

# Overweight and Obesity in Pregnancy: A Review of Evidence

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## Introduction

This literature review focuses on the implications of maternal overweight and obesity, the experiences of pregnant women who are overweight or obese, and the provision of maternity care for overweight or obese women. Given the rise in rates of overweight and obesity in Canada and in many countries around the world in recent years, researchers, health care providers and policy makers have begun to focus more attention on the relationship between overweight and obesity and health. Of particular interest has been the impact of overweight and obesity on maternal and newborn health. Biomedical research has equipped us with a breadth of knowledge about the physical health implications of overweight and obesity in pregnancy for both mothers and babies, such as infertility, hypertension, gestational diabetes, caesarean delivery, hemorrhage, congenital abnormalities, and late fetal death (Arendas, Qiu & Gruslin, 2008; Heslehurst et al., 2007).

By comparison, we know little about the psychological and emotional implications of overweight and obesity in pregnancy and about how the social context of women's lives affects their experiences of overweight and obesity throughout pregnancy. The lack of attention to the psychosocial dimensions of overweight, obesity and pregnancy represents a significant gap in the literature, because we know that individuals who are overweight or obese are more likely to experience stigma, lower self-esteem and negative body image compared to those with a healthy weight (Furber & McGowan, 2010). People living with overweight or obesity may also be more prone to developing psychological distress, including depression, anxiety, and mood disorders than the general population (Furber & McGowan, 2010). Given the findings on the psychological and emotional well-being of overweight and obese individuals in the general public, we might also expect that women who are overweight or obese experience more psychological and emotional distress throughout their pregnancy than women who are at a healthy weight. Indeed, the few studies that have addressed these issues suggests that overweight and obese women experience more stigma and discrimination, as well as greater depressive symptoms than healthy weight women (Amador et al, 2008; LaCoursiere et al., 2006; LaCoursiere, Hutton, & Varner, 2007; Krause, Østbye, & Swamy, 2009). However, little research has been conducted in this area and further exploration is needed.

In addition to learning more about the psychological, emotional and social implications of overweight and obesity in pregnancy, we wanted to understand women's experiences of maternity care. Research has demonstrated that women and men who are overweight or obese are regularly subjected to stigma and discrimination in the health care system (Budd, Mariotti, Graff, & Falkenstein, 2009; Wray & Dreery, 2008). A literature review by the Atlantic Centre of Excellence for Women's Health (Petite & Clow, 2010) revealed that little research has been done on the experiences of overweight and obese pregnant women in health care settings. We were able to uncover only a single study related to this topic, but it suggests that this sub-population of pregnant women endure a range of negative maternity care experiences (Nyman, Prebensen & Flensner, 2008).

While we were interested in women's experiences and their psychosocial needs, we also wanted to learn more about health care providers' attitudes and their approach to providing care and support for overweight and obese pregnant women. The literature demonstrates that practitioners are aware of the health risks that maternal overweight and obesity pose for both mother and baby, yet it appears that little information has been made available to assist or guide health care providers in managing the

health and well-being of overweight and obese women during pregnancy. In 2010, the College of Midwives of Manitoba commissioned Prairie Women's Centre of Excellence for Women's Health (see Hanson, 2010) to conduct a review of existing clinical guidelines related to overweight and obesity in pregnancy and found that across the spectrum of health care professionals few standards of care had been established. Since then, new clinical guidelines have been released in Canada by the Society for Obstetricians and Gynecologists of Canada (SOGC) and the Association of Ontario Midwives (AOM), and other guidelines have been developed in the UK by the Centre for Maternal and Child Enquiries/Royal College of Obstetricians and Gynecologists (CMACE/RCOG), and the National Institute for Health and Clinical Excellence (NICE). Yet, there is still no consensus about "promising practices" frameworks for other providers, such as nurse practitioners, nurses, or dietitians. We also know little about practitioners' awareness of such guidelines or the degree to which these guidelines have been integrated into practice. Health care practitioners' experiences of providing maternity care to overweight or obese women remain a subject that requires further research.

This paper comprises a synthesis of information from two separate literature reviews on pregnant women with overweight and obesity, conducted by the Atlantic Centre of Excellence for Women's Health (see Petite and Clow, 2010) and Prairie Women's Health Centre of Excellence for the College of Midwives of Manitoba (see Hanson, 2010), and the results of a secondary search of the literature published since the reports were released. Information on the physical health implications of maternal overweight and obesity has been expanded from the earlier reviews and a new analysis of women's experiences of overweight and obesity during pregnancy has been added. This paper also provides a deeper discussion of the issues associated with the provision of maternity care for women who are overweight or obese, including new information about clinical guidelines.

In all three instances, reviews of the literature were conducted using academic databases (such as Medline and Pubmed), key online academic journals (such as *Obesity* and *Obstetrics and Gynecology*) and common web browsers (such as Google Scholar). Some of the common key words used in the searches were: obesity, overweight, BMI, pregnancy, maternal, maternal care, care management, care guidelines, women, fetus, and neonatal. In addition, relevant websites, such as those of the Society of Obstetrics and Gynecology Canada, and the Royal College of Obstetricians and Gynecologists were consulted. Other websites were reviewed for "grey literature." We focused on information released since 2005 to ensure the most up-to-date analysis of the subject. Some older articles were included because they were relevant and influential and/or cited frequently.

