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# **GESTATIONAL WEIGHT GAIN SURVEY FINAL REPORT**

***An Overview of Healthy Eating and Physical Activity  
Behaviours of Pregnant Women in the  
Simcoe Muskoka District Health Unit Area***

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## EXECUTIVE SUMMARY

In their 2009 report, *Weight Gain During Pregnancy: Reexamining the Guidelines*, the Institute of Medicine (IOM) identified associations between excess gestational weight gain (GWG) and adverse birth and maternal outcomes.<sup>1;2</sup> The report includes guidelines for appropriate gestational weight gain ranges and rates, based on pre-pregnancy Body Mass Index (BMI). These guidelines were adopted by Health Canada<sup>3</sup>.

In order to develop a comprehensive health promotion plan related to healthy weight gain in pregnancy, the Simcoe Muskoka District Health Unit (SMDHU) implemented the *Food and Exercise in Pregnancy Survey*. Eligible participants were at least 18 years of age, 14 or more weeks gestation, could read English and were receiving antenatal care from a health care provider (HCP) who practiced within the SMDHU catchment area. A total of 457 surveys were analyzed.

### Body Mass Index (BMI) and Gestational Weight Gain

Approximately 54% of our sample entered pregnancy at a BMI<sup>4</sup> which fell within the normal weight category; 42% entered pregnancy at a BMI which fell within either the overweight category or the obese category. Only 5% of the pregnant women surveyed had a pre-pregnancy BMI defined as underweight.

Fifty-eight per cent (58%) of the sample were exceeding their recommended GWG rate at the time of the survey; 23% had already exceeded the upper limit of their recommended GWG range<sup>3</sup>.

### Nutrition Behaviour

Thirty-six percent reported consuming fewer than the recommended 7-9 servings of Vegetables and Fruit<sup>5</sup>; 34% reported consuming more than 9 servings. Although women consumed an average of eight servings of Vegetables & Fruit, two of these servings were from fruit juice. Forty percent of pregnant women consumed the recommended 2-3 servings of products from the Milk and Alternatives food group<sup>5</sup>. Forty-seven percent of pregnant women over-consumed Milk & Alternatives. The average number of Milk & Alternatives servings consumed was 3.5, with 43% of these servings being any type of cheese. Cheese and fruit juice may contribute to excess calorie intake.

Pregnant women were more likely to exceed their recommended GWG rate if they reported consuming fast food more frequently than “rarely or never”.

## Physical Activity

Thirty-two per cent of women surveyed reported engaging in moderate exercise for at least 15-30 minutes 3-4 times per week, as recommended in the Joint Society of Obstetricians and Gynecologists of Canada (SOGC)/Canadian Society for Exercise Physiology (CSEP) Clinical Practice Guideline: *Exercise in Pregnancy and the Postpartum Period*<sup>6</sup>. Twenty-eight per cent reported rarely or never engaging in moderate exercise. Over half of our sample (57%) reported they engaged in less moderate physical activity since pregnancy began.

## Barriers to Healthy Eating and Exercise

Just over half (52%) of women reported they were told by their health care provider to exercise. A similar proportion was told to follow Canada's Food Guide<sup>5</sup> (55%) during their pregnancy. A smaller proportion of women were given specific advice.

## Prenatal Health Information

The top three preferred sources of prenatal health information were: one-to-one discussion with Health Care Providers (HCPs) (77%), websites and books written by health experts (41%) and in-person prenatal classes (40%).

## Conclusions

Since a large proportion of pregnant women in Simcoe Muskoka are exceeding their recommended GWG rate, it is clear many women need guidance and support to achieve healthy weight gain during pregnancy. Eating according to *Canada's Food Guide*<sup>5</sup>, including the recommended number/size of servings for pregnant women and following the recommendations for physical activity outlined in the joint SOGC/CSEP Guideline<sup>6</sup> will contribute to their success. Discussing strategies to decrease fast food consumption may support the achievement of recommended weight gain rates and ranges.

Working collaboratively to support pregnant women to achieve healthy weight gain during pregnancy is a critical component of a comprehensive health promotion plan. In order to optimize maternal and child health outcomes related to gestational weight gain, health care providers must have the tools and resources required to address healthy lifestyle recommendations for pregnant women, calculate pre-pregnancy BMI, communicate individual GWG range and rate, plot GWG throughout pregnancy and make appropriate referrals to registered dietitians and other community supports.

## INTRODUCTION

Health promotion planning to address gestational weight gain of pregnant women in Simcoe County and the District of Muskoka began at the Simcoe Muskoka District Health Unit in 2011. This planning was initiated as a result of the review of the Institute of Medicine report, *Weight Gain During Pregnancy: Reexamining the Guidelines* (IOM, 2009), which identified associations between excess gestational weight gain and negative birth outcomes such as increased risks of caesarian sections, preterm births, and large for gestational age and high birth weight babies. Postpartum weight retention was also noted to increase body mass index in the long-term which may increase their future chronic disease risk.<sup>1;2</sup> The IOM released new guidelines for appropriate gestational weight gain in 2009 and these were adopted by Health Canada<sup>3</sup> that same year.

Gestational weight gain (GWG) is considered a modifiable risk factor as pregnant women can change their eating and physical activity behaviours during pregnancy to achieve current weight gain recommendations. GWG falls within the mandated identified outcomes and requirements of the Reproductive Health Program as directed by the 2008 Ontario Public Health Standards<sup>7</sup> (OPHS). Please see [Appendix 1](#) to see how gestational weight gain fits within the OPHS.

Beginning in the fall of 2009, a background document describing the current issue of GWG was drafted by internal staff and the results were presented to the Reproductive Health (RH) Program and Healthy Babies, Healthy Children (HBHC) Program teams of SMDHU.

The RH Program team began a situational assessment process in consultation with The Health Communications Unit, University of Toronto.<sup>8</sup> Although some information about the eating and physical activity behaviours of pregnant women was available from cohorts in the United States, the United Kingdom and Australia, very little information could be found about Canadian women. As planning of health promotion strategies began at the Health Unit in 2009, it was clear that current specific information about the eating and physical activity behaviours of local pregnant women was required.

Knowing more about the eating and physical activity behaviours of pregnant women in Simcoe Muskoka, as well as their information needs and preferences would provide the information required to support the development of comprehensive reproductive health education strategies to address the issue of healthy gestational weight gain.

## PURPOSE

The purpose of this research was to investigate the nutrition and physical activity behaviours of pregnant women in Simcoe Muskoka, their motivators and barriers related to nutrition and physical activity, as well as how and where they prefer to access information about pregnancy.

Specifically, the research set out to answer the following questions about pregnant women in Simcoe Muskoka:

1. What proportion had a pre-pregnancy BMI  $\geq 25$  (overweight or obese)?
2. How do they feel about the amount of weight they have gained during their current pregnancy?
3. What are the perceived motivators and barriers to current healthy eating and physical activity behaviours?
4. What proportion changed their vegetable and fruit and milk and alternative consumption behaviours compared to before the pregnancy was confirmed?
5. Has the proportion engaging in moderate physical activity changed significantly since before pregnancy was confirmed?
6. What proportion gained weight in excess of their recommended weight gain **rate**, according to their pre-pregnancy BMI?
7. What proportion gained weight in excess of their recommended weight gain **range**, according to their pre-pregnancy BMI?
8. Are there significantly more pregnant women in Simcoe Muskoka who are meeting the recommended number of vegetable and fruit servings and milk product servings who are also achieving the recommended **rate** of weight gain compared to those exceeding their rate?
9. Are there significantly more pregnant women in Simcoe Muskoka who are meeting the recommendation for moderate exercise who are also achieving the recommended rate of weight gain compared to those exceeding their rate?
10. In what format(s) do they receive pregnancy information from their health care provider?
11. In addition to the prenatal information currently available, how would they prefer to access pregnancy information?



## BACKGROUND

In the fall of 2009, Health Canada updated its Gestational Weight Gain recommendations<sup>3</sup> to align with the Institute of Medicine (IOM, 2009) *Weight Gain During Pregnancy: Re-examining the Guidelines*<sup>1</sup> report and the results of the Maternity Experiences Survey (MES)<sup>9</sup>, a national survey implemented by the Public Health Agency of Canada. One of the key additions to Health Canada's revised guidelines was a weekly gestational weight gain **rate** for underweight, normal weight, overweight and obese women, starting in the second trimester. The recommended weight gain ranges are the same as the previous guidelines except for the addition of a recommended range for obese pregnant women. See [Table 1](#) for more information.

Table 1: Canadian Gestational Weight Gain Recommendations

Pre-pregnancy BMI category	Mean* rate of weight gain in the 2 <sup>nd</sup> and 3 <sup>rd</sup> trimester		Recommended** range of total weight gain	
	kg/week	lb/week	kg	lbs
BMI < 18.5 Underweight	0.5	1.0	12.5-18	28-40
BMI 18.5-24.9 Normal 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

\* rounded values

\*\* calculations assume a total of 0.5- 2 kg (1.1-4.4 lbs) weight gain in the first trimester

\*\*\* a narrower range of weight gain may be advised for women with a pre-pregnancy BMI of 35 or greater.

Individualized advice for weight gain is recommended for these women.

Source: Health Canada, 2009

Simcoe Muskoka District Health Unit (SMDHU) is one of 36 public health units/departments in the province of Ontario, Canada. Its jurisdiction ranges from the Township of Bradford West Gwillimbury in the south, to the Township of Collingwood in the west, the Town of Huntsville in the North, to Ramara Township in the East. SMDHU has seven offices, located in Barrie (main office), Gravenhurst, Huntsville, Orillia, Midland, Collingwood and Cookstown. Please see [Appendix 5](#) for the catchment area map.

