

**The Impact of Overweight and Obesity on Maternal and Newborn Health:  
A Critical Review of the Literature**

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## **Introduction**

Rates of overweight and obesity are increasing dramatically across Canada and in many countries around the world. According to the 2007 Canadian Community Health Survey (CCHS), 4 million people aged 18 or older, representing 16% of the total population, were obese while another 8 million, or 32%, were overweight (Statistics Canada, 2008). These figures were up considerably from the 1980s and early 1990s. As a result, researchers, health care providers and policy makers are paying more attention to the role of overweight and obesity in various diseases, such as diabetes, arthritis, and cardiovascular diseases, and in relation to mental and physical health more generally, including quality of life. In one systematic review of the literature, for instance, 18 health conditions were associated with overweight and obesity (Guh et al., 2009). Although studies on the role of overweight and obesity in depression are few in number and findings are variable, where there is a demonstrated connection, women are more likely than men to be affected (Jorm et al., 2003; McElroy et al., 2004). In other words, there is a plethora of literature examining and demonstrating the relationship between weight and wellness.

One area that has received considerable attention in the literature is the impact of overweight and obesity on maternal and newborn health. Much of this

work utilizes the biomedical model, which defines health as the absence of disease in organs, tissues and cells, and, to a lesser extent, the mind. As a result, we know a good deal about the physical health implications of overweight and obesity in pregnancy. Maternal complications of overweight and obesity include infertility, hypertension, gestational diabetes, caesarean delivery, and hemorrhage (Arendas, Qiu & Gruslin, 2008). Fetal complications of maternal overweight and obesity include fetal distress and death, stillbirth, increased birth weight, and congenital anomalies (Arendas et al.). Further some research has linked maternal overweight and obesity with decreased rates of breastfeeding, which has health implications for both mother and child, including higher rates of childhood obesity (Amir & Donath, 2007).

Without a doubt, the biomedical model has resulted in enormous health advances, including the reduction of maternal and newborn mortality. But it is not sufficient to appreciate fully the relationship between weight and wellness in pregnancy. For instance, studies in this area tend to focus on the health of the fetus or infant, paying scant or no attention to the well-being of the mother. As Cahill has observed, women are sometimes reduced to reproductive “vessels” that need to be managed to ensure the “cure” of a healthy birth and child (Cahill, 2001). Similarly, although we are beginning to understand the psychological,

emotional, and social ramifications of overweight and obesity, we know comparatively little about these dimensions of overweight and obesity in pregnancy. Indeed, much of the research in this area ignores many of the social determinants of health. Few efforts have been made to track and compare rates of overweight and obesity in diverse populations of pregnant women (Cossrow & Falkner, 2004; Scharoun-Lee, Adair, Kaufman & Gordon-Larsen, 2009), or to explore how experiences of overweight and obesity in pregnancy might differ across communities. For instance, we know in Canada that rates of obesity and overweight are significantly higher among Aboriginal than non-Aboriginal peoples (ref), yet there is a dearth of research examining the health and well-being of overweight and obese pregnant Aboriginal women and their newborns.

While the biomedical approach has clearly demonstrated that overweight and obesity in pregnancy have health consequences for both mother and child, much remains to be learned about the causes and experiences of overweight and obesity among pregnant women from various social locations. How does socio-economic status affect the likelihood of being overweight or obese during pregnancy or the ability to address unhealthy weight? Are overweight and obesity in pregnancy experienced differently in diverse ethnic groups? How does the health care system view and respond to women who are overweight or obese

while pregnant? Are overweight and obesity in pregnancy associated with mental as well as physical health consequences? These and other questions represent significant and serious knowledge gaps that must be addressed in the interests of equitable improvements in health for pregnant women and their children.

This review is divided into several sections. The first outlines the methodology for the collection of literature and the second section addresses the measurement of overweight and obesity as a significant limitation of the research and, consequently, of this review. The following sections deal with the health implications of obesity and overweight in pregnancy, starting with the physical health of women and children and moving on to a consideration of some of the social determinants of health. The review closes with a synthesis of findings and recommendations for further research.