### **Measuring Overweight and Obesity: The Body Mass Index**

The most commonly used measure of weight is the Body Mass Index (BMI). BMI is calculated from the height and weight of an individual where the weight in kilograms or pounds is divided by the square of height in meters or inches. For example, an individual who is 83.6 kg and 1.7 m will have a BMI of 28.8. Normal or healthy weights fall within the range of 20 to 25 on the BMI scale while overweight is categorized as a BMI between 25 and 30 and obesity is defined as a BMI of 30 or greater (Catenacci, Hill & Wyatt, 2009; Razak et al., 2007). Overweight and obesity among pregnant women are defined as women who are 110% to 120% of their ideal weight or greater than 91 kg (200lbs) or who have a BMI higher than 30 kg/m<sup>2</sup> (SOGC, 2010).

While BMI is widely used, there is a general recognition that it is not a reliable measure for healthy and unhealthy weights. Studies have highlighted the limitations of BMI across diverse populations, including racial and ethnic groups, youth who have not reached their full height, adults who are naturally very lean or muscular, the elderly and pregnant women (Health Canada, 2003). Despite its drawbacks, BMI is still the most commonly used measure in research on overweight and obesity, including with pregnant women. However, research using BMI should be viewed with caution.

## **Implications of Maternal Overweight and Obesity**

The negative effects of maternal overweight and obesity on the physical health of women and their babies, as well as the longer term health concerns for children and adolescents is well documented. In the following section, we outline the negative effects of maternal overweight and obesity that are commonly reported in the literature by stage of pregnancy, as well as specifically for the fetus and neonate as well as older child and adolescent.

### ***Conception***

Increased attention about overweight and obesity in general has extended into reproductive health (Arendas, Qiu & Gruslin, 2008; Linné, 2004; Sarwer et al., 2006). Compared to other stages of pregnancy, however, very little has been written about issues related to conception. There is some evidence to suggest that overweight and obesity are associated with reduced fertility (van der steeg, et al., 2007) and lower success rates for assisted reproduction (Jones, Moragianni, & Ryley, 2011).

### ***Pregnancy***

The literature indicates that pregnancies in women with obesity are more frequently complicated than pregnancies with women of “normal” weight, and therefore obesity poses health risks for mothers and babies. Many studies found that pregnancy outcomes deteriorate in a linear manner as BMI increases from “normal” to obese (Cnattingius, Bergstrom, & Lipworth, 1998; Richens & Fiennes, 2009; Wax, 2009). The list of complications during pregnancy for overweight and obese women is substantial, including heightened risk of gestational diabetes (Torloni et al., 2009), hypertensive disorders, blood clots, infections, and preterm delivery (Arendas, Qiu & Gruslin, 2008; Linné, 2004; Siega-Riz & Laraia, 2006; Sarwer et al., 2006; Yu, Teoh, & Robinson, 2006). Many of these conditions create further risks and complications. For example, diabetes during pregnancy increases the likelihood of pre-eclampsia, pre-term birth, caesarean section, and postoperative infections. In the case of hypertension, pregnant women with high BMIs are also more likely to experience more severe forms of hypertensive complications (Robinson et al., 2005). Excess weight and limited mobility are also considered to be major factors in developing blood clots (CMACE/RCOG, 2010). Women who are overweight or obese pre-pregnancy are also at greater risk of having large birth weight babies or babies with metabolic abnormalities (SOGC, 2010). Further, there is some indication that women who are overweight or obese may be at risk for multiple pregnancies not related to fertility treatments (Arendas, Qiu & Gruslin, 2008). Women who are obese are also at increased risk of spontaneous

abortion and recurrent miscarriages in early pregnancy (more than three successively within the first trimester) (Lashen, Fear & Sturdee, 2004). Many pregnancy-related complications require that women undergo an increased level of maternal and fetal monitoring and given their weight there is the potential for poor ultrasound visualization of the baby and consequent difficulties in fetal surveillance and screening for anomalies (CMACE/RCOG, 2010).

### *Labour and Delivery*

There is evidence to suggest that overweight and obesity also affects women's experiences of labour and delivery. Research clearly indicates that women who are obese are more likely to need assistance during delivery, such as the use of forceps during vaginal delivery and caesarean section (Arendas et al.; Poobalan et al., 2008). Numerous sources have documented elevated rates of caesarean section among obese pregnant women (Allison, Sarwer & Pare, 2007; Arendas, Qiu & Gruslin, 2008; Dresner, Brocklesby, & Bamber, 2006; Fitzsimons & Modder, 2010; Harper, 2010; Kerrigan & Kingdon, 2006; Poobalan et al., 2008; Ramachenderan, Bradford & Mclean, 2008; SOGC, 2008; Yogev & Catalano, 2009). According to Poobalan and colleagues (2008), caesarean delivery risk is increased by 50% in overweight women and is more than double for obese women when compared with women who have a healthy BMI. Positive outcomes following caesarean delivery are also compromised for overweight and obese women. Women with high BMIs are more likely to endure increased blood loss, operation times, endometritis, vertical skin incisions, and postoperative wound infection (Perlow & Morgan, 1994; Wall et al., 2005). For example, in one study that examined the charts of 611 women who had undergone caesarean delivery, obesity emerged as an independent risk factor for infection, even when the caesarean was elective (not the result of an emergency) and prophylactic antibiotics were given (Myles, Gooch & Santolaya, 2002).

A number of sources indicate that women with a BMI greater than 35 are at an elevated risk of anaesthesia-related complications (Catalano & Ehrenberg, 2006; Fitzsimons & Modder, 2010), including airway management, difficulty with insertion of regional nerve blocks and incidence of failed intubation (Kerrigan & Kingdon, 2006). Accumulation of anesthetic agents in adipose tissue also puts obese pregnant women at increased risk of delayed recovery from general anesthesia and postoperative hypoxemia (Perreira, 2009). Several studies have also indicated that women with BMIs equal to or greater than 30 have significantly more perinatal morbidity causing adverse outcomes for both maternal and fetal/newborn health (Catalano & Ehrenberg, 2006; Ramachenderan, Bedford & McLean, 2008).