In Ontario, the self-reported overweight and obesity estimate for women of reproductive age (age 20-44) is 36% (95% CI: 33.9%-37.7%). In SMDHU, estimates of combined overweight and obesity rates for women in this age group based on self-reported heights and weights is 48% (95% CI: 38.2%-57.2%)<sup>10</sup>. This is significantly higher than the provincial estimate.

The only Canadian data describing gestational weight gain comes from the Maternity Experiences Survey<sup>9</sup> (MES,2009). This Canadian survey reported that 55% of women who began pregnancy as either overweight or obese gained in excess of their recommended gestational weight gain range, and 41% of normal weight women also gained an excess amount of weight during pregnancy. A sub-analysis of the MES data<sup>11</sup> found 62-69% of Ontario women gained an amount of weight that is outside their recommended gestational weight gain range (23% below and 42% above) as defined by their pre-pregnancy body mass index (BMI).

The 2009 Institute of Medicine report<sup>1</sup>, based on a 2008 systematic review<sup>2</sup> found birth weights, pre-term births, caesarean deliveries and postpartum weight retention were associated with gestational weight gain. In the County of Simcoe and the District of Muskoka, the rates of several birth outcomes associated with excess gestational weight gain have increased over time. Between 1986 and 2007, there are significantly more large for gestational age (LGA) infants (12.3 %) compared to small for gestational age (SGA) infants (7.5%) born in Simcoe Muskoka<sup>12</sup>. Also, the rates of both pre-term births (1986-5.2% 2007-7.3%)<sup>13</sup> and caesarean deliveries (2003-28.6%; -2009-29.8%)<sup>14</sup> have increased, although these differences are not statistically significant.

In 2003, the Society of Obstetricians and Gynecologists of Canada (SOGC) and the Canadian Society for Exercise Physiology (CSEP), released a joint clinical practice guideline (CPG), *Exercise in Pregnancy and the Postpartum Period*<sup>6</sup>. This CPG, endorsed by Health Canada, provides general recommendations about aerobic and strength-conditioning exercises as part of a healthy pregnancy, and identifies the Physical Activity Readiness Medical Exam for Pregnancy (PARmed-X for Pregnancy)<sup>15</sup> as the tool for health care providers to use for screening pregnant women. The questions included in the survey are based on the PARmed-X recommendations for Frequency, Intensity, Time and Type (FITT) of exercise during pregnancy. The PARmed-X recommends that “aerobic

exercise should be increased gradually during the second trimester from a minimum of 15 minutes per session, 3 times per week, to a maximum of 30 minutes per session, 4 times per week.” Women should exercise at the appropriate ‘rate of perceived exertion’ of ‘somewhat hard’, which is considered moderate intensity.

There is limited population level data that links gestational weight gain to eating and physical activity behaviours of pregnant Canadian women. One small study by Cohen et al (2010) of 81 pregnant women in Montreal, Quebec, found most pregnant women would be classified as “sedentary” (34%) or “low active” (36%)<sup>16</sup>. Weekly gestational weight gain was negatively associated with the mean number of steps taken. These authors also found less than 30% of their sample achieved their recommended amount of (walking) steps.

An American study using Behavioral Risk Factor Surveillance data from 2000 found that 33% of pregnant women performed no physical activity and 37% engaged in irregular physical activity (less than 150 minutes per week at a low intensity)<sup>17</sup>. A similar study using data from the 2003 to 2006 National Health and Nutrition Examination Survey (NHANES) (n=356) found American pregnant women spent 57% of their time in sedentary activities<sup>18</sup>.

Eating Well with Canada’s Food Guide<sup>5</sup> currently recommends that pregnant women consume an additional 2-3 extra servings from three of the four food groups to meet additional nutrient and energy increases required during pregnancy. This recommendation is based on the assumption that women are following the Eating Well with Canada’s Food Guide pattern of eating<sup>19</sup>.

Olsen and Strawderman found women who consumed three or more servings of fruit and vegetables per day gained significantly less weight than those who consumed fewer servings<sup>20</sup>. An American study<sup>21</sup> found total energy intake, and the consumption of dairy and fried foods to be significantly associated with excessive GWG. Vegetarian style eating, walking and vigorous physical activity were found to be protective against excessive GWG.

Conflicting information exists as to what pregnant women eat currently. An Australian study (2010)<sup>22</sup> found low consumption of vegetables and fruit and high consumption of soft drinks and fast food during pregnancy. A study from the United Kingdom<sup>23</sup> and the United States<sup>24</sup> found little change in vegetable and fruit consumption, increased intake of high calorie foods and increased consumption of dairy foods, red and processed meats as pregnancy progressed. This author noted minimal change in dietary behaviours in pregnancy versus pre-pregnancy or as pregnancy progressed<sup>23-26</sup>.

## METHODOLOGY

A survey of pregnant women who accessed prenatal health care providers in Simcoe County and the District of Muskoka was conducted during March and April of 2011. All pregnant women who were age 18 and over, at least 14 weeks gestation and could read English were eligible for this study. Internal Simcoe Muskoka District Health Unit policies for confidentiality and privacy were followed. The research survey process was approved by the Family Health Service Director, the SMDHU Medical Officer of Health and the SMDHU Research Review Committee.

### Survey Design

The self-administered survey tool included a total of 31 questions. It was divided into 5 sections covering the following topics; demographics, height and weight, physical activity, nutrition and sources of prenatal health information.

The survey tool was developed from a variety of sources, and validated questions were included, where possible. Questions about height and pre-pregnancy weight were included to assess pre-pregnancy BMI. Although often an underestimation (especially among those with a BMI  $\geq 25$ )<sup>27</sup>, self-reported heights and weights have been found to closely approximate measured BMI from medical records for women of reproductive age<sup>28</sup>. The food recall questions were adapted from a recent study conducted by Dr. Isabelle Giroux and Jennifer MacLellan from the Brescia University College, University of Western Ontario. Food items belonging in the Vegetables and Fruit food group and the Milk and Alternatives food group from Eating Well with Canada's Food Guide (2007) were listed within the food recall questions to act as memory prompts for the pregnant women.

There is some evidence that women may be more open to improving the quality of their diet during pregnancy compared to other times within the lifecycle<sup>29</sup>. Therefore, questions about the changes in amount of foods eaten during pregnancy, adapted from Olsen and Strawderman<sup>20</sup>, were included. Nutrition and physical activity motivator and barrier questions were developed by reviewing the current evidence base of factors that influence these behaviours. The remaining questions about frequency of consumption of breakfast, sugar-sweetened beverages, commercially prepared baked products, processed meats, fast food and fried food were taken from an adaptation<sup>30</sup> of the PRIME screen tool, as implemented by Brawarsky et al.<sup>31</sup>. An additional question specific to frequency of consumption of ice cream was added using the same wording and format as the other questions. The physical activity questions were adapted from the Physical Activity Readiness Medical Exam (PARmed-X) for Pregnancy<sup>15</sup>, an evidence-based tool which provides Canadian women with practical prescriptions for participating in physical activities during pregnancy. The prenatal information questions were adapted from questions used

in the Maternity Experiences Survey<sup>9</sup> and the Early Prenatal Health Education Report-Community Survey<sup>32</sup>.

The resulting survey was six pages in length. Although not a pre-validated tool in its entirety, many questions on the survey were adapted from other validated surveys and tools such as the PrimeScreen tool<sup>33</sup> and the 2006 Canadian Census<sup>34</sup>. The survey was pretested internally with SMDHU staff, externally with five pregnant women from SMDHU prenatal classes and six pregnant participants of the Canada Prenatal Nutrition Program (CPNP). Small changes were made based on the feedback from the pre-testing.

## Recruitment

In the Simcoe Muskoka District Health Unit catchment area, there were approximately 4,922 births (live births and stillbirths)<sup>35</sup> and 1,089 therapeutic abortions in 2007<sup>36</sup>. This equals 6,011 total pregnancies. With  $n=6,011$  and using a margin of error of 5% and a 95% confidence level, a sample size of **361** was calculated as the minimum number of surveys that needed to be completed in order to be representative of all pregnant women in Simcoe Muskoka at the time the survey was distributed. The number of perinatal deaths was not included in the sample size calculation.

Nine Public Health Nurses (PHNs) of the Reproductive Health Program, representing all of the seven SMDHU offices, created local listings of health care providers (HCP) in their area. The *a priori* inclusion criteria for HCPs were those who might reasonably be expected to provide primary care to pregnant women, and could implement our survey with their pregnant patients/clients. Local knowledge of HCPs practicing in their communities, as well as the current listing of HCPs maintained by SMDHU, were used to create these lists. The lists were then combined to create a master list. This master list of 329 HCPs included family practitioners, midwives and obstetricians in Simcoe County and the District of Muskoka.

Since our list did not identify which of the 329 HCPs provide primary care to pregnant women in Simcoe County or the District of Muskoka, Public Health Nurses contacted all 329 HCPs. Of the 329 HCPs contacted, 248 family practitioners, midwives and obstetricians in Simcoe County and the District of Muskoka met our inclusion criteria.

At each HCP office, Public Health Nurses gathered information about the anticipated number of pregnant women seen per week. Information was recorded on a documentation tool developed specifically for documenting the survey implementation process. During the initial contact, each HCP office was provided a package containing a letter signed by the SMDHU Medical Officer of Health which provided information about the survey, a consent

form to be signed by the HCP, a copy of the survey, an information letter for the mothers, a copy of instructions for office staff, and a list of resources related to gestational weight gain ([Appendix 3](#)). PHNs referred to a prepared summary sheet describing the research project to answer any questions about the survey implementation process. Office staff was informed that they would be provided with a \$10 dollar grocery voucher in appreciation of their support of the survey implementation process. The office staff was told that the PHN would be following up in one week to determine whether or not the HCP had consented to participate in the survey implementation.