## **Methodology**

A search of the literature was carried out starting with combinations of the following search terms: women, fetal, neonatal, pregnancy, overweight, obesity, BMI, outcomes (all words, anywhere in article). The search was conducted using common web browsers (such as Google Scholar), academic databases (such as

PubMed/Medline and Sociological Abstracts), and Government of Canada reports. Within these results, a search was done for terms including race, ethnicity, culture, Aboriginal, indigenous, and marginalized to determine to what extent women from diverse subpopulations are represented in the literature. To assess the extent to which research in this area includes a consideration of the social determinants of health (SDOH), search were carried out using terms such as “social determinants of health”, socioeconomic, psychosocial, discrimination, stigma, shame, and healthcare. Because these searches returned only a small number of studies dealing with women who are pregnant, overweight or obese, and members of diverse populations, the review was expanded to include literature that looked at healthcare issues for women who were overweight or obese and from diverse populations, but not pregnant. The articles at this stage were reviewed and chosen if relevant for at least 2 of the following categories: overweight/obese, pregnant, member of a diverse population, discrimination or stigma. Initially the search was limited to the years since 2005, to gather the most up-to-date research on the subject, but some older articles were included because they were relevant and influential, appearing in a number of bibliographies and references lists.

## Measuring Overweight and Obesity

Measuring overweight and obesity and their relationship to health or illness is not without its challenges. For one thing, there is no clear agreement on how best to measure overweight and obesity. Some researchers argue percentage of body fat is the best measure of healthy weight, while others maintain that waist circumference is better able to identify individuals at heightened risk of weight-related health conditions. The easiest and most economical measure – and therefore the one most commonly used – is 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).

While BMI is widely used, there is a general recognition that as a measure of healthy and unhealthy weight it is far from perfect. For one thing, BMI is often calculated using self-reported measurements of height and weight, which are often inaccurate, leading to miscalculations in as many as many as 30% of cases

(Elgar & Stewart, 2008). For another thing, BMI fails to differentiate between fat and musculoskeletal as sources of weight (Burkhauser & Cawley, 2007).

Some studies have also highlighted the limitations of BMI across diverse populations (Burkhauser & Cawley, 2007; Razak et al., 2007). Because this measure was developed with individuals of European descent, it may not be accurate or appropriate for other ethnic populations (Duncan et al., 2004; Health Canada, 2003; Razak et al., 2007). For example, the gap in rates of obesity between white and African-American women is cut in half when percent body fat rather than BMI is used to measure of healthy weight (Burkhauser & Cawley). It is also unclear whether BMI captures the relationship between weight and wellness. In other words, the point at which weight becomes unhealthy may vary between individuals and across populations. For example, research suggests that the health risks associated with obesity, defined as a BMI of 30 or above, may be greater in particular racial or ethnic groups. Some studies suggest that BMI under-represents the risk of heart disease associated with obesity among Aboriginal peoples in Canada (Razak et al., 2007). These limitations have led some researchers to argue for the development of population-specific BMI scales (Duncan et al., 2004) or the design and use of alternative measures of healthy body weight.

Despite its many drawbacks, BMI is still the most commonly used measure in existing research on overweight and obesity and it is impossible to avoid in a review of the literature. But research using BMI should be viewed with caution.

### **Overweight, Obesity and Maternal Health**

The negative effects of maternal overweight and obesity on the physical health of women and fetal/neonates is well documented. Many literature reviews provide comprehensive overviews of these health issues from a biomedical perspective. Many of the reviews begin in the pre-pregnancy phase with the impact of overweight and obesity on reproductive health (Arendas et al., 2008; Linné, 2004; Sarwer et al., 2006). For instance, overweight and obesity have been implicated in reduced fertility as well as lower success rates for assisted reproductive interventions. Some studies also indicate that a high BMI prior to pregnancy is associated with a heightened risk of gestational diabetes (Torloni et al., 2009).