### *Post-Pregnancy*

Following labour and delivery, overweight and obese women experience more physical health complications than women with healthy weights. A report on maternal and child health in the UK, for instance, noted that obese women are at greater risk of death from hemorrhage, blood clots and infection in the post-partum period (Lewis, 2007). Some studies have shown that breastfeeding by pregnant women with obesity immediately following birth can enhance uterine contractions and reduce the risk of postpartum hemorrhage (Jevitt, 2009). Additionally, delayed milk production, which is more common in obese women, can be improved with breastfeeding early-on post-partum (Dartford & Gravesham, 2009). Breastfeeding can also facilitate weight loss (NICE, 2010).

Other post-pregnancy issues that have been linked with overweight and obesity include prolonged hospitalization, incontinence, and endometriosis, as well as open wounds, and urinary tract infections (Arendas, Qiu & Gruslin, 2008; Morin, 1998; Sarwer et al., 2006; Smith, Husley & Goodnight, 2008). Health risks facing mothers, especially those that precede or last beyond pregnancy, have received scant attention. For example, women with gestational diabetes are at increased risk for developing Type II diabetes postpartum (Buchanan & Kjos, 1999), but studies have shown that health care practitioners often do not follow-up with maternal screening after delivery (Clark, van Walraven, Karovitch, & Keely 2003; Smirnakis et al., 2005).

### ***Fetus and Infant***

Maternal overweight and obesity are also associated with a variety of health risks for the fetus and infant (Arendas, Qiu & Gruslin, 2008; Sarwer et al., 2006; Linné, 2004; Smith et al., 2005). Complications include stillbirth, fetal distress, macrosomia, neonatal death, and congenital anomalies (Arendas, Qiu & Gruslin, 2008). Large birth size, macrosomia, is associated with fetal distress and injury as well as increased risk of caesarean section or medically assisted vaginal delivery, which have their own risks (Arendas, Qiu & Gruslin, 2008). While women with gestational diabetes often give birth to large babies, it appears that maternal overweight and obesity is associated with high birth weight even in the absence of gestational diabetes (King, 2006; Sarwer et al., 2006). Maternal overweight and obesity – both before and during pregnancy – are further linked with neural tube defects (Nuthalapaty & Rouse, 2004) and congenital anomalies, including cardiac defects, skeletal malformations and neurological conditions, such as spina bifida (Watkins et al., 2003; Stothard, Tennant, Bell & Rankin, 2009).

### ***Child and Adolescent***

The literature identifies a number of longer term health concerns for children whose mothers were overweight or obese during pregnancy. For example, children of mothers with high BMIs, have a tendency to be overweight or obese in childhood (American Congress of Obstetricians and Gynecologists (ACOG), 2009; Amir & Donath, 2007; CMACE/RCOG, 2010; Oddy et al., 2006; Catalano, Presley, Minium & Hauguel-de Mouzon, 2009; Gillman et al., 2003; Hampton, 2004). In addition, a recent study found higher rates of respiratory illness among children born to overweight or obese women (Håberg et al., 2009). Research has also demonstrated that infants born to diabetic women, whose condition may be associated with overweight or obesity, also have a higher likelihood of developing Type II diabetes later in life (Smith, Hulse, Goodnight, 2008; Di Lillo, Hendrix, O'Neill & Berghella, 2008; Yogev & Visser, 2009). Furthermore, some research has linked maternal overweight and obesity with decreased rates of breastfeeding, which is also associated with higher rates of obesity among children and youth (Amir & Donath, 2007).

Research from all over the world has established the physical health implications of overweight and obesity in pregnancy for mothers and their babies, as well as longer term outcomes for children and adolescents. Without a doubt, the biomedical model has resulted in enormous health advances, including the reduction of maternal and newborn mortality. However, it is not sufficient to appreciate fully the relationship between weight and wellness in pregnancy. Significantly more attention needs to be paid to the emotional, psychological and social aspects of health among pregnant women living with overweight or obesity.

## Women's Experiences of Overweight and Obesity during Pregnancy

Understanding women's experiences of overweight or obesity during pregnancy is key to improving their health and the healthcare services they receive (Smith & Lavender, 2011). Yet, much fewer studies have been conducted on the needs and experiences of pregnant women with high BMIs compared to biomedical research focused on physical health implications. The following section describes what is known about the psychological and emotional well-being of pregnant women who are overweight or obese, as well as some of the social factors that may influence health outcomes and women's overall experiences of care during pregnancy.

### *Psychological and Emotional*

Little research has been conducted on the psychological and emotional aspects of women's experiences of overweight and obesity during pregnancy. Yet, there is a substantial body of research for overweight and obese individuals in the general population demonstrating that people with high BMIs experience more psychological and emotional distress, including increased stigmatization, depressive and anxiety disorders, negative body image and lower self-esteem than individuals of healthy weights (Furber & McGowan, 2010). Given these findings, we could expect that overweight and obese pregnant women experience greater psychological and emotional discomfort during pregnancy in comparison to women who are considered to be a healthy weight.