If a HCP consented to participate, the PHN asked about the number of office staff who would be involved in handing out surveys (to determine the number of grocery store vouchers needed), and how many pregnant women would typically be seen in one week (to determine the number of surveys the office would receive). The PHN then arranged to meet with the office staff to provide the required supplies and share the process for the survey implementation.

During the second visit, the PHNs brought the supplies needed for the survey and provided orientation to the office staff. Specifically, they brought a survey box containing the required number of \$10 grocery vouchers for office staff, canvas bags for the mothers which contained the Family Health Service rack card (which describes the Health Unit services available to support pregnant women), survey packages (containing a numbered survey and information letter), measuring cup images and the instruction sheet for office staff. The PHN was expected to pick up the consent form, signed by the HCP, before survey implementation began.

## **Data Collection**

The data collection period ran from February 28 to April 21, 2011. The total number of participating HCP offices was unknown at the beginning of the data collection period as not all consents were received prior to the initiation of the data collection period. Due to difficulties collecting all the required consents and/or scheduling issues for some HCP offices (i.e. the office was closed for a period of time), a staggered time period for data collection was implemented with the goal of offering each HCP a one week supply of surveys. HCP offices may have had between two to seven weeks during which they could offer a survey to an eligible patient. Decisions regarding dates to pick up the surveys in the HCP offices were based on PHN communication with the office staff about the rate of completion of the surveys provided. If the office staff reported that they still had blank surveys, additional time was given to that office. The local PHN picked up the one week supply of surveys from offices that had completed them and returned them to the SMDHU main office. None of the HCP offices received additional surveys. The PHNs contacted the participating offices periodically during the data collection period to provide support as

needed. The data collection period was scheduled to end once 361 completed surveys were collected, or by April 21, 2011, whichever came first.

All surveys were coded from 000-800 so they could be tracked during transport to and from each health care provider. Coding numbers were present on the envelope for the survey package and the survey only. Survey packages were provided to each respondent in an unsealed envelope. Each envelope had a label with general instructions and contained a copy of the survey and a thank-you letter addressed to the woman. An anonymous consent process was used and no identifying personal information was on the information letter or the survey.

The office staff, using pre-scripted instructions ([Appendix 4](#)), asked all eligible pregnant women who entered their office for an appointment with their HCP if they were interested in participating in this voluntary survey. The staff described that it would take about 10-15 minutes to complete the survey, and that participants would receive a canvas bag with the SMDHU logo on it. If a woman declined to participate, the office staff marked an X on the envelope and placed it in the box with the completed surveys. Women who consented to participate received the survey package along with a sheet with coloured measuring cup images demonstrating serving sizes, a pen and a canvas bag containing the Family Health Service rack card bearing the SMDHU Health Connection phone number. The survey was completed while the women waited to be seen by their health care provider.

Pregnant women inserted their completed surveys into the envelope provided and sealed it shut. This instruction was given verbally by the office staff (included in their script), in the information letter for the mothers and on a label on the front of the envelope. The information about privacy legislation was also on the information letter and the envelope label. Women were asked to hand back the survey to the office staff when finished or if they were unfinished and were called to their appointment. Women were asked not to take the survey out of the health care provider office.

PHNs reported the number of completed surveys to the Reproductive Health Program Assistant during scheduled check-in dates.

Completed surveys were stored in the HCP office in a secure, locked location. All surveys (complete and incomplete) were picked up by the local PHN. The data collection period ended on April 21, 2011.

The HCP office staff confirmed the code numbers on surveys to be returned to the Health Unit, and informed the PHN. The PHN then transported the sealed envelopes to the nearest SMDHU office by car. PHNs from all offices except the Barrie office then put the



surveys into the SMDHU courier process or delivered the surveys to the Barrie office in person. Upon receipt, the Reproductive Health Program Assistant confirmed receipt of the correct number of surveys, with the correct codes.

Completed surveys and consent forms were stored within SMDHU in a secure, locked filing cabinet. The database was stored on a secure drive in the SMDHU network. The data will be stored for seven years as per the SMDHU Research Record Retention Recommendations and will be disposed of using the electronic purging method. Consent forms from the health care professionals will be retained for one year and then shredded.

## **Data Entry**

Data was inputted by two dietetic interns from the Northern Ontario Dietetic Internship program, a program housed by the Northern Ontario School of Medicine. The SMDHU Research Analyst developed the Microsoft Access database and trained each intern along with another study author (BB). To ensure data entry consistency, the interns wrote notes for any question or decision that was made during the inputting process and communicated these to BB. Once the intern placement period of one week was over, the remaining surveys were inputted by a program assistant from the Simcoe Muskoka District Health Unit, after training from BB.

The surveys were stored in a locked filing cabinet when they were not being inputted. The Research Analyst checked for inputting errors by randomly selecting hard copy coded surveys and comparing them with the corresponding database entry. All signed HCP consent forms were stored as per the SMDHU nursing documentation guidelines.

## **Statistical Analysis**

Frequencies were calculated for all survey questions. Further analysis included cross tabulations, means, medians and ranges. Selected data were analyzed by pre-pregnancy BMI and by trimester. Statistical analysis was performed using both Excel and SPSS<sup>37</sup>. Chi-Square tests of significance were used where appropriate.

Women were asked if they had given birth before, and parity was defined as either nulliparous (0 live births) or multiparous (one or more previous births). Parity was analyzed overall as frequencies, by mean age of mother and by gestational weight gain rate.

Gestational week was calculated using information supplied on the survey that asked for today's date and for the baby's due date.



### Calculating BMI

The following formula was used to calculate Body Mass Index:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ <sup>4</sup>. Women were asked to report their height, either in metres and centimetres or feet and inches. Height in centimetres was entered into the database, and this was later converted to metres. They were asked to report their pre-pregnancy weight (to determine pre-pregnancy BMI), and their weight at the time the survey. Weight was reported in either kilograms or pounds. Weight in kilograms was entered into the Access database during data entry. Women with a pre-pregnancy BMI <18.5 were defined as underweight, 18.5-24.9 as normal weight, 25-29.9 as overweight and 30 and over as obese. Gestational weight gain ranges and rates were defined as per Health Canada's recommendations<sup>3</sup> ([Table 1](#)).

### Calculating the GWG Rate

In order to measure whether women were above, below or within their recommended gestational weight gain **rate**, an adaptation of Laraia et al (2010)<sup>38</sup> adequacy of gestational weight gain ratio was used. It was calculated using pre-pregnancy BMI categories ([Table 1](#)) and was a ratio of actual weight gain divided by the recommended weight gain determined using Canadian Gestational Weight Gain Recommendations<sup>3</sup> ([Table 1](#)) for each BMI range. Actual weight gain was defined as difference between "my weight now" and "my weight before pregnancy".

To determine the recommended GWG rate, the following recommended first trimester weight gains were used: 2.0 kg, 1.5 kg, 1.0 kg and 0.5 kg for underweight, normal weight, overweight and obese women respectively. Recommended weight gain rates used were 0.5 kg, 0.4 kg, 0.3 kg and 0.2 kg for underweight, normal weight, overweight and obese women respectively. A ratio > 1.2 was defined as gaining above Health Canada's recommended weight gain **rate** and a ratio of < 0.8 was defined as gaining below Health Canada's recommended weight gain **rate**. Adequacy of gestational weight gain was then categorized to determine inadequate and excess weight gain rates based on Health Canada's BMI specific pregnancy weight gain rate recommendations.

Recommended weight gain was calculated using the following formula:

Recommended first trimester total weight gain + ([gestational week the day the survey was completed-13 weeks] x rate of weight gain recommended for the second and third trimester).

For example:

A hypothetical pregnant woman with a pre-pregnancy BMI of 23 (i.e. is in a normal weight range, see Table 1) is 25 weeks gestation and has gained 13.5 kg since conception: Using the GWG rate information for normal weight women (Table 1), the following equation can be created:

$$=1.5 \text{ kg} + (25-13 \text{ weeks gestation}) \times 0.4 \text{ kg/wk}$$

$$=1.5 \text{ kg} + (12) \times 0.4$$

$$=6.3 \text{ kg}$$

Using the ratio formula of:

$$\text{Actual weight gain (13.5 kg)} / \text{Recommended weight gain (6.3 kg)} = 2.1$$

Since this value is larger than the 1.2 value that defined exceeding the GWG rate, this women would be placed in the exceeding the GWG rate category.

### Physical Activity

The PARmed-X for Pregnancy<sup>15</sup> physical activity recommendation of engaging in moderate exercise for 15-30 minutes 3-4 times per week was used as the standard. Two questions were cross tabulated to get this information: Question 12 which asked how often women exercise per week with Question 13 which asked how long they exercise each time. This data was further analyzed by gestational weight gain rate and tested for significance using Chi-Square tests.

### Food Consumption

Meeting *Eating Well with Canada's Food Guide*<sup>5</sup> (2007) recommendations for pregnancy for Vegetables and Fruit consumption was defined as 7-9 servings per day and for Milk and Alternatives as 2-3 servings per day.

Responses to the Vegetables and Fruit recall questions were coded as 0 if boxes were checked but no serving numbers were written. Twenty servings was the implausible number used by the Canadian Community Health Survey (CCHS)<sup>39</sup> cycle (2.2) for nutrition. Therefore, when a survey respondent reported 20 or more Vegetable and Fruit servings, this was considered implausible and their responses to this question were excluded from all analyses. Seven surveys had an implausible number of servings of Vegetables and Fruit were therefore excluded. The reported number of servings of milk products from the same seven surveys was also excluded, as it appeared that responses given to both questions on those surveys were unrealistically overestimated.

A range of the number of servings and the mean consumption of Vegetables and Fruit (both separate and combined) and Milk or Alternatives was calculated. The mean number of servings of fruit juice consumption was also calculated. Descriptive statistics were provided for cheese alone, including mean cheese intake.

