians are young and female, and the influx of team-based practices occurred within the past decade (Royall, 2009; Walters, 2009). The health care disciplines described to comprise a prenatal care team were well represented in this study, as most focus groups included at least a primary caregiver, dietitian, nurse and other allied health care professional. The underrepresentation of obstetricians and midwives does not take away from the main objective of this research, that is, to explore prenatal care from the perspective of team-based care providers. Furthermore, this study captured a range of prenatal care practices, ranging from teams with and without prenatal care programs (Refer to Table 1). Overall, a major strength of this study is the inclusion of a range of FHT and CHC teams and team members in Ontario.

5.4.2. Data collection and analysis
As this is a new area of study, a qualitative research methodology is an appropriate approach to support the in-depth exploratory nature of this study. Focus group interviews were chosen over one-on-one interviews as this data collection method provides a cross-section of perspectives, allows participants to build on each other’s ideas, and facilitates investigation of the interdisciplinary communication of participating teams. Past research supports the effectiveness of interdisciplinary focus groups in investigating the perspectives and experiences of team-based primary health care providers (Bonilla, 2013; Sargeant et al., 2008). It should be noted that, unlike direct observation, focus group interviewing is not a data collection method that attests to the actual practice of team members. Also, this data collection method may not have captured each participant’s individual perspectives due to social pressure. The lack of participant anonymity during focus group discussions raises concern for social desirability bias given the sensitive nature of discussing challenges and pitfalls of one’s team-based practice. Efforts were made to minimize the influence of social desirability bias by having the semi-structured guide focused on shared experiences, allowing for an indirect inquisition of challenges experienced. As well, a preamble was built into the semi-structured guide emphasized that challenges are common across Canada. The aim of this was to alleviate onus on the individual team and minimizing defensiveness among team members.

Another strength of this study was that saturation in health provider’s perspectives and experiences was met; data from the final three focus groups did not generate new codes and subcodes for analysis. Subjectivity was minimized through the use of a trained focus group facilitator, a semi-structured interview guide, audio recording of
focus group discussion and a trained transcriber. Scientific rigor was strengthened as two research assistants independently analyzed preliminary data for comparison and contrast of findings, in order to examine the reliability of the data analysis process. Validity of the semi-structured focus group guide was improved as the tool was reviewed by the research team and pilot tested. As well, expert and member checking were conducted, as necessary, to confirm that accuracy of data interpretation. The findings of this study should not be interpreted as conclusive, but considered as contributors of a more in-depth understanding of the current practices and opportunities to optimize team-based prenatal nutrition care.

5.5 Priorities for optimization of prenatal nutrition care

To build on the findings of this study, recommended follow-up actions for optimization of prenatal nutrition care are:

1) Close the “high risk” care gap

This study highlights two key strategies to improve care for high risk prenatal patients. The first strategy is to establish the definition of “high risk pregnancy” across stakeholders, including team-based care providers, obstetricians and midwives. The second strategy is to implement clear practice guidelines to address borderline high risk pregnancy cases. Future research should identify key team members to be involved, training protocols to be in place for those team members, and resources to be available to address excess weight and high blood sugars in pregnancy.
2) Close the excess weight care gap

This study highlights two key strategies to optimize care for prenatal patients gaining excess weight. The first strategy is to create weight-related educational resources for both dietitians and non-dietitian providers. The second strategy is to implement nutrition training for all prenatal care team members. These strategies aim to overcome care providers’ barriers to addressing excess gestational weight by: improving weight management knowledge and skills, improving confidence in discussing sensitive topics, and minimizing the time barrier via sharing responsibilities.

3) Capitalize on the shared dreams

This study highlights two key strategies to capitalize on the shared dreams of health care professionals to optimize prenatal nutrition care. The first strategy is to improve nutrition screening tools and patient education care packages. The second strategy is to support interdisciplinary care and community outreach. Variations in care processes and resources should be embraced in order to facilitate teams to adapt to their unique community. This involves building on the strengths of each individual practice, tailoring resources to reflect the patient demographics, and supporting non-dietitian providers to conduct basic nutrition care to pregnant women. Future research should continue to explore the kinds of changes that would be supported by team-based care providers and their prenatal patients.
Chapter 6: Conclusions

This study described the current process of prenatal nutrition care delivered in FHTs and CHCs, and revealed opportunities and strategies to optimize this care for the future. The structure of team-based prenatal care was conceptualized into three spheres of influence: the individual provider, the team and the community. This study found variations among teams at each level of influence. This included how team members were involved in prenatal care, what approach to care was practiced, and how teams connected with their community.