The few studies that have been conducted with pregnant women with high BMIs have shown that compared to women who are a healthy weight, they experience elevated rates of emotional and psychological distress throughout their entire pregnancy, including greater depressive symptoms post-partum, as well as various forms of stereotyping, stigma and discrimination (Amador et al, 2008; LaCoursiere et al., 2006; LaCoursiere, Hutton, & Varner, 2007; Krause, Østbye, & Swamy, 2009). Research has also shown that during pregnancy, overweight and obese women's direct experiences with the health system are often negative and result in emotional and psychological distress (Smith & Lavender, 2011). The medicalization of the pregnancy experience has left many women with high BMIs feeling upset about the level of advice and guidance they received from health providers (Smith & Lavender, 2011). Many women describe the interactions they have with health professionals to be impersonal and report feelings of discomfort as a direct consequence of their midwife's or physician's treatment or comments about their weight (Merrill & Grassley, 2008; Nyman, Prebensen & Flensner, 2008; Thomas et al., 2008). Pregnant women who are overweight or obese have also described personal feelings of guilt, worry and embarrassment during healthcare visits (Nyman, Prebensen & Flensner, 2008; Smith & Lavender, 2011). Additionally, they reported feeling anxious during medical examinations and were fearful that gowns and equipment would not be large enough for their body sizes (Nyman, Prebensen & Flensner, 2008). Having to reveal one's weight to health professionals and even to their own partners was said to be embarrassing and shaming for many pregnant women who are overweight or obese. Many women also felt guilty for ostensibly putting both their own life and that of their unborn child's in danger because of their weight.

On the positive side, studies have found that pregnancy can reduce negative feelings about weight for women with a BMI greater than 25 (Fox & Yamaguchi, 1997; Nyman, Prebensen & Flensner, 2008; Smith & Lavender, 2011; Weir et al., 2010; Wiles, 1998). According to a review of available literature by Smith and Lavender (2011), many women who were overweight or obese viewed changes to their bodies favourably during pregnancy and felt physically attractive while pregnant. Some women even reported

feeling less stigmatized by strangers during this time of their life, suggesting one of the main reasons for this is that larger body sizes are more socially acceptable for pregnant women (Fox & Yamaguchi, 1997; Nyman, Prebensen & Flensner, 2008; Weir et al., 2010; Wiles, 1998). Research has also demonstrated that the positive attention women who are overweight or obese receive during pregnancy increases feelings of self-worth (Smith & Lavender, 2011).

### *The Social Determinants of Health*

A narrow focus on the biomedical model of health has not only resulted in a lack of information on the psychological and emotional implications of overweight and pregnancy, but it has also led to a shortfall in understanding the social context of women's lives in their experiences of overweight and obesity while pregnant, as well as the role these factors play in maternal and newborn health outcomes. Contextual issues, such as ethnicity and socioeconomic status, need to be factored into explanations of and responses to overweight and obesity in pregnancy. Emergent studies that have taken various social determinants of health into consideration have found significant relationships between race/ethnicity (Bryant, Worjolah, Caughey & Washington, 2010; Sparks, 2009), poverty (Schrauwers & Dekker, 2009) and poor maternal and neonate health outcomes. In Canada, we know that First Nations populations experience a number of social factors, such as poverty, poor housing conditions, histories of colonization and violence and so on, associated with poorer health outcomes, such as increased rates of overweight and obesity and chronic disease. A recent Canadian study investigating pregnancy outcomes of First Nations women in Quebec revealed that almost 80% of this population was overweight or obese prior to pregnancy and the authors suggested that First Nations women may be at a greater risk of experiencing negative maternal health implications than non-First Nations women due to excessive weights (Brennand, Dannenbaum, & Willows, 2005). More research is needed, however, to gain a better understanding of the relationships that may be at play here between race and culture, other social determinants of health, overweight and obesity, and poor maternal health outcomes for First Nations and other women. For example, we know very little about the implications of maternal overweight and obesity among immigrant and African Nova Scotian women – who may experience very different social contexts. A study from Sweden that examined increased adverse pregnancy outcomes among overweight and obese women found that factors, such as lower educational attainment and daily smoking, may play a significant role in negative outcomes among women with high BMIs (Cnattingius, Bergstrom, & Lipworth, 1998), pointing to the importance of examining the relationship between overweight, obesity and pregnancy in the context of women's lives. Many gaps in knowledge around lifestyle issues, such as smoking, drugs, sexually transmitted diseases, and nutritional status prior to pregnancy exist and more research is needed to determine how various factors may influence women's experiences – positively or negatively – of weight during pregnancy and adverse health outcomes.

Research has just begun to uncover some of the psychological, emotional, and social aspects of women's experiences of overweight, obesity and pregnancy. More research is needed in the area to help us better understand the complexities of overweight and obese pregnant women's experiences. For example, further exploration into the social determinants of health, such as housing, education, food security and more, will help identify which groups of overweight and obese women may be at increased risks of experiencing negative physical, psychological and/or emotional health outcomes.

## Providing Care and Support to Pregnant Women who are Overweight or Obese

In addition to gaining a greater appreciation of women's experiences, it is also important to learn about health practitioners' experiences of providing maternity care to overweight and obese women, as well as the standards of care that have been established to assist them. Practitioners are aware of the negative health implications associated with maternal overweight and obesity, including implications for health service delivery, such as the level of care and support required from health providers (Heslehurst et al., 2007). While health providers know these issues exist, little information has been available to assist practitioners on how best to care for and support overweight and obese women during pregnancy. This is beginning to change, however. As a testament to the need for such guidance, a number of professional associations have recently published clinical guidelines related to the care and support of overweight and obese women in pregnancy. The following section describes existing clinical guidelines on overweight and obesity in pregnancy and health care providers' accounts of maternity care with this particular group of women.

In February of 2010, the Society for Obstetricians and Gynecologists of Canada (SOGC) released their clinical guidelines on obesity in pregnancy. The following month, the Centre for Maternal and Child Enquiries (CMACE) and Royal College of Obstetricians and Gynecologists (RCOG), both from the UK, released their joint guidelines on the management of pregnant women with obesity. During the same month, the Association of Ontario Midwives (AOM) approved their own set of guidelines on the management of women with a high or low BMI. In July of the same year, the National Institute for Health and Clinical Excellence (NICE), another organization from the UK, unveiled their detailed guidelines on weight management in pregnancy and after childbirth. In the following section, we summarize the recommendations outlined in these guidelines according to stage of pregnancy, as well as present complementary information found in the popular literature.