Total Vegetable and Fruit intake (combined) was recoded as 'below', 'within' or 'exceeding' recommended amounts. This data was cross tabulated with gestational weight gain rate and tested for significance using Chi-Square tests. The same process was followed with Milk and Alternatives intake.

To determine whether the mean number of vegetable and fruit servings consumed significantly affected gestational weight gain rate, those 'below' 'within' and 'exceeding' the recommended number of vegetable and fruit servings and those 'below' 'within' and 'exceeding' the rate were cross tabulated.

Survey Questions 20-26 asked respondents if they ate breakfast, and if they consumed any of the following: sweetened beverages, fast food, commercially prepared baked products, deep fried foods, processed meats and ice cream. These were analyzed as frequencies. They were then cross tabulated by whether they were below, within or above the recommended gestational weight gain rate and then analyzed using Chi-Square tests to determine statistical significance.

### **Information Sources**

The questions about information sources were multiple response (a respondent could select multiple information sources) and were analyzed accordingly in SPSS.

### **Socio-Demographic Information**

Age, education and income data were collected. During analysis, the age data was grouped into the following categories (<20, 20-24, 25-29, 30-34, 35-39, 40+) to be consistent with Statistics Canada age groupings. Mean age and mean age by parity were calculated.

## RESULTS

A total of 124 consents were received from 248 eligible prenatal health care providers. This resulted in a rate of 50% of eligible health care providers consenting to implement the survey in their office.

A total of 883 surveys were distributed to the HCP offices; 363 were returned unused, 20 were returned marked as refused and PHNs reported that 14 were not returned to office staff. Demographic information for the 20 women who refused to participate was not available.

Seven surveys were excluded because the respondents completed sample surveys rather than coded surveys. After data entry, an additional 22 surveys were excluded because they were completed by pregnant women who were less than 14 weeks gestation or were under the age of 18. The final number of surveys used for analysis was 457.

The following empirical equation was used to determine the survey response rate (RR) and assumed 10% of the eligible sample was not asked to complete the survey.

$$\text{Response Rate} = \frac{\text{Completes}}{\left( \text{Completes} \right) + \left( \frac{\text{Completes}}{\text{Completes} + \text{Not Qualified}} \times \left( \text{Not Contacted} + \text{Refused} \right) \right)}_{40}$$

Completes=457

Not qualified=29 (7+ 22)

Not contacted=49 (486 x 10%)

Refused=34 (20 +14)

This created an equation of 457/535.02 resulting in a response rate of 85%.

## Demographics

Table 2: Demographics

N-457	Survey Results	SMDHU Comparison <sup>i, ii, iii</sup>
<b>Parity</b> (n=455)	(%)	(%)
Nulliparous (first time mothers)	52	43
Multiparous	48	57 (n=4890)
<b>Geographic Location</b> (n=457)	(%)	(%)
Simcoe County	91	90
District of Muskoka	9	10
<b>Age</b> (n=456)		
Mean:	29	29
Range:	18-41	14-46
Mean age nulliparous mothers	28	27
Mean age multiparous mothers	30	31
<b>Age Ranges</b>	(%)	(%)
18-19	3	3 <sup>iv</sup>
20-24	16	17
25-29	37	30
30-34	30	31
35-39	12	16
40+	1	2
<b>Trimester</b> (n=447)	(%)	
Second	41	No data
Third	59	Available
<b>Surveys by HCP type</b> (n=457)	(%)	(%)
Family Physicians	51	55
Obstetricians	27	69
Midwives	21	10
<b>Education</b> (n=434)	(%)	(%)
Less than high school	7	11
High school diploma	25	30
Registered apprenticeship/trades	4	6
College diploma	35	32
University/graduate degree	29	21
<b>Household Income</b> (before tax) <sup>v</sup> (n=389)	(%)	(%)
Less than \$15,000 - \$49,999	35	30-40
\$50,000 - \$79,999	28	25.5-28
\$80,000 - \$99,999	17	13-15
More than \$100,000	20	22-27

We sampled an almost equal proportion of nulliparous (first time mothers) and multiparous women. However, we sampled more first time mothers compared to the proportion of first time mothers thought to live in Simcoe Muskoka (Table 2).

<sup>i</sup> Parity, geographic location and age for SMDHU comparison are from 2007 Ontario Livebirth Database, Ontario Ministry of Health and Long-Term Care

<sup>ii</sup> Surveys by HCP type for SMDHU comparisons are from Niday 2010, BORN Ontario. Values do not add up to 100% as mothers can see more than one health care provider

<sup>iii</sup> Education for SMDHU comparison are from the 2006 Canadian Census for females aged 20 years and over

<sup>iv</sup> The proportion of women aged less than 18 years is 1%. Totals for this column do not add to 100% due to rounding

<sup>v</sup> Household Income for SMDHU comparison is from the 2006 Canadian Census. Ranges are provided to include proportions of private households and economic families. Economic family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. A couple may be of opposite or same sex. Foster children are included. Private households refers to a person or a group of persons who permanently reside in the same dwelling

A smaller proportion of pregnant women in Midland and South Simcoe local office areas completed our survey compared to the proportion of pregnant women accessing prenatal care providers in those areas. A larger proportion of pregnant women in the Orillia and Collingwood areas completed our survey compared to the proportion of pregnant women accessing prenatal care in those areas ([Table 3](#)). Overall, 91% (n=414) of the surveys were completed in the offices of HCPs with practices in Simcoe County, and 9% (n=43) came from HCPs with practices in the District of Muskoka. This is similar to the estimated proportion of pregnancies in Simcoe County compared to the District of Muskoka ([Table 2](#)).

The mean age of our sample was 29 years (n=456). This is also the mean age of pregnant women living in Simcoe Muskoka ([Table 2](#)). The mean age of nulliparous women was slightly higher, and the mean age of multiparous women was slightly lower in our sample, compared to the mean ages of these groups of pregnant women in Simcoe Muskoka.

The majority of women sampled were in the 25-34 age group (67%, n=307). Nearly 20% of our sample were between the ages of 18-24 (20%, n=89) and 13% (n=60) were age 35 or greater.

More women completing the survey were in their third trimester (59%) (n=262) compared to the second trimester (41%).

Fifty-one per cent (n=235) of surveys were completed in family physician offices, 27% (n=124) were completed in obstetrician offices and 21% (n=98) were completed in the offices of midwives ([Table 2](#)).

The majority (68%) (279/434) of our study participants had some form of post-secondary education. Only 7% of the respondents had a high school diploma or less. A majority (65%) had a before-tax household income of \$50,000 or more.

Table 3: Comparison of Estimated % of Pregnancies by SMDHU local office area to % of surveys received by local office area

SMDHU Local Office Area	% of pregnancies by local office area <sup>vi</sup>	% surveys by local office area
Barrie	37	34
Midland	8	3
Collingwood	10	16
Cookstown	23	8
Gravenhurst + Huntsville <sup>vii</sup>	9	9
Orillia	13	29

## Behavioural Risk Factors

Overall, 17.5% (80/457) of our sample reported smoking during pregnancy; 13% (60/457) reported smoking daily. Among daily smokers, 40% (24/60) smoked 1-5 cigarettes per day, 48% (29/60) smoked 6-10 cigarettes per day and 12% (7/60) smoked 11 or more cigarettes per day ([Table 4](#)).

Table 4: Behavioural Risk Factors

Study Participants	
Smoking during Pregnancy (n=457)	(%)
Any cigarette smoking	18
Daily cigarette smoking	13
Moderate Exercise Frequency (N=455)	(%)
Rarely or never	28
1-2 times a week	41
3-4 times a week	22
More than 4 times a week	9
Moderate Exercise Time (N=457)	(%)
Less than 15 minutes	25
15-30 minutes	53
More than 30 minutes	23

<sup>vi</sup> Reflects the location of the HCP offices by local office area and not the residence of the pregnant woman.

<sup>vii</sup> Gravenhurst + Huntsville local offices are in the District of Muskoka. The remaining offices are in Simcoe County.

Study Participants	
Vegetables and Fruit servings (n=423)	
Mean # servings per day:	8
Proportions compared to Recommendation <sup>viii</sup>	(%)
Below:	30
Within:	36
Above:	34
Fruit juice servings (n=223)	
Mean # servings per day:	2
Range:	0.5-6.5
Milk and Alternatives servings (n=416)	
Mean # servings per day:	3.5
Range:	0.5-10
Proportions compared to Recommendation	(%)
Below:	13
Within:	40
Above:	47
Cheese (any type) servings: (n=232)	
Mean per day #	1.5

## Physical Activity

Overall, 32% of the women reported engaging in moderate exercise for at least 15-30 minutes 3-4 times per week. Twenty-eight per cent reported rarely or never engaging in moderate exercise. Over half of our sample (57%) reported they engaged in less moderate physical activity since pregnancy began.

Motivator and barrier statements for exercise were in a “true” and “false” format. See Appendix 1 for the full results for this question. Most women reported they wanted to be fit (90%), thought exercise was important (90%), and felt supported by significant others to exercise during pregnancy (86%). Awareness about where to exercise was also high (81%). Fewer women reported exercising made them feel better (63%), or reported they liked to exercise (60%). Most women reported they knew which exercises were safe (76%). Feeling tired (47%) and being busy (32%) were the most commonly cited barriers to exercise during pregnancy. Only 8% of women claimed they had a medical reason for not exercising. Feeling sad (5%) or stressed (10%) were not commonly reported barriers to exercise. Most women marked “false” in response to these questions. Just over half (52%) of women reported they were told by their health care provider to exercise during

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<sup>viii</sup> Eating Well with Canada's Food Guide



their pregnancy; 45% reported their health care provider explained how to exercise during pregnancy. Fourteen per cent of women reported they couldn't afford exercise-related equipment or programs.