This study also found that currently, prenatal nutrition care consists of in-person discussions, giving prenatal handouts and referring patients to other community services or programs. Limited diet and excess weight-related education and counselling are provided during routine prenatal care. However, caregivers feel that healthy weight gain and a healthy diet are important, and the tension between drivers and barriers to discussing weight gain was one theme identified by our analysis. The second area of tension described by this research was tension caused by inconsistent definitions of ‘high risk’ pregnancies. The result of this discrepancy is that some high risk women may not receive the type of care that they need.

This study identified four key dreams for the future of prenatal nutrition care in Ontario. These are: 1) Fulfill the team’s prevention mandate 2) Empower the individual provider to strengthen the interdisciplinary team 3) Empower the patient to facilitate self-care, and 4) Build the patients’ medical home with strong community outreach. Key perceived barriers to actualizing these dreams included: insufficient time, lack of nutritional training and expertise, and lack of confidence in addressing sensitive topics such as diet and weight. Key strategies to
overcome the shared challenges and achieve the shared dreams of team-based care providers include: 1) Close the “high risk” care gap 2) Close the excess weight care gap, and 3) Capitalize on the shared dreams of care providers. This movement involves developing practice guidelines, educational resources and training protocols to address excess weight and high blood sugars in pregnancy. These steps should facilitate teams to adapt to their unique community for enhanced patient-centred care.

The findings of this study contribute to existing health care literature and have practical implications in promoting high-quality interdisciplinary prenatal nutrition care for all pregnant women living in Ontario. Sharing current practices in prenatal care will guide researchers and practitioners towards creating more efficient practices, user-friendly nutritional assessment and education tools, and effective processes of interdisciplinary collaboration.
References


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Appendices

Appendix A: Ethical Approval Letter

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human participants in the above-named research project and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that researchers:

- Adhere to the protocol as last reviewed and approved by the REB.
- Receive approval from the REB for any modifications before they can be implemented.
- Report any change in the source of funding.
- Report unexpected events or incidental findings to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants, and the continuation of the protocol.
- Are responsible for ascertaining and complying with all applicable legal and regulatory requirements with respect to consent and the protection of privacy of participants in the jurisdiction of the research project.

The Principal Investigator must:

- Ensure that the ethical guidelines and approvals of facilities or institutions involved in the research are obtained and filed with the REB prior to the initiation of any research protocols.
- Submit a Status Report to the REB upon completion of the project. If the research is a multi-year project, a status report must be submitted annually prior to the expiry date. Failure to submit an annual status report will lead to your study being suspended and potentially terminated.

The approval for this protocol terminates on the EXPIRY DATE, or the term of your appointment or employment at the University of Guelph whichever comes first.

Signature: 
Date: July 22, 2014

L. Kuczynski
Chair, Research Ethics Board-General
Diet plays an important role promoting healthy pregnancies and in the long-term health of both mothers and infants. Prenatal care is changing in Canada and little is currently known about the prenatal nutrition care provided in team-care. Professor Laura Forbes and Martina Coady (MSc student) from the University of Guelph are conducting this research study to understand current prenatal nutrition care practices and to explore opportunities for future care.

Purpose of the Study

The purpose of the study is to understand prenatal nutrition care practices and identify opportunities for optimization of care in team-based primary health care models.

Procedures

A sixty-minute interdisciplinary focus group will be conducted with a moderator. The conversation will be audio-taped.

The following procedures are planned for today:

1) Completion of a short demographic questionnaire (five questions).
2) Discussion about the structure of prenatal care in your team-based environment.
3) Discussion about what prenatal nutrition care is offered by your team and who provides that care.
4) Discussion about the potential for quality improvement in prenatal nutrition care.
5) Discussion about recruitment strategies of high-risk populations to attend prenatal care services.

Audio data will be stored in an encrypted laptop and transcribed by a professional transcribing service to a Word document. When transcription is complete and has been reviewed for accuracy, audiotapes are destroyed. Speakers will only be identified by an ID number on transcripts. A hard copy document connecting ID numbers to personal identifies will be kept confidential and separate from the transcripts. Once transcription is complete and has been reviewed for accuracy, the document will be destroyed.
Personal contact information including your full name, address and phone number will be kept confidential and separate from the transcripts. We may need to contact you to confirm information on the transcript, after focus group is finished. Martina Coady will contact to you by e-mail or telephone.

An electronic copy of the transcripts in a CD will be stored securely in a locked filing cabinet in MINS B41 University of Guelph Department of Family Relations and Applied Human Nutrition for five 5 years after research publication, at which time it will be destroyed. Thematic analysis (a qualitative method) will be the method to analyze this information.

**Possible Risk or Discomfort**

This research project poses minimal risk as it does not involve personal, sensitive nor incriminating topics.