### *Pre-Pregnancy and Conception*

Optimal care of women with overweight and obese conditions is essential to ensuring as positive pregnancy outcomes as possible. According to the literature on clinical guidelines, optimal maternal care starts before a woman becomes pregnant. It has been recommended that during family planning consultations, weight and weight loss, nutrition and food choices, as well as exercise and lifestyle advice be given (CMACE/RCOG, 2010; NICE, 2010; SOGC, 2010). In pre-pregnancy, it has also been suggested that primary care providers advise and support women to achieve healthy weight or lower their BMIs (CMACE/RCOG, 2010; SOGC, 2010). For example, the SOGC (2010) recommends that women be encouraged to enter pregnancy with a BMI less than 30 and ideally lower than 25. Encouraging weight loss prior to conception is important, as dieting is not recommended for women during pregnancy (NICE, 2010; SOGC, 2010). However, it is equally important that the conversations around weight loss prior to pregnancy be approached in a sensitive manner by health care providers.

Recommendations made in the guidelines we reviewed also advise health practitioners to discuss the increased risks of childbearing for women with elevated BMIs (CMACE/RCOG, 2010; NICE, 2010; SOGC, 2010) and encourage them to have appropriate screening (SOGC, 2010). In addition, given that pregnant women with obese or overweight conditions are at an increased risk for infant neural tube defects (Nuthalapaty & Rouse, 2004), CMACE/RCOG (2010) and others (see Rasmussen et al., 2006) recommend that they be encouraged by health care professionals to take 5 mg of folic acid for at least one month prior to conception and throughout the first trimester of pregnancy. However, there is contradictory

evidence that shows that the protective affects of using folic acid before conception and during early pregnancy does not benefit obese women (Weber et al., 1996).

### **Pregnancy**

CMACE/RCOG (2010) advocate that the care of pregnant women with overweight or obesity be integrated into all prenatal clinics and based on clear policies and guidelines. The documents we reviewed set out a number of clinical guidelines to assist health practitioners providing care to pregnant

women with high BMIs. One of the most common recommendations noted in the guidelines was the importance of weighing women during the first prenatal visit (AOM, 2010; CMACE/RCOG, 2010; NICE, 2010). Both CMACE/RCOG and NICE guidelines advise against self-reported measures of height and weight, instead suggesting that health care providers take weight and height measurements of obese parturient women themselves. However, as one study showed, obtaining height and weight measurements for obese women may not be possible outside of health services locations, such as in women’s homes, because of a lack of appropriate portable equipment to weigh women with high BMIs (Heslehurst, 2007). In addition, recommendations on how often to weigh overweight or obese pregnant women vary. Some guidelines suggest that women be weighed at every appointment and others, such as NICE (2010), believe it is only necessary to regularly weigh women in cases where clinical management can be influenced or nutrition is a concern.

Both CMACE/RCOG (2010) and NICE (2010) are careful to note the importance of being sensitive to any concerns pregnant women may have about their weight. With this sensitivity in mind, all four sets of clinical guidelines we reviewed recommended that issues around weight and weight loss, nutrition and food choices, as well as exercise, smoking cessation and the implication of drug use and alcohol consumption in pregnancy be discussed with women at the initial prenatal visit (AOM, 2010; CMACE/RCOG, 2010; NICE, 2010; SOGC, 2010).

Another common topic noted to be important in discussions with overweight or obese parturient women was expectations around weight gain during pregnancy. The SOGC (2010) suggests that women set pregnancy weight gain goals based on their pre-pregnancy BMI. Both the SOGC and NICE, as well as much of the literature (Fitzsimons & Modder, 2010; Hampton, 2004; Jevitt, 2009; Massiah & Kumar, 2008; Ramachenderan, Bradford, & Mclean, 2008; Smith, Hulse, & Goodnight, 2008; Soltani, 2009), refer to the United States Institute of Medicine’s (IOM) revised 2009 guidelines for weight gain as the

**Table 1: Recommended rate of weight gain and total weight gain for singleton pregnancies according to pre-pregnancy BMI**

Pre-Pregnancy BMI category	Mean Rate of Weight Gain in 2 <sup>nd</sup> & 3 <sup>rd</sup> Trimester		Recommended Range of Total Weight Gain	
	Kg/week	lb/week	Kg	lb
BMI<18.5 Underweight	0.5	1.0	12.5 - 18	28 - 40
BMI 18.5-24.9 Healthy Weight	0.4	1.0	11.5 - 16	25 - 35
BMI 25.0-29.9 Overweight	0.3	0.6	7 – 11.5	15 - 25
BMI ≥ 30 Obese	0.2	0.5	5 – 9	11 - 20

Adapted from IOM (2009)

benchmark for protocol (see Table 1 above). Health Canada also cites IOM 2009 guidelines suggesting that women aim to achieve weight gain in the lower end of each recommended range for BMI category (Health Canada, 2009; Jevitt, 2009). The SOGC (2010) recommends the optimal weight gain for obese pregnant women is 7 kilograms/15 pounds. Of note, authors of IOM guidelines state “the reality [is] that good outcomes are achieved within a range of weight gains, and the many additional factors that may need to be considered for an individual woman,” including psychological, behavioural, family, socio-cultural, geographical and environmental aspects of women’s lives (Rasmussen, & Yaktine, 2009, p.2).