## Nutrition

The mean number of Vegetables and Fruit servings consumed the day before the survey was eight. The mean number of fruit servings was 4.5 and the mean number of vegetable servings was 3.5. Thirty-six per cent reported Vegetables and Fruit consumption below the current recommendations (less than seven servings per day), 30% were within the recommendation (seven to nine servings) and 34% were exceeding the recommendation for Vegetables and Fruit. Just over half (53%) of those consuming fruit consumed some portion of it as 100% fruit juice. Fruit juice consumption ranged from 0.5-6.5 servings per day. The mean intake of fruit juice was two servings. Among those women who drank fruit juice, about one quarter (24%) drank more than three servings of fruit juice the day before the survey. Close to two-thirds (64%) of the sample met the minimum recommendation of seven servings of Vegetables and Fruit per day. Sixty-two per cent reported that they were eating about the same number of servings of Vegetables and Fruit compared to before they were pregnant, as compared to only 36% who reported eating more Vegetables and Fruit during pregnancy.

The mean number of Milk and Alternatives servings consumed the day before the survey was 3.5 with 1.5 (43%) of these servings being any type of cheese. The mean for any type of fluid milk was 2.0 servings. Thirteen per cent of respondents were below the recommendation of two servings per day, 40% were within the recommendation of two to three servings and 47% were exceeding the recommendation for Milk and Alternatives. The reported range of milk product consumption was 0.5-10 servings per day. The majority of women (54%) reported consuming more milk products during pregnancy compared to before pregnancy. Forty-three per cent reported they were drinking about the same amount.

Just over one quarter (27% or 119/443) of the pregnant women sampled reported eating breakfast "less than daily". The same proportion (27%) consumed sugar sweetened beverages nearly daily or more [Table 5](#).

With regard to the remaining selected eating behaviours, 17% of our sample consumed fast food, 32% consumed commercially prepared baked products, 18% consumed fried foods, 21% consumed processed meats, and 23% consumed regular fat ice cream two times a week or more frequently (nearly daily or more) (Table 5).

Table 5: Proportions of selected dietary behaviours

Food Choice	Nearly Daily or More	Consumed 2 - 4 Times per Week	Once per week	"Rarely" or "Never"
Sugar sweetened beverages	27%	31%	17%	24%
Eating fast food	1%	16%	41%	42%
Eating commercially prepared baked products	5%	27%	35%	33%
Eating fried food	2%	16%	46%	36%
Processed meats	3%	18%	33%	46%
Ice Cream	4%	19%	25%	53%

When examining motivators for healthy eating, almost all women (99%) who completed the survey confirmed that they understood the importance of eating healthy foods to have a healthy baby. They also reported they knew how to cook healthy food (95%). The majority (88%) continued to enjoy the taste of healthy foods during this pregnancy. With regard to barriers to healthy eating, half (51%) of the women surveyed liked to eat whatever was quick to cook during their pregnancy. Almost half reported that they had cravings for high fat foods (47%). More than a quarter (29%) of women identified that they were too tired to cook healthy foods during this pregnancy. Reported knowledge related to Canada's Food Guide recommendations for pregnancy was high (76%), yet reported confidence in using the food guide was lower (52%). Reported knowledge related to the use of Nutrition Facts Tables on food products was high (80%). Few women reported being too sad or blue (3%) or too stressed (4%) to eat healthy foods during their pregnancy. Twelve per cent reported they were too busy to prepare healthy foods.

Just over half of women reported they were told to follow Eating Well with Canada's Food Guide (55%) by their HCP; only 37% reported their HCP explained how to use the Food Guide. Nine per cent of women in the sample reported they could not afford to eat healthy foods during pregnancy. For the full results of the nutrition motivators and barriers questions, see Appendix 2.

## Pre-pregnancy Weight & Gestational Weight Gain

Forty-two per cent of our sample reported a weight and height that classified them as overweight or obese (BMI  $\geq 25$ ) before pregnancy began (174/427). Approximately 54% (230/427) entered pregnancy at a BMI defined as normal weight and 5% (20/427) were underweight. At the time of the survey, 23% of respondents had already exceeded the upper limit of their recommended gestational weight gain **range**, as defined by their pre-pregnancy BMI ([Table 6](#)).

Table 6: Proportions of respondents by self-reported pre-pregnancy BMI categories, gestational weight gain rate and range

	(%)
Pre-pregnancy BMI: (n=427)	
< 18.5	5
18.5-24.9	54
BMI $\geq 25$	42
Gestational Weight Gain <b>Rate</b> (n=409)	(%)
Below Rate	14
Within Rate	28
Above Rate	58
Gestational Weight Gain <b>Range</b> (n=417)	(%)
Below Range	53
Within Range	24
Above Range	23

Of women who were in their second trimester (n=164), 6% had exceeded the upper limit of their recommended gestational weight gain **range**. Of women in their third trimester (n=245), 36% had exceeded the upper limit of their recommended gestational weight gain **range**. Overall, 23% (96/409) of the sample had exceeded the upper limit of their recommended gestational weight gain **range** (defined by their pre-pregnancy BMI) the day they completed the survey ([Table 6](#)). Of these 23% or 96 women, 14% were in the normal pre-pregnancy BMI range, 33% were overweight and 42% were in the obese BMI categories.

When examining the rate of weight gain, 14% (57/409) of the sample gained at a **rate** below the recommendation, 28% (115/409) were gaining at the recommended **rate**, and 58% (237/409) were exceeding their recommended weight gain **rate** as defined by pre-pregnancy BMI.

When asked about their weight gain, 64% (288/448) of our sample reported they thought they had gained the “right amount of weight” and 75% (333/447) of our sample reported they felt “fine” with the amount of weight they gained. For the 102 women who thought they had gained too much weight, 39% (n=40) felt “fine” with the amount of weight they had gained and 48% (n=49) were concerned. The remaining 13% (n=13) had not thought about it.

Of the 58% of pregnant women who had exceeded their recommended GWG rate (n=237), 51% (120/237) began pregnancy in the normal BMI range and 45% (107/237) began pregnancy in the overweight or obese BMI ranges. Trimester data was cross tabulated with GWG rate. Of the 58% of all women who had exceeded the recommended **rate** (n=237), 37% were in their second trimester and 63% were in their third trimester. In addition, 56% (131/237) of the women exceeding their GWG rate thought they had gained the “right amount” of weight and 69% (163/235) felt “fine” with the amount of weight they were gaining.

Regardless of their reported level of physical activity, women were equally likely to have gained weight at a rate that was less than, within, or in excess of their recommended GWG rate. ( $p=0.00$ ,  $1-\beta=99\%$ ).

Women who ate the recommended number of servings of Vegetables and Fruit (7-9 servings per day) were equally as likely to exceed their GWG rate compared to those who ate less or more than the recommended number of servings. However, when women who ate more than nine servings of Vegetables and Fruit per day were excluded from analysis, we found that pregnant women who ate less than seven servings per day were more likely ( $p=0.054$ ) to exceed their GWG rate (64%, 88/138) compared to being within or below their rate (36%, 50/138). This may suggest that eating less than the recommended number of servings of Vegetables and Fruit results in exceeding the GWG rate.

This test was repeated for milk consumption, however, there was not sufficient power to detect a difference [ $(1-\beta) = 52\%$ ] for Milk and Alternatives.

Fifty-eight per cent of pregnant women reported consuming fast food once per week or more often. Those pregnant women who consumed fast food more frequently (63%, 143/227) than rarely or never (37%, 84/227) were significantly more likely ( $p=.026$ ) to have exceeded their GWG rate (data not shown). Power was sufficient to provide evidence of a difference ( $1-\beta = 97\%$ ).

There were no other significant associations found when comparing those who exceeded their GWG rate to those who were below or within their rate for the selected<sup>ix</sup> nutrition behaviours<sup>x</sup>.

## Sources of Prenatal Health Information

The top three actual sources of prenatal information received from or provided by health care providers (HCPs) were: one-to-one discussion with these health care providers (78%), pamphlets (64%) and information about prenatal classes (29%). The top three preferred sources of prenatal health information were: one-to-one discussion with HCPs (77%), websites (41%) and books written by health experts (41%). In-person prenatal classes were identified as a preferred source of prenatal information by 40% of survey respondents. There was no significant difference found between those who chose books as a preferred source of information versus those who chose in-person prenatal classes. Online prenatal classes, social networking sites, e-mail reminders from health organizations, blogs and CDs/DVDs were each chosen by less than 10% of the survey respondents as one of their top three preferred sources of prenatal information ([Table 7](#)).

Table 7: Comparison of Actual versus Preferred Sources of Prenatal Information

	Actual Sources* (%)	Preferred Sources** (%)
1-to-1 discussion with health care provider	78	77
Websites	20	41
Book written by health expert	32	41
In-person prenatal classes	29	40
Pamphlets or handouts	64	36
Magazines	22	27
Online prenatal classes	2	10
E-mail reminders from a health organization	3	10

<sup>ix</sup> selected eating behaviours = consumption of breakfast, sugar sweetened beverages, processed meats, fried foods, commercially prepared baked products and ice cream

<sup>x</sup> We did not have sufficient power to detect a difference between consumption of ice cream frequency and the likelihood of being within or below compared to exceeding the GWG rate (power based on normal approximation = 21.35%)

CD or DVD	4	6
Social networking sites	7	4
Blogs	n/a***	1.5

\*Totals are greater than 100% as respondents were asked to check all that apply.

\*\*Totals are greater than 100% as respondents were asked to select their top 3 choices.

\*\*\*Social networking sites and blogs were combined into the same item for the "my information sources" question.

N=409 for Received Sources, N=432 for Preferred Sources.