The list of complications during pregnancy for overweight and obese women is substantial. Well-documented in the literature reviews are gestational diabetes mellitus (GDM), hypertensive disorders blood clots, infections, and

preterm delivery (Arendas et al., 2008; Linné, 2004; Siega-Riz & Laraia, 2006; Sarwer et al., 2006; Yu, Teoh, & Robinson, 2006). Diabetes, in particular, poses significant risks for pregnancy complications, including pre-eclampsia, pre-term birth, caesarean section, and postoperative infections. There is also some indication that women who are overweight or obese may be at risk for multiple pregnancies not related to fertility treatments. (Arendas et al.).

Overweight and obesity also contribute to delivery complications, although opinions differ about the impact they have on length of labour or the need for oxytocin where labour is not progressing (Arendas et al., 2008). The research also suggests that women who are severely 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). It is estimated, for instance, that 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 (Poobalan et al., 2008). Positive outcomes following caesarean delivery are also compromised for overweight and obese women. 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).

Following labour and delivery, overweight and obese women also experience more physical health complications than women with healthy weights. A report on maternal and child health in the United Kingdom, 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). Other post-partum issues that have been linked with overweight and obesity include prolonged hospitalization, incontinence, endometriosis, open wounds, and urinary tract infections (Arendas et al., 2008; Morin, 1998; Sarwer et al., 2006; Smith, Husley & Goodnight, 2008). While not conclusive, some research has also identified a possible relationship between post-partum depression and overweight and obesity (LaCoursiere, Hutton, & Varner, 2007; Krause, Østbye, & Swamy, 2009). Similar findings have emerged with respect to overweight and obesity in the general population, with some research confirming a link to depression and other studies disputing this association (Jorm et al., 2003; McElroy et al., 2004). The lack of clarity around this issue suggests the need for further research.

Interestingly, maternal overweight and obesity have also been identified as potential risks for injury – for both patients and health care workers – when equipment and facilities cannot accommodate large patients (Kirk et al., 2009). Early research in this area needs to be augmented by further research on the management of the health of overweight and obese pregnant women in health care facilities and the health care setting.

### **Maternal Overweight, Obesity and Neonatal Health**

Maternal overweight and obesity are also associated with a variety of health risks for the fetus or neonate (Arendas et al., 2008; Sarwer et al., 2006; Linné, 2004; Smith et al., 2005). Complications include stillbirth, fetal distress, macrosomia (babies who are large for gestational age), neonatal death, and congenital anomalies. Large birth size is associated with fetal distress and injury as well as delivery complications, such as increased risk of caesarean or medically assisted vaginal delivery, and associated risks. 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 congenital anomalies, including cardiac defects, skeletal malformations, and neurological conditions, such as spina bifida (Watkins et al., 2003; Stothard, Tennant, Bell & Rankin, 2009).

Longer term health concerns identified for children whose mothers were overweight or obese during pregnancy include a tendency to overweight and obesity in childhood and adulthood linked to lower rates of breast feeding (Amir & Donath, 2007; Oddy et al., 2006; Catalano, Presley, Minium & Hauguel-de Mouzon, 2009). Higher rates of respiratory illness were also evident among children born to overweight or obese women (Håberg et al., 2009). Infants born to diabetic women, whose condition is often linked to weight, also have a higher likelihood of developing Type II diabetes later in life (Smith et al., 2008; Di Lillo, Hendrix, O’Neill & Berghella, 2008; Yogev & Visser, 2009).

Much of the literature on overweight and obesity in pregnancy focuses on fetal or neonatal health, as in discussions of the health risks associated with gestational diabetes (Kim, Newton & Knopp, 2002). By comparison, the health risks facing mothers, especially those that precede or last beyond pregnancy, receive scant attention. For example, women with gestational diabetes are at increased risk for developing type 2 diabetes postpartum (Buchanan, 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).

### **Maternal overweight, obesity and mental health**

By comparison with the considerable literature on the physical health of overweight and obese pregnant women and their newborns, there is almost no research that addresses their mental health. This knowledge is likely a by-product of the biomedical perspective, which emphasizes physical health, and of the tendency to focus attention on the health of the fetus or infant rather than the mother. Yet the literature on popular and professional attitudes to those who are overweight or obese suggests the potential for significant mental health risks for this group of pregnant women. Stigma and discrimination associated with overweight and obesity are well documented in the literature. Individuals may experience discrimination in education and employment opportunities as well as in their pay levels as a result of being overweight or obesity. According to one study, overweight workers pay rates were consistently lower than their healthy

weight colleagues. (Rhode, 2009; Puhl & Heuer, 2009, McLaren, 2007; Mocan & Tekin, 2009).