Controlling weight gain to 7 kilograms or less, including weight loss and no weight gain, has shown to be associated with reduced rates of macrosomia (Bhogul & Jayawardane, 2008/9; Nyman, Prebensen & Flensner, 2008; Wax, 2009). There is little data about the effects of weight loss on fetal growth (Jevitt, 2009). Other investigations and authors suggest rates of preeclampsia, caesarean delivery and other adverse outcomes are reduced when weight gain is limited to 7 kilograms (CMACE/RCOG, 2010; Fitzsimons & Modder, 2010; SOGC, 2010).

To better support overweight or obese women during pregnancy, it has also been suggested that a strategy that maximizes nutritious intake while limiting caloric intake be developed in the first prenatal visit (Jevitt, 2009) and that all pregnant women with a BMI of 30 or more be referred to a dietician for further information and support (AOM, 2010). It has also been recommended that during the first prenatal visit, health professionals inform patients about the risks of childbearing for women with high BMIs (AOM, 2010; CMACE/RCOG, 2010; NICE, 2010; SOGC, 2010).

In addition to weight, the AOM (2010) recommends that midwives obtain and document a baseline blood pressure for women with a BMI of 30 or more during the initial prenatal visit. Obese parturient women should also be assessed for the risk of thromboembolism, or blood clots, at their first appointment and continued to be tested throughout the duration of their pregnancy (CMACE/RCOG, 2010). In addition, according to CMACE/RCOG (2010), women with a BMI of 40 or more should schedule a consultation with an obstetric anaesthetist to develop a management plan. Similarly, it is recommended in the AOM (2010) guidelines that midwives offer anesthesiology consultations to all women with high BMIs who are planning an epidural or who simply wish to have more information about the potential complications associated with anesthesia.

The AOM (2010) recommends that midwives discuss the increased risks of gestational diabetes with women who have high BMIs. Other guidelines emphasize the importance of encouraging and providing advice on exercise and physical activity to reduce the risk of gestational diabetes mellitus and other complications during the initial prenatal visit. The benefits and risks of gestational diabetes screening should also be discussed with obese parturient women (AOM, 2010). The decision of when -or whether- to test for gestational diabetes, however, is widely contested in the literature. Some guidelines suggest all women with BMIs of 30 or more have glucose screening at the first prenatal visit or as early as possible in their pregnancy (Darling, 2006; Jevitt, 2009), while others suggest glucose tests take place between 24 to 28 weeks (Fitzsimons & Modder, 2010; Vogel et al., 2000).

Guidelines have also been developed around fetal growth monitoring during pregnancy, including external monitoring, such as abdominal palpation, and internal monitoring through ultrasounds. In clinical practice, abdominal palpation for fetal growth assessment may be difficult to perform on women with obesity due to excess adipose tissue in the abdominal area (SOGC, 2010). Additionally, it has been noted that methods for measuring and monitoring fetal developments such as ultrasound, arterial

doppler and cardiotocography (CTG) are difficult to realize with obese women and do not always provide successful results. For example, poor or inaccurate ultrasound images have led to increased intervention and caesarean sections when macrosomia is mistakenly diagnosed (SOGC, 2010). The SOGC notes that in women with a BMI above the 97.5 percentile, only 63% of fetal structures are well visualized. For example, it may be difficult or impossible to see the fetal heart, spine, kidneys, diaphragm, and umbilical cord on ultrasound with overweight or obese women (Hendler et al., 2005). The SOGC (2010) recommends that a better option for women who are overweight or obese, is to wait to arrange the ultrasound assessment until 20 to 22 weeks. Another remedial suggestion has been the use of non-invasive abdominal fetal electrocardiogram (ECG) (Bhogul & Jayawardane, 2008/9).

### *Labour and Delivery*

Given the increased risks associated with labour and delivery for pregnant women who are overweight or obese, a number of guidelines have been established to assist health practitioners caring for these women. It is recommended that normal vaginal delivery be encouraged with all pregnant women – regardless of weight (Dietz et al., 2005; SOGC, 2010). CMACE/RCOG (2010) guidelines also notes that pregnant women with high BMIs who have already had a previous caesarean delivery be included in all planning for vaginal birth despite the fact that obese women are less likely to be successful in delivering vaginally after having a caesarean section (SOGC, 2010).

Studies have found both shorter and longer labour durations associated with elevated BMIs (Arendas, Qiu Gruslin, 2008). A number of sources reiterate the cause for concern in inducing pregnant women with obesity (Arendas, Qiu Gruslin, 2008; SOGC, 2008). Obesity alone is not an indication to induce labour and normal birth should be encouraged by health care professionals (CMACE/RCOG, 2010). CMACE/RCOG asserts that an induction of labour carries the risk of failed induction and emergency caesarean section, which can be a high risk procedure in women with obesity. Induction of labour should therefore be reserved for situations where there is a specific obstetric or medical indication, with recourse to senior obstetric and anaesthetic help in the event that abdominal delivery becomes necessary.

Complications that may arise during the monitoring of labour are also important to consider with overweight and obese pregnant women. There is increasing evidence showing that pregnant women who are obese are more likely than women of healthy weight to have altered or impaired uterine contractions (Zhang, Bricker, Wray, & Quenby, 2007; Monynihan et al., 2006), which may lead to abnormal labour or caesarean section. Monitoring contractions and caring for women with obesity during labour and delivery can pose some challenges for health professionals, such as difficulties assisting women to change position and during abdominal palpations to feel the baby's positioning. The SOGC (2010) notes that intrauterine monitoring, such as pressure catheters and newer technologies like electrohysterography, which uses abdominal electrodes to provide information about uterine contractions, may be advantageous when providing care for obese pregnant women.