Information from one-to-one discussions with HCPs was the most frequently reported preferred source of prenatal information across age and parity groupings; discussion with health care provider was preferred by almost twice as many respondents when compared to other forms of prenatal information ([Table 8](#)). For women 18-24 years of age, the number two and three preferred sources of prenatal information were books and in-person prenatal classes for women 25-34 years of age, websites and in-person prenatal classes were preferred; for women 35 and older, books and websites/pamphlets or handouts/books were the most preferred sources of prenatal information after one-to-one discussion with a HCP. Primiparous women chose in-person prenatal classes and books written by health experts most frequently, after one-to-one discussions with their HCP. Multiparous women preferred pamphlets or handouts and websites for their prenatal information.

Table 8: Preferred Sources of Prenatal Information by Age and Parity Groupings

Prenatal Information	Age Groups			Parity	
	18-24 N=89 (%)	25-34 N=307 (%)	35+ N=60 (%)	Primiparous (N=144) (%)	Multiparous (N=75) (%)
1-to-1 discussion with health care provider	80	77	75	79	75.5
Websites	38	43	37	38	45
Book written by health expert	43	40.5	39	42	40
In-person prenatal classes	40	41	35	56	21
Pamphlets or handouts	33	37	37	26.5	46
Magazines	30	24	37	21	34
Online prenatal classes	9	8	17.5	11	8
E-mail reminders from a health organization	6	10	12	10	9
CD or DVD	9	6	--**	7.5	5.5
Social networking sites	3.5	3.5	--**	3	4
Blogs	0	--**	--**	0	3

\*Totals are greater than 100% as respondents were asked to select their top 3 choices.

\*\*Numbers too small to release.

Preference for prenatal health information through one-to-one discussions with health care providers decreases by age and parity. However, this source of prenatal information is still the most preferred in all three age and parity categories. Preferences for e-mail reminders from health care organizations, online prenatal classes and blogs increased with age. Preference for CDs and DVDs decreased with age. There was no difference in the preference for social media websites across all three age groups.

## DISCUSSION

### Representativeness

This survey produced a high response rate (85%) for a self-administered questionnaire. A high response rate was also reported by a pilot study conducted in Hamilton, Ontario. This other study also used the offices of primary care providers to implement their survey; their response rate was 94%<sup>41</sup>. Women may have perceived the survey to be highly credible due to the fact it was administered in a health care provider office, and this may have impacted the response rate.

The demographic characteristics of the women were generally representative of the women living in Simcoe Muskoka (SM). Our sample of pregnant women is similar when comparing the mean age and the age range distribution of pregnant women surveyed to the mean age and age range distribution of the population of pregnant women living in Simcoe County and the District of Muskoka. We also achieved a similar distribution of surveys from Simcoe County and the District of Muskoka based on the estimated proportions of pregnancies that occur in Simcoe County and the District of Muskoka<sup>42</sup>. Our reported prenatal smoking rate (17%) was also similar to that reported for Simcoe Muskoka mothers in the BORN database in 2010 for SM (17.6%)<sup>43</sup>.

The fact that more women of higher education participated in our survey was expected as this is a common limitation to survey methodology in general. People with higher education and income typically respond more readily to surveys compared to their peers who have lower education and income<sup>44-47</sup>. We also sampled a high proportion of midwifery clients and a low proportion of obstetrician clients. The proportion of pregnant women in Ontario receiving midwifery care is thought to range between 8.2%<sup>48</sup> and 9.2%<sup>9</sup>. Within SM, the Niday Perinatal Database reports 10.2%<sup>49</sup> of women receive care from a midwife. A lower proportion of pregnant women who were patients of obstetricians were sampled (27%) compared to the actual proportion of women in Simcoe Muskoka who receive prenatal care from an obstetrician (69%); a higher proportion of midwifery clients were sampled (21%) compared to the actual proportion who receive midwifery care in the Simcoe Muskoka area (10.2%); thus, our sample under-represents the patients of obstetricians and over-represents the clients of midwives.

### Gestational Weight Gain Rate

No other research study could be found that estimated the proportion of women achieving the revised Health Canada Gestational Weight Gain Recommendation (2009) rates ([Table 1](#)). In our study, 58% of mothers were exceeding their recommended weight gain **rate** as defined by their pre-pregnancy BMI. Although our reported proportion of 58% is considered to be an overestimation (see limitations section), it is still interesting to note



this value is similar to the proportions of women exceeding the upper limit of their recommended gestational weight gain range (41% normal weight women, 55% overweight women) as reported in the Maternity Experiences Survey<sup>9</sup>.

Although approximately 58% of our sample had exceeded their recommended GWG rate at the time of the survey, nearly two thirds (64%, n=288) of our sample who responded to this question thought they had gained the “right amount of weight” and felt “fine” (75%, n=333) with the amount of weight they were gaining. This may imply that women may not be aware of gestational weight gain recommendations, or of the potential impact of excess gestational weight gain on pregnancy and birth outcomes.

## Physical Activity

Canadian experts recommend that “all women without contraindications should participate in aerobic and strength-conditioning exercises to support a healthy pregnancy”<sup>6</sup>. In spite of this, few women are achieving the recommended frequency, intensity, type and amount of physical activity. This low level of physical activity was also found in our study as less than one third of our sample (32%) of pregnant women reported that they are engaging in at least 15-30 minutes of moderate exercise 3-4 (or more) times per week.

Our study did not reveal an association between reported levels of physical activity and rate of gestational weight gain. Weisman et al (2010) found physical activity levels meeting the guidelines reduced the odds of exceeding the IOM GWG guidelines, but the statistical association did not reach significance<sup>17;50</sup>. Conversely, Steube et al. (2009)<sup>21</sup> found mid-pregnancy walking and vigorous physical activity to be protective of excessive gestational weight gain. Cohen et al (2010)<sup>16</sup> revealed women who are active are more likely to achieve appropriate GWG. Given these inconsistent findings, the association between meeting prenatal physical activity recommendations and the likelihood of achieving Health Canada’s GWG rates and ranges requires further study.

In spite of having numerous motivators or enablers (e.g. adequate knowledge and support), more than two-thirds of our sample is not meeting the recommendations for aerobic activity during pregnancy. Our results are consistent with the only other available data regarding physical activity in Canadian pregnant women: Cohen et al (2010)<sup>16</sup> identified that most of their study participants were inactive, with only 30% reportedly meeting the adult steps recommendations.

Well over half of our survey respondents (57%) reported that they have engaged in less physical activity since pregnancy began. In addition, 63% of women who were exceeding their GWG rate reported they were exercising less since pregnancy began. Previous epidemiological research has identified that non-pregnant women were more likely than

pregnant women to meet physical activity recommendations<sup>51;52;17;53;54</sup>. This is especially concerning when we consider the recent Canadian Health Measures Survey results that revealed only 14% of Canadian women met the recommendations for physical activity for non-pregnant adults<sup>55</sup>, when their level of physical activity was objectively measured (using an accelerometer). Although fatigue (47%) and being too busy (32%) were the common barriers identified to exercise during pregnancy, further work around the social determinants of health and the built environment and their impact on physical activity amongst pregnant women is warranted. This information would strengthen the impact of public health programming.

## Nutrition

Our finding of a mean intake of eight servings of Vegetables and Fruit falls within the range of seven to eight servings per day recommended in Eating Well with Canada's Food Guide<sup>5</sup>. This result is similar to one study<sup>21</sup>; however, others note decreased consumption<sup>22;50;56</sup> of Vegetables and Fruit. Therefore, results are inconsistent as to whether Vegetables and Fruit consumption changes during pregnancy.

Our sample of pregnant women appears to be consuming the recommended minimum of seven servings of Vegetables and Fruits, as defined by Eating Well with Canada's Food Guide<sup>5</sup>. However, half of the respondents achieved the recommendation of 7-9 servings because of their mean consumption of two servings of 100% fruit juice. Although Canada's Food Guide recommends that Canadians "Have vegetables and fruit more often than juice", there are no current Canadian recommendations for a daily maximum number of servings of 100% fruit juice. Fruit juice, although considered a source of fruit in the Vegetables and Fruit food group, can contribute extra calories<sup>57</sup>. Recently, the Harvard School of Public Health recommended that Americans limit fruit juice to 4-6 ounces per day. They argue that ounce per ounce, juice contains as much sugar and as many calories as a sugary pop<sup>58</sup>.

Our results also suggest that nearly two thirds of our sample (64%) met the minimum recommendation of seven servings per day of Vegetables and Fruit. Sixty-two percent of the sample reported eating the same number of servings of Vegetables and Fruit during their pregnancy compared to before they were pregnant. This may imply that those women who already consumed the recommended minimum number of servings of Vegetables and Fruit continued with this behaviour during pregnancy. Also, consumption of Vegetables and Fruit may not change significantly during pregnancy compared to pre-pregnancy overall. This finding is similar to the results of Inskip et al (2009)<sup>25</sup>. Indeed, eating behaviours in general may not change significantly during pregnancy compared to non-pregnancy. This finding has been cited by others<sup>26;59</sup>.

In contrast to the results related to the consumption of Vegetables and Fruit, our findings revealed over half of our sample (53%) reported consuming more Milk and Alternatives since pregnancy began. The mean consumption of 3.5 servings per day exceeds the current recommendation of Eating Well with Canada's Food Guide<sup>5</sup> of two servings (with the possible addition of one extra serving to meet the additional energy requirements of pregnancy). Since 47% of the sample consumed more than three servings from the Milk and Alternatives food group in one day, it appears that a large proportion of pregnant women are over-consuming milk products. Similar findings were also reported by Stuebe et al (2009)<sup>21</sup>. Of additional concern is that a mean of 1.5 servings per day of Milk and Alternatives was consumed as cheese (any type). Although the Food Guide recommends that Canadians "Select lower fat milk alternatives", it does not provide specific guidance about limiting cheese consumption. Cheese, especially higher fat cheese, is a major source of saturated fat<sup>57</sup> and total calories. The Dietary Guidelines for Americans state nearly half of the milk and milk products consumed in the United States come from cheese. Most of this cheese is the regular, full fat form<sup>57</sup>. Therefore, higher fat cheese consumption may be contributing to the overall energy intake of our sample of pregnant women.