In addition, some studies have focused on how overweight and obese individuals are treated in the healthcare system (Puhl & Heuer, 2009; MacLean et al., 2009). Wray and Deery (2008) contend that the biomedical model itself contributes to stigma and discrimination by medicalizing “fatness” and applying clinical labels, such as “morbidly” obese, that have perjorative overtones. This view is supported by a review of literature published between 1990 and 2007, which revealed that health care providers’ attitudes toward overweight patients are largely negative (Budd, Mariotti, Graff & Falkenstein, 2009). Another study found that health care interventions aimed at obesity reduction tended to emphasize personal responsibility rather than environmental factors, thereby blaming and stigmatizing those with unhealthy weights (Maclean et al., 2009). For example, one study suggested that educating women early about the risks of obesity in pregnancy “might provide women with an incentive for implementing and adhering to lifestyle modifications” (Helmreich, Hundley & Varnel, 2008, p.72)” as if change was possible through education alone rather than in combination with broader social action.

Little research has been done that directly examines the treatment of women who are both obese and pregnant. A single Swedish study was identified in this literature search and it advances the suggestion that overweight and obese pregnant women are vulnerable, at risk of being discriminated against and treated in negative ways by health care providers (Nyman, Prebensen & Flensner, 2008). Certainly the literature reviewed here reinforces this interpretation because much of the research implicitly blames women for poor health outcomes by presenting maternal overweight and obesity as exclusively the result of modifiable choices without any consideration of the social determinants of health or the influence of obesogenic environments (Smith et al., 2008; Baughcum et al., 2001). Clearly, much more research is needed in this area of wellness, weight and pregnancy.

### **Maternal overweight and obesity and the social determinants of health**

Despite the wealth of research on the social determinants of health, there is little attention to the determinants in research on overweight, obesity and maternal/newborn health. This literature review uncovered a handful of articles, all of which supported the view that contextual issues, such as ethnicity and

socioeconomic status, need to be factored into explanations of and responses to overweight and obesity in pregnancy. For example, a study carried out in one of Australia's poorest suburbs found a significant relationship between overweight, obesity and poor maternal health and neonatal outcomes as compared with outcomes for new mothers with BMI's defined as healthy (Schrauwers & Dekker, 2009). Other studies have examined the role of racial/ethnic differences in obstetrical care and found that non-white women are likely to have poorer outcomes than white women (Bryant, Worjolah, Caughey & Washington, 2010; Sparks, 2009). Moreover, these differences persisted even after controlling for socioeconomic factors such as educational attainment and healthcare insurance (Ramos & Caughey, 2005). A Canadian investigation of pregnancy outcomes among First Nations Women in Quebec revealed that almost 80% of the population was overweight or obese prior to pregnancy (Brennand, Dannenbaum, & Willows, 2005) Pre-pregnancy weight status as well as excessive weight gain during pregnancy were found to be indicators of poor maternal and infant outcomes.

Although this body of research is small, it demonstrates the need for further investigation of the social determinants of health in overweight and obesity during pregnancy. We need more evidence of how the rates of

overweight and obesity in pregnancy differ across populations as well as how diverse social locations affect health outcomes for these groups of mothers and

The lack of attention to the social determinants of health means that guidelines and recommendations for healthy weights that will optimize outcomes in pregnancy often fail to consider the everyday lives of women. For instance, several of the reviews examined for this paper concluded that interventions for maternal weight management needed to begin before conception (Arendas et al., 2008; Linné, 2004; Derbyshire, 2008; Smith et al., 2008; Siega-Riz & Laraia, 2006; Rasmussen & Yaktine, 2009). Rasmussen suggested that more women need to plan their pregnancies, thereby allowing them to maximize their own health and, by extension, the health of the developing fetus. Clearly lacking in these recommendations is an understanding that privilege may influence the planning of pregnancies. Unintended pregnancies are more common among women who are young, unmarried, members of a minority group, have low income, and less than high school education (Finer & Henshaw, 2006). Furthermore, women in many of these sub-populations are disproportionately affected by obesity (Siega-Riz & Laraia, 2006; Catenacci, Hill & Wyatt, 2009). Even when researchers recognize that the social determinants of health contribute to both healthy and unhealthy weights, the interventions they prescribe sometimes ignore contextual