**Possible Benefits**

This is an excellent opportunity to influence the future development of prenatal care that may improve pregnancy outcomes and long term health of mothers and infants. It is an opportunity to participate in novel research as a team.

**Confidentiality**

Every effort will be made to ensure confidentiality of any identifying information that is obtained in connection with this study. Since you will be in a focus group, it is important to ensure confidentiality by refraining from any discussion of who took part or what was said once you leave the focus group. You will not be identified by name in the focus groups discussion. The information obtained from the interview will not be released to any other party for any reason. The transcripts will be kept confidential and only the researchers will have access to the transcripts. Confidentiality will be assured in the study, but not anonymity.

**Participation Withdrawal**

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. If you withdraw from participation, it may or may not be possible to exclude comments already made in the focus group from the transcript. Exclusion of such comments will be at the researcher’s discretion. You may also refuse to answer any questions you don’t want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise that warrant doing so.

**Rights of Research Participants**

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, contact: Director, Research Ethics: (519) 824-4120, ext. 56606, e-mail: sauld@uoguelph.ca. You may receive a copy of the results by emailing Martina Coady at coadym@uoguelph.ca.
Signature of Research Participant

I have read the information provided for the study ‘Team-Based Prenatal Nutrition Care in Family Health Teams and Community Health Centres in Ontario’ as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study.

I have been given a copy of this form.

___________________________             ________________________       ___________
Name of Participant (please print)                                 Signature

___________________________             ________________________       ___________
Name of Witness (please print)                                 Signature
Appendix C: Email Invitations to Executive Directors and Members of FHTs/CHCs

Re: Research from the University of Guelph “Exploring Prenatal Nutrition Care in Family Health Teams and Community Health Centres in Ontario.”

Dear Executive Director _____________ (name),

We are requesting your assistance in recruiting FHT/CHC providers for an upcoming focus group study, being conducted by an MSc student, Martina Coady, under the supervision of Dr. Laura Forbes from the University of Guelph. This study has been reviewed by the Research Ethics Board of the University of Guelph. The study participants are the FHT/CHC providers. No patients are to be involved.

The study may be of interest to your team as the focus is team-based prenatal nutrition care. The project funds refreshments and the professional moderator. We will organize the session once a team, through the ED, has committed to participation. The FHT/CHC will need to communicate with its members with reminders and to possibly provide a meeting space. One contact within each FHT/CHC to facilitate organization will be preferred. Note that to calculate the number of respondents and non-respondents in the study; we will need to ask you the number of providers by profession in your FHT/CHC.

We are kindly asking you to advertise the focus group study among your team members. To facilitate recruitment we have prepared the email below for possible forwarding to the team.

In the following days you will receive a telephone follow-up call regarding the study. If you would like to participate or if you have any questions, please don’t hesitate to contact the researchers (contact information below).

Sincerely,

Laura Forbes PhD, RD
Assistant Professor
forbesl@uoguelph.ca

Martina Coady
MSc Student
coadym@uoguelph.ca
Dear FHT/CHC Team:

Dr. Laura Forbes and her MSc student, Martina Coady, from the Department of Family Relations and Applied Nutrition of the University of Guelph are recruiting for a team focus group study to examine current practice in team-based prenatal nutrition care.

The study consists of a one-time, one-hour interdisciplinary focus group during lunch hour held at the FHT/CHC or nearby. At least four health care professionals with a collective minimum of three different professions (e.g., physician, dietitian, registered nurses, nurse practitioner, pharmacist, health promoter, kinesiologist) must agree to participate to ensure a team discussion.

Refreshments will be provided and a professional moderator with experience in primary care team discussions will conduct the session. Focus groups will be held during the fall 2014.

Please contact Martina Coady directly at coadym@uoguelph.ca if you are interested in participating or have any questions. Provide your profession and name of the FHT to make future arrangements for the meeting.

Xxxx
Executive Director

To contact the researchers:

Laura Forbes PhD, RD
Assistant Professor
forbesl@uoguelph.ca
519-824-4120 x5254423

Martina Coady
MSc Student
coadym@uoguelph.ca
519-824-4120 x58066
Appendix D: Interdisciplinary Focus Group Guide

Participants: Family physicians, family registered nurses, PHC nurse practitioners, pharmacists, dietitians and other healthcare providers working at FHTs and CHCs in Ontario. Executive directors, medical and nursing students, partnered midwives and public health care providers.

Introduction Moderator:

Today, we would like to hear your shared stories and experiences of working with both normal-risk and high-risk pregnant women in your [family health team (FHTs) or community health centre (CHC)]. First we will discuss how your team cares for NORMAL-Risk pregnant women. Then we will discuss HIGH-risk pregnancies.