The high number of servings chosen from the Milk and Alternatives food group may reflect outdated information concerning the importance of milk products during pregnancy. The 1992 version of Canada's Food Guide recommended 3-4 servings of Milk Products for pregnant and lactating women. The current version of Eating Well with Canada's Food Guide recommends only two servings of Milk and Alternatives for women aged 19-50, including pregnant women. The rationale is that the body increases its absorption of calcium from milk products during pregnancy so additional servings beyond the two recommended are not needed to meet calcium requirements<sup>19 xi</sup>.

This study found about one quarter of pregnant women (27%) were not eating breakfast (defined as food eaten within two hours after waking) daily. No other studies could be found that demonstrated an association between daily breakfast consumption and healthy gestational weight gain; however, the nutritional benefits of eating breakfast have been found in the adult population. These benefits include increased diet quality and lower BMI<sup>60-63</sup>. The Canadian Community Health Survey (CCHS) data (cycle 2.2), found 10% of all adults (men and women) skipped breakfast<sup>64</sup>. The American Dietary Guidelines (2010) currently recommends eating a nutrient dense breakfast as a weight management strategy<sup>57</sup>. Skipping breakfast may be an existing habit of our survey respondents, or may

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<sup>xi</sup> Pregnant women however may choose an optional additional Milk and Alternatives serving to meet the required energy needs of pregnancy. This recommendation applies to those women already following an Eating Well with Canada's Food Guide pattern of eating (HC-HCP following CFG)

be related to weight control efforts or nausea and vomiting that may continue into the second trimester.

One quarter of our sample consumed sweetened beverages nearly daily or daily; a similar proportion ate fast food, deep-fried food and commercially baked products twice a week or more. Sugar sweetened beverages are a concern as they are high in refined sugars and are high in overall calories. A study by Crozier et al (2009)<sup>65</sup> also found an increased intake of sweetened beverages during pregnancy. No research studies could be located that reported on the consumption of sugar sweetened beverages of Canadian pregnant women; however, a recent Statistics Canada report found about one fifth of the total calories consumed by non-pregnant women ages 19-30 (20%) and ages 31-50 (19%) are derived from sugar<sup>66</sup>.

Our results indicate that women prefer making foods that are quick to prepare. The women also reported having cravings for high fat foods, and some women reported that they were too tired to cook healthy meals during this pregnancy. Developing strategies which would enable pregnant women to have the required knowledge and environmental supports to assist them in overcoming these barriers will help make healthy eating choices more likely.

Given the current emphasis in public health nutrition on food skill development, we found it surprising that a high proportion of pregnant women reported they knew how to cook healthy foods. This result was also described by Pan Canadian Public Health Group<sup>67</sup> (2010) who noted that among adults there can be variability in the definition of “cooking”. They continue to describe that 94% of women have reported being very or fairly confident in their cooking skills and that their confidence in their cooking skills increases with age and level of income. Public health professionals would benefit from the knowledge that pregnant women report some degree of confidence to “cook” for their families, therefore, campaigns advertising “healthy cooking” may not be successful. Public health professionals eager to improve the food skills of pregnant women should consider partnering with other community agencies to develop targeted food skill development.

This study identified that fast food consumption was significantly associated with exceeding the recommended GWG rate. No other studies could be located that investigated the impact of fast food consumption on GWG. Fast food consumption has long been thought to be a contributing factor in the obesity epidemic. Evidence has shown that [non-pregnant] adults who eat at fast food restaurants are at increased risk of weight gain, overweight and obesity<sup>57</sup>. Public health strategies should increase awareness amongst pregnant women of healthy food choices provided by fast food establishments.

The overall number of servings of Vegetables and Fruit consumed was not significantly associated with the likelihood of achieving the recommended GWG rate. This may have

occurred because those eating in excess of the recommended number of servings of Vegetables and Fruit may have been eating too much food overall, thus affecting their GWG. When these respondents were excluded, meeting Eating Well with Canada's Food Guide's recommendation for number of servings of Vegetables and Fruit was significantly associated with being below or within the GWG rate. Therefore, public health strategies should continue to promote the recommendation of 7-9 servings of Vegetables and Fruit per day for the prenatal population.

## Role of Health Care Providers

Our survey results indicated that the proportion of women who were told by their health care provider to exercise during pregnancy (52%) and to follow Canada's Food Guide (55%) was similar. Health care providers addressed specific physical activity recommendations with their pregnant patients more often (45%) than they discussed specific recommendations of the Food Guide (37%). Our results related to frequency of provision of physical activity advice by health care providers are similar to other reports. Entin and Munhall<sup>68</sup> found that about half of obstetricians in their sample (N=83) routinely discussed exercise with their pregnant patients, and Cohen et al (2010) found that only 41% of women received advice from a physician regarding physical activity<sup>16</sup>.

## Sources of Prenatal Health Information

Preconception and pregnancy are times in a woman's life that lead to an increased interest in, need and search for nutrition-related information<sup>59;69</sup>. While midwives, obstetricians, general practitioners and paediatricians are traditional providers of health information during pregnancy<sup>70</sup>, women access this information from different sources for different reasons. For instance, they value the factual information they receive from their health care provider, but also learn from the personal experience of their family and friends<sup>9</sup>.

Our results demonstrated that pregnant women have a strong preference for receiving their prenatal information through one-to-one discussions with their health care providers. Women reported they would also like to receive information from websites, books written by health experts and in-person prenatal classes. Over half of first time mothers would prefer information from in-person prenatal classes. It is also noteworthy that traditional sources of prenatal information continued to be preferred sources compared to more modern methods (with the exception of websites) such as e-reminders, social networking sites, blogs and online prenatal classes. In fact, the younger age group (18-24) was less likely to choose these sources of information compared to their older counterparts (35+). Therefore, social networking sites may be useful as opportunities for peer-to-peer support for pregnant women, but they are not reported as a preferred source of prenatal

information. The popularity of online prenatal classes may increase in the future as awareness of this format increases amongst the general population of pregnant women.

Other research has found similar results. The Canadian Maternity Experiences Survey (MES)<sup>9</sup> (2009) asked women to describe their single most useful source of pregnancy-related information; these included health care providers (32%), books (22%), and information they had learned during a previous pregnancy (17%). Friends and family, the Internet and prenatal classes all scored at or less than 10%. Interestingly, of women who had attended prenatal classes, 19% viewed them as their most useful source of information. These results varied with the age of the woman, the number of times she had been pregnant and what province she lived in<sup>9</sup>.

In late 2002 and early 2003, prospective and expectant mothers in Simcoe County were questioned about their sources of prenatal health information. Commonly reported sources included health professionals, educational print materials and friends and family. Most respondents reported using the Internet; however, books and magazines were regarded as the most helpful sources of information<sup>32</sup>. In other studies, pregnant women have cited the Internet, health care providers, books, information they learned during a previous pregnancy and family members as their most important sources of health information<sup>59;69</sup>.

Leung (2008) notes that although people are increasingly using the Internet to obtain health information, the majority still prefer health professionals as their main source of information<sup>71</sup>. This holds true in the literature as well as in our local research. In general, pregnant women look to their health care provider for information during pregnancy and supplement this with reading print materials (mainly books) and accessing the Internet. Prenatal classes were identified locally as an important resource and, in the MES<sup>9</sup>, women pregnant for the first time also noted this source of information as being important.

A gestational weight gain strategy for Simcoe Muskoka must support local health care providers' knowledge related to healthy weight gain during pregnancy, recommended websites and print resources, as well as information on local prenatal classes available to their clients. Advocacy for the development and distribution of a publicly funded, comprehensive book on healthy pregnancy for all women in the province is also an important part of the strategy. A common provincial resource that incorporates the new recommendations on gestational weight gain would require expert consultation; it would be current, based on best practice and support interdisciplinary perinatal care. Local efforts could then focus on local education and perinatal care rather than on resource development.

The need for a major shift from traditional maternity care towards more innovative models in which health care professionals participate in collaborative maternity care teams has

been identified in Canada<sup>72;73</sup>. Women participating in these innovative models of care are more satisfied with the care they receive and experience better perinatal and birth outcomes<sup>73-75</sup>. Incorporating the delivery of gestational weight gain information and support as part of this shift takes advantage of women's willingness to act on what they learn from their health care provider during pregnancy, sets them on a path of healthy living and creates a foundation for future health.

## LIMITATIONS

There were several limitations to our community-based study. First, pregnant women without access to health care providers were not captured by the survey. We were unable to confirm if office staff gave surveys to all eligible women or if surveys were described to all the women in the same way; however, scripts were provided to the office staff, and the high response rate implies that eligible women in the offices were asked to participate. In addition, we could not assess if any pregnant women completed the survey more than once, although this is considered unlikely given the length of the survey (six pages).

Women were asked to report their “weight today” in the survey tool. It is acknowledged that pregnant women may not have been weighed at their HCP visit before they completed the survey; these women may have used the weight from their last appointment or may have recorded a weight from a scale in another location. Regardless, there will be some measurement error in the weights recorded for this survey. Also, women in their second trimester are typically seen monthly, so their most recent recorded weight may have been at their last monthly visit. Women in their third trimester are usually seen bi-weekly, so their weight may have been recorded more recently. Therefore, because the length of time between weight measurements in the second trimester is potentially greater, the weight recordings of those in the second trimester may contain more error compared to those women in their third trimester.

Pregnancy is defined in this study as live births, still births and therapeutic abortions. Ectopic pregnancies and miscarriages are not included in this calculation therefore the number of total pregnancies is underestimated. This may create an underestimation of the sample size required (361) to create a representative sample of the pregnant women in Simcoe County and the District of Muskoka. However, the final sample size of 457 is thought to be representative of women in SM.