factors. For instance, one study suggested that “new, creative treatment vehicles, such as the use of phone, internet-based programs, or personal digital assistants, might help overcome some of the potential barriers to participating in or adhering to a behavioural weight control program” (Sarwer et al., 2006, p. 728). If overweight and obese people, including pregnant women, are more likely to have low incomes and limited education it seems unlikely that these types of interventions would be effective.

## **Conclusion**

Research on overweight and obesity in pregnancy has demonstrated conclusively that healthy weights are better for mothers and their babies. Women who are overweight or obese during pregnancy are more likely to suffer short and long term physical health complications than women with healthy body weights. The physical health of the fetus or neonate may also be affected immediately, during gestation and delivery, or in the longer term. This knowledge is an important legacy of the biomedical approach to health and care.

But there are still gaping holes in our knowledge about overweight and obesity in pregnancy, which the biomedical approach has not filled and may not

be able to fill. Simply put, more attention to the social determinants of health is needed if we are to understand why women are overweight or obese during pregnancy and how their weight affects their mental health and social well-being. Moreover, while the biomedical approach can tell us the importance of avoiding overweight and obesity in pregnancy, it has not – thus far – been able to tell us how to achieve this goal. Research that addresses the social determinants of health offers the best chance of understanding and supporting women in diverse social locations to achieve healthier weights for their own benefit as well as that of their children.

### **Research and Policy Recommendations**

Although much has been written about the physical health implications of overweight and obesity in pregnancy, little attention has been paid to establishing the incidence of the condition. This is especially true for specific sub-populations of women who are likely to be at greater risk of overweight and obesity during pregnancy and are therefore more vulnerable to both illnesses and dangerous interventions. The absence of this kind of data in Canada is most glaring for Aboriginal women who experience higher rates of overweight and obesity, but it

is also true for other sub-populations, in various jurisdictions, and for the population as a whole. For example, we can only estimate rates of overweight and obesity among pregnant women in Nova Scotia because data on height and weight are not gathered and/or reported systematically. Policy should be directed to the development of better systems for tracking rates of obesity and overweight in pregnancy, including in diverse populations and locations.

Some of the articles reviewed here suggest the need for preconception counseling to address maternal overweight and obesity. There is no question that preventative approaches to health, including weight management, are more effective and cost effective than treatment interventions. But preventive strategies in this area are unlikely to succeed because this approach ignores the fact that many women are not able to plan their pregnancies and even those who do may not have the resources to help them achieve and maintain healthy weights. It is also clear that existing methods of promoting healthy weights in primary health care settings are not working, which suggests that counseling of women prior to conception may not make a difference. If we hope to help women who are planning or likely to become pregnant to achieve and maintain healthy weights, we need policies that encourage the development of weight management strategies and services that address the social determinants of

health. This is true whether the strategies and services are delivered prior to, during or after pregnancy.

When it comes to maternal health care, the needs of overweight and obese pregnant women are not well understood. Research on the social, emotional and psychological dimensions of health for these women is much needed as is investigation of barriers to care. Certainly equipment and facilities that cannot accommodate larger patients reduce access to maternal health care, but we also need to study the experiences of care among women who are pregnant and overweight or obese. A small body of literature suggests that professional attitudes may discourage overweight and obese pregnant women from seeking medical attention, but we need further study of this phenomenon as well as research on curricula and other training opportunities as well as best practices. Professional, institutional and governmental policies that foster greater understanding of overweight and obesity in pregnancy could go a long way towards addressing barriers arising from stigma and discrimination. It would be important to ensure that cultural competency guidelines and training include attention to overweight and obesity in general as well as among pregnant women.

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