Pregnant women who are overweight or obese are also more likely than women of a healthy weight to experience difficulties with intubation (Saravanakumar, Rao & Cooper, 2006), epidurals (Hood & Dewan, 1993), and general anesthesia (SOGC, 2010). Given that regional anaesthesia often requires significantly more time and staff resources with women who are obese and the increased risk of epidural failure, the SOGC (2010) suggests that health practitioners consider giving obese women epidurals early in their labour. Additionally, given the challenges associated with anesthetic and increased likelihood of

caesarean section among women with high BMIs, a number of guidelines suggest that midwives and physicians refer women for anaesthetic assessments prenatally (ACOG, 2009; Health Canada, 2010; Massiah & Kumar, 2008). For example, the SOGC (2010) recommends that prenatal consultations with anesthesiologists be considered to review options and to devise a plan in case local anesthetic needs to be used.

The guidelines also speak to place of birth as an important consideration. Most literature sources in obstetrical, nursing and some midwifery journals caution against home as the venue for birthing for overweight and obese women, citing safety to both the woman (involving risks of postpartum hemorrhage, shoulder dystocia and surgical birthing needs) and her care team who might be involved in lifting during emergency transports to the hospital. Both NICE (2010) and CMACE/RCOG (2010) recommend that women with a BMI of 35 or more be advised against having a home birth and to give birth in an obstetric unit to reduce the increased risk of maternal and fetal adverse outcomes and to minimize transport difficulties. They further recommend individual risk assessment regarding planned place of birth for women with a BMI of 30 to 34 (SOGC, 2008). Where the decision to have a homebirth is made, main floor usage is suggested to avoid stairs and falling or injury. A water birth may be considered, as some argue that water is the best place for overweight parturient women to give birth (Harper, 2010). Overweight and obese women can move in the water, control their bodies, respond better to the movements of the baby and feel much better physically after the birth because of the buoyancy effect on their muscles and cardiovascular system (Harper, 2010). In Switzerland, where water birth is a popular way to give birth, only women whose BMI is greater than 40 are excluded from water births (presumably then, women with BMIs between 25 and 39 are given water birth as an option) (Geissbuehler, Stein & Eberhard, 2004). Like other birth-planning discussions, water birth should be decided on a case-by-case basis, taking into consideration the overall woman's health (Harper, 2010). Regardless of where the birth takes place, the AOM (2010) believes that, as long as all possibilities have been discussed, midwives should support a woman's choice of birthplace.

### *Post-Pregnancy*

In addition to providing recommendations prior to and during pregnancy, the clinical guidelines we reviewed offer postpartum guidance to health practitioners. It is recommended that lactation advice and encouragement to breastfeed, including good positioning, latching, and milk supply, be offered to all women regardless of their weight (AOM, 2010; NICE, 2010). CMACE/RCOG (2010) suggests that women with a pre-pregnancy BMI of 30 or more receive "appropriate specialist advice and support antenatally and postnatally regarding the benefits, initiation and maintenance of breastfeeding" (p.13).

Regardless of the mode of delivery – either vaginally or by caesarean – women who are overweight or obese are more likely than women of a healthy weight to experience blood clots (CMACE/RCOG, 2010). Thus, women with a BMI of 30 or higher should be encouraged to move around as soon as possible after birth (CMACE/RCOG, 2010). CMACE/RCOG (2010) also recommends that women with a BMI of 40 or more be offered small doses of anticoagulant drugs after the birth of their baby to decrease blood clots, while AOM (2010) suggests that midwives discuss such treatment options with women who have a BMI of 30 or above. For overweight or obese women who have been diagnosed with gestational diabetes mellitus during pregnancy, a test of glucose tolerance is suggested for 6 weeks post-partum (CMACE/RCOG, 2010). Continuous check-ups for Type II diabetes and screenings for metabolic risk factors should be encouraged (Fitzsimons & Modder, 2009). All pregnant women should be seen to identify risks of postpartum depression or anxiety and given support to work them through difficulties.

NICE (2010) also sets out guidelines around postnatal checkups. They recommend that health professionals, such as physicians and midwives, use the 6 to 8 week checkups as an opportunity to ask women whether or not they would like further advice or support – either now or at a later date – around their weight. Discussion topics may include how to lose weight safely, realistic expectations around weight loss, as well as the benefits of healthy diet and regular exercise. NICE also recognizes the context of women’s lives in supporting healthy lifestyles and reminds health providers to acknowledge women’s roles within the family and discuss how family members might be able to support women in achieving their goals. They recommend that advice be tailored to the specific circumstances of women, including the demands of taking care of a baby and any other children in the home, sleep deprivation, and any known health problems. There are also specific recommendations in the NICE guidelines that target community-based services, suggesting that local leisure and community services offer physical activities and programming specifically designed for women with babies and children. NICE advises that such opportunities be affordable, scheduled at times that are convenient for women with young children, offer childcare and additional support for women who are breastfeeding. Examples of activities and programs included organized walks, cycling, dancing or swimming.

### ***Equipment and Staff Support in Providing Care***

A group of healthcare practitioners interviewed about the impact of obesity on maternity services highlighted a lack of appropriate equipment as a major barrier to providing adequate care for overweight and obese pregnant women (Heslehurst, 2007). Recognizing that proper equipment is vital to the care of pregnant women with high BMIs, the CMACE/RCOG and SOGC (2010) recommend that all maternity units have proper equipment and medical emergency services. This includes surgical theatre tables, appropriate gown sizes, transportation accommodations, large blood pressure cuffs, sit-on weigh scales, large chairs (without arms) and wheelchairs, ward and delivery beds, lifting and lateral transfer equipment, circulation space, birthing stools, etc. Doorways need to be wide enough to transfer through safely while working with up to 250 kg. If equipment is stowed away, staff requires knowledge of and access to it. The SOGC (2010) also points out the importance of ensuring that proper equipment and surgical instruments, such as intubation tubes, be made available in hospital operating rooms to accommodate obese women during caesarean section. In addition, CMACE/RCOG (2010) put forward in their guidelines that a documented assessment occur in the third trimester for women with obesity in order to develop appropriate plans for equipment and personnel in the case of manual handling. This includes the assurance that theatre tables and other equipment are sufficiently sized as well as management of obstetric emergencies is discussed.