1) What is the current process of prenatal care provided to NORMAL-risk pregnant women in your FHT/CHC?

- What health care professionals make up your team for providing prenatal care?
- Describe a typical process of care throughout the prenatal period.
  - What is the role of each health care professional, with respect to prenatal care?

2) What is the current routine for prenatal NUTRITION care provided to NORMAL-risk pregnant women in your FHT/CHC?

- Describe a typical process of care throughout the prenatal period.
  - When is prenatal nutrition care offered to pregnant women?
  - Who is involved in providing prenatal nutrition care?
  - What types of dietary assessments are conducted?
    - Is recording weight routine? Self-reported or measured?
  - What nutrition education and counselling are provided?
Topics covered
Resources offered
Any other services offered

- How does your prenatal population respond to the nutritional care provided? (Ex. Compliance, motivated, receptive)

Moderator: Now that we have discussed the process of care for Normal-risk pregnancies, we will move forward to discuss HIGH-risk pregnancy care. The types of definitions present in the literature include: teenage or older maternal age; under or overweight pre-pregnancy status; use of cigarettes, alcohol or drugs; history of pregnancy complications in a prior birth; or an acute or chronic health diagnosis.

3) Does this definition reflect your high-risk prenatal patients?

- Prompt: What are some examples of high-risk patients that you have had recently?

4) What is the current process of prenatal care provided to HIGH-risk pregnant women in your FHT/CHC?

Prompt: Ask participants to describe their routine for a recent patient

- What types of care does each health professional provide (their role)?

- One challenge that health care professionals face across Ontario is encouraging high-risk pregnant women to seek prenatal care in primary care facilities.

- Does your team actively recruit the high-risk prenatal population in the community?

- How does your team encourage these high-risk pregnant women to seek continued prenatal care at your FHT/CHC?

5) What is the current routine for prenatal NURITION care provided to HIGH-risk pregnant women in your FHT/CHC?

Prompt: Ask participants to describe their routine for a recent patient

- Who is involved in providing prenatal nutrition care?

- What types of dietary assessments are conducted?

- What nutrition education and counselling are provided?
• Do you address excess weight? If so, How?

• How does your high-risk prenatal population respond to the care provided? (Ex. Compliance, motivated, receptive)

• What do you find is challenging as health care professionals, with respect to the nutrition management of high-risk pregnancies?

• What do you perceive as challenging for the patients, with respect to the nutrition management of their high-risk pregnancy?

6) In an ideal world, what would you like to see to improve prenatal nutrition care in your FHT/CHC?

   o What would you need in order to make those changes?

   o Who would be involved in making those changes?

7) Is there anything else you would like to add about this topic?

Thank you very much for sharing your thoughts.

Bye.
 Appendix E: Interdisciplinary Focus Group Demographic Questionnaire

Demographic questionnaire for interdisciplinary focus groups in Family Health Teams (FHTs) / Community Health Centres (CHCs)

1) My age (years):
- □ <35
- □ 35-44
- □ 45-54
- □ 55-64
- □ ≥65

2) My gender is:
- □ Male
- □ Female
- □ Alternative / Prefer not to answer

3) My years in professional practice:
- □ 0-2 years
- □ 3-5 years
- □ 6-9 years
- □ 10-25 years
- □ >25 years

4) My years in a FHT/CHC
- □ 0-2 years
- □ 3-5 years
- □ 6-9 years
- □ 10-25 years
- □ >25 years

5) My current health care profession at the FHT/CHC:
- □ Physician
- □ Pharmacist
- □ Registered Nurse
- □ Nurse Practitioner
- □ Registered Dietitian
- □ Midwife
- □ Internship (specify) ____________
- □ Other: _______________________

6) My contact information is (Optional)

   Name: __________________________

   Email: __________________________

   Phone number: ____________________
Appendix F: Confidentiality Agreement for Transcriber

1. I, ____________________________, the transcriber have been hired to transcribe the focus group audio recordings for the above project. I agree to:

2. Keep all the research information shared with me confidential by not discussing or sharing the research information in any form or format (e.g., disks, tapes, transcripts) with anyone other than the Researcher(s).

3. Keep all research information in any form or format (e.g., disks, tapes, transcripts) secure while it is in my possession.

4. Return all research information in any form or format (e.g., disks, tapes, transcripts) to the Researcher(s) when I have completed the research tasks.

5. After consulting with the Researcher(s), erase or destroy all research information in any form or format regarding this research project that is not returnable to the Researcher(s) (e.g., information stored on computer hard drive).

Transcriber’s name _____________________________________________

Transcriber’s signature ___________________________________________

Transcriber’s Name of Business and Title (if applicable)____________________

Date____________________________________________________________