Proper education and training for health practitioners on weight and pregnancy has also been viewed as an important aspect of providing optimal care. Accordingly, CMACE/RCOG (2010) recommends that health professionals involved in manual handling of pregnant women with high BMIs receive specialized training (Fitzsimons & Modder, 2009). They also suggest staff receive instruction on how to use specialized equipment that might be needed when working with overweight or obese pregnant women prior to, during or after pregnancy.

### ***Final Considerations***

Establishing standards of care through clinical guidelines is an important first step in assisting health practitioners who support and care for overweight and obese women during pregnancy, but much more

work in supporting health professionals is needed. These guidelines are relatively new and there does not appear to be a consensus of “promising practices” frameworks for many groups of health care practitioners who play key roles in women’s maternity care, including nurse practitioners, nurses, and dietitians. There does not appear to be a national set of midwifery guidelines adopted in Canada or other parts of the world. While many roles and responsibilities are shared across the professions, others are not, such as the kinds of care provided by obstetricians and gynaecologists compared to the support and information offered by dietitians. These differences stress the need for tailored guidelines specific to professional bodies and the type of maternity care they provide.

The shortage of clinical practice guidelines related to the provision of maternal overweight and obesity creates inconsistencies across the health field and may exacerbate feelings of uncertainty among providers, especially as some professional bodies have guidelines and others do not. Furthermore, even though these guidelines exist, that does not necessarily mean that practitioners are aware of them or are integrating them into practice. We also do not know the extent to which health care settings, such as hospitals, are instituting the clinical care guidelines and ensuring that recommendations are followed by staff (and by which staff). For example, it was recommended that all hospitals have appropriate equipment to properly care for overweight and obese pregnant women, but how many hospitals and other care settings actually have the recommended equipment to care for overweight or obese women? An even more basic question that needs to be investigated is how many hospitals have conducted audits to know what equipment they have and what is needed. Furthermore, the cost of obtaining additional equipment is often a barrier and hospitals need to budget accordingly or find additional funding.

Another shortcoming is that the guidelines reinforce the biomedical model of health care by focusing largely on physical health outcomes. Psychological and social factors are for the most part ignored. The only recognition of the social context of women’s lives was by NICE, but even then they only discussed gender roles within the family in relation to making healthy lifestyle changes. The lack of consideration for the everyday lives of women has caused many to overlook important factors that influence pregnancy. Several of the clinical guidelines encouraged women to lose weight before conception. However, many women do not plan their pregnancies. Unintended pregnancies are more common among women who are young, unmarried, racialized, and of lower socio-economic status (Finer & Henshaw, 2006). These women are also disproportionately affected by obesity (Siega-Riz & Laraia, 2006; Catenacci, Hill & Watt, 2009). Therefore, expectations for losing weight before pregnancy are not realistic for many women. There is also no discussion on the relationship between social factors, overweight and obesity, and maternal health outcomes, leaving us with very little information about adverse health outcomes among pregnant women from diverse racial and ethnic, socio-economic, and educational backgrounds. Further, in terms of psychological distress, CMACE/RCOG and NICE noted the importance of being sensitive to any concerns women may have around their weight when discussing related issues, but there are no suggestions offered on how practitioners can raise the topic with sensitivity. There is also very little else in the way of acknowledging psychological implication of overweight, obesity and pregnancy, nor on promoting psychological well-being.

In addition, there is very little research describing health care practitioners overall experiences of providing maternity care for overweight or obese women, particularly in relation to recommendations made in the guidelines. A study by Heslehurst and colleagues (2001) identified a number of challenges associated with engaging pregnant women in discussions around weight– which all guidelines suggest providers do. Practitioners found it difficult to broach the topic of weight with women, deliver a balance of information, they were often uncomfortable, experienced feelings of blame for victimizing mothers,

and said that patients were often embarrassed when the providers brought up weight. Clearly, more research is needed to uncover practitioners' experiences in implementing the recommendations put forth in the various guidelines, to see how well they can actually be put into practice.

Given the guidelines have only been in circulation for a couple of years, we do not have sufficient evidence to know whether or not the recommendations put forth in the guidelines lead to changes in health outcomes and increased safety of overweight or obese women and their babies. For example, the SOGC recommends that newer intrauterine monitoring technologies like electrohysterography be used with obese pregnant women, but we do not necessarily know the results of using such devices.

## Conclusion

As rates of overweight and obesity have increased in recent years, more attention has been paid to the role that overweight and obesity play on maternal and newborn health. The current review of literature shows that there is a breadth of knowledge about potential physical health implications of maternal overweight and obesity for both mothers and babies. Yet, we know very little about the psychological, emotional and social implications and outcomes of overweight and obesity in pregnant women. We also know little about health providers' experiences of providing care to pregnant women with high BMIs. We found few clinical care guidelines to assist health practitioners in providing the best possible care and support for this group of women. More research is needed to explore the psycho-social aspects of overweight and obesity among pregnant women, including studies that consider the intersections of multiple social determinants in the health and well-being of pregnant women with overweight and obesity. In addition, further research on practitioners' experiences of providing maternity care to overweight and obese women is needed to gain a more complete picture of maternal overweight and obesity.

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