We over-sampled women from midwifery practices due to the midwives' high level of interest in implementing the survey with their clients. We also under-sampled obstetricians. This may affect the overall generalizability of the survey findings.

The survey tool was not validated, but the questions were adapted from validated questions where possible. Limitations related to the survey tool were due to the constraints of a self-administered, self-reported survey tool. As such, the diet-specific questions could not address total energy intake and could only focus on selected components of the diet that have been found to be related to excess gestational weight gain, or weight gain in general.



In an effort to reduce measurement error, a sheet of photographs showing examples of serving sizes was given to the women as they completed the survey; however, it is unknown if the serving size example sheet was given to all women, or if the women used it to help estimate portions consumed.

In addition, questions related to food intake and exercise during pregnancy are prone to social desirability bias, which is the tendency of respondents to answer questions in a manner that will be viewed favorably by others. This type of bias may have impacted the responses to the 24-hour recall questions for intake of Vegetables and Fruit and Milk and Alternatives. In order to limit recall bias, we asked for women to recall only what they had eaten the day before and not throughout the length of their pregnancy. Since the physical activity questions required the survey respondents to make generalizations about their physical activity levels since becoming pregnant, social desirability bias may have led to overestimation of the frequency and amount of time spent engaging in moderate intensity exercise. Also seasonality may impact dietary intake and physical activity levels as the survey was implemented in March and April. Both healthy eating and physical activity behaviours might have been more frequently reported if the survey tool had been implemented in the summer months.

Chi square tests of significance were used to examine variables. Multivariate statistical models were not used that would control for confounders. Use of these models may reveal new statistical associations of significance.

Marital status of the pregnant women was not collected in the survey tool; therefore, we could not determine the appropriate comparator as being economic families or private household families.

There was an error in the household income category in the final printed copy of the survey; the range of income between \$15,000 - \$49,999 was mistakenly written as \$15,000- \$44,999. Although it is likely that those who fell into the \$45,000 - \$49,999 household income category checked off the \$15,000 - \$44,999 range, we cannot be entirely sure of the accuracy of this range.

The survey did not ask women to identify if they were pregnant with more than one fetus (multiple gestation pregnancy), therefore, we were unable to determine what proportion of our sample fell into this category. Since the recommended gestational weight gain for a multiple pregnancy is higher than for a single gestation pregnancy, our reported proportion of women exceeding their recommended gestational weight gain is a slight overestimation. The estimated proportion of pregnant women who have a multiple gestation pregnancy is 1.5% of total pregnancies in Simcoe Muskoka.

We were also unable to assess the degree of edema experienced by the pregnant women as there is no universally accepted definition for the severity of edema. Based on this limitation, our reported proportion of women exceeding their recommended weight gain rate by pre-pregnancy BMI may be a slight overestimation.

## **CONCLUSIONS**

Beginning pregnancy overweight or obese, and gaining too much weight during pregnancy, have both been associated with negative pregnancy, birth and child health outcomes. Although more research needs to be done to be conclusive, our findings from this study suggest that more than one in three women in Simcoe Muskoka (SM) are entering pregnancy as either overweight or obese, and that over half of pregnant women in SM are gaining in excess of their recommended gestational weight gain (GWG) rate as defined by Health Canada. At these reported weight gain rates, pregnant women in SM are on track to exceed the upper limit of their recommended GWG range as defined by Health Canada. Despite these trends, pregnant women in SM appear to lack awareness of the potential impact of excess GWG on pregnancy and birth outcomes, as well as on future maternal and child health.

According to our study results, a significant proportion of pregnant women in SM are not following healthy lifestyles recommendations related to nutrition, physical activity and smoking. Time and fatigue were commonly cited barriers to healthy eating and physical activity. Low levels of physical activity were found, despite reports of knowledge and support. One third of our sample did not consume the recommended minimum of seven servings of Vegetables and Fruit per day. Calorie dense foods, such as sugar sweetened beverages, were frequently consumed. Fast food consumption was significantly associated with exceeding the GWG rate. Pregnant women in SM reported very high levels of knowledge and skill on how to cook healthy foods; however, the definition of “cooking” and “healthy” is open to interpretation.

Health care providers (HCP) play a critical role in communicating healthy lifestyle messages to pregnant women. Although one-to-one discussion with HCPs is by far the most preferred source of health information, a large proportion of pregnant women reported that HCPs are not discussing nutrition and physical activity recommendations with them. Pregnant women surveyed report preference for more traditional sources of information about pregnancy, with the exception of websites. Neither social media nor on-line prenatal classes were preferred sources, although few pregnant women may be aware of how these new formats could support their pregnancy.

Our survey results highlight the importance of supporting HCPs to provide healthy lifestyle information to all pregnant women, and to refer to nutrition and physical activity resources, including counseling by a registered dietitian.

## **RECOMMENDATIONS**

Reproductive Health Program members of Simcoe Muskoka District Health Unit (SMDHU):

1. Collaborate with stakeholders to develop and implement strategies which enable local prenatal health care providers (HCP) to
  - determine pre-pregnancy Body Mass Index (BMI) of pregnant patients/clients
  - inform pregnant patients/clients early in pregnancy of their recommended gestational weight gain (GWG) range and rate, according to pre-pregnancy BMI
  - plot GWG throughout pregnancy
  - discuss healthy eating and physical activity (PA) recommendations for pregnant women throughout pregnancy, acknowledging lack of time and fatigue as potential barriers
  - refer overweight/obese pregnant women to nutrition and PA professionals
  - refer pregnant women who are exceeding the recommended GWG rate/range to nutrition and PA professionals, and
  - refer all pregnant women to information and resources which support healthy eating, PA and healthy GWG.
2. Collaborate with stakeholders to develop and implement a comprehensive preconception health strategy that addresses pre-pregnancy body mass index (BMI)
3. Collaborate with stakeholders to explore the development and implementation of strategies aimed at pregnant women which
  - decrease fast food consumption, and
  - support consumption of the recommended number of servings of vegetables and fruit, according to Eating Well with Canada's Food Guide (2007)

Simcoe Muskoka District Health Unit Reproductive Health Program Manager, Family Health Service Director and Associate Medical Officer of Health:

1. Collaborate with other health units/departments to gain further understanding of food and exercise behaviors of pregnant women. This could include applying for Public Health Ontario's Locally Driven Collaborative Projects funding opportunity.
2. Continue to collaborate with Public Health Ontario (PHO) and the Association of Public Health Epidemiologists in Ontario (APHEO) regarding the development of

additional reproductive health indicators related to maternal nutrition and physical activity behaviours.

3. Advocate to the North Simcoe Muskoka Local Health Integration Network (NSM LHIN) and Central LHIN to work collaboratively with SMDHU and local HCP to develop comprehensive health care policies to address gestational weight gain as a priority health issue.
4. Advocate with the Provincial Council for Maternal and Child Health (PCMCH) to:
  - ensure the Better Outcomes Registry Network (BORN) includes surveillance indicators associated with healthy gestational weight gain (GWG), in order to support monitoring of GWG trends at the provincial level.
  - implement a comprehensive interdisciplinary model of prenatal care that supports:
    1. routine screening related to nutrition, physical activity (PA), mental health and disordered eating
    2. referrals to allied health professionals, including registered dietitians and mental health professionals
    3. development of policies that support clinical practice related to healthy GWG; practitioners to
      - a. determine pre-pregnancy BMI of pregnant patients/clients
      - b. inform pregnant patients/clients early in pregnancy of their recommended GWG range and rate, according to pre-pregnancy BMI
      - c. discuss healthy eating and PA recommendations for pregnant women throughout pregnancy, acknowledging lack of time and fatigue as potential barriers
      - d. plot GWG throughout pregnancy
      - e. refer overweight/obese pregnant women to nutrition and PA professionals, including registered dietitians
      - f. refer pregnant women who are exceeding the recommended GWG rate and range to nutrition and PA professionals
      - g. refer all pregnant women to information and resources which support healthy eating, PA and healthy GWG
  - fund the development of tools including an interactive electronic tool for plotting gestational weight gain

- develop and implement a health communication strategy to support healthy gestational weight gain; at a minimum, campaign should address nutrition, physical activity and sources of support for pregnant women
- advocate to Dietitians of Canada, Registered Nurses Association of Ontario, Society of Obstetricians and Gynecologists of Canada, Association of Ontario Midwives and the Ontario Medical Association to support their members to address appropriate gestational weight gain by providing:
  - a. clinical practice guidelines
  - b. professional educational opportunities

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## APPENDICES

### Appendix 1- Ontario Public Health Standards (OPHS, 2008)

Family Health Program Standards:

Reproductive Health

Societal Outcomes related to gestational weight gain:

- An increased proportion of community partners provide safe and supportive environments to promote healthy pregnancies, healthy birth outcomes, and preparation for parenthood.
- An increased proportion of pregnant women and their families adopt practices to support a healthy pregnancy.
- An increased proportion of full-term newborns are born within a healthy birth weight range.

Board of Health Outcomes related to gestational weight gain:

- The board of health is aware of and uses epidemiology to influence the development of healthy public policy and its programs and services for the promotion of reproductive health.
- Community partners are aware of the importance of creating safe and supportive environments that promote healthy pregnancies, healthy birth outcomes, and preparation for parenthood.
- Policy-makers have the information required to enable them to amend current policies or develop new policies that would have an impact on the promotion of reproductive health.
- Individuals in their reproductive years, including pregnant women and their families, have the information, skills, and supports necessary to adopt health-promoting practices.
- Priority populations are linked to reproductive health information, programs, and services.
- Pregnant women and their families at risk of poor birth outcomes are supported and referred to services in the prenatal period.

Health Promotion and Policy Development Requirements:

- The board of health shall work with community partners, using a comprehensive health promotion approach, to influence the development and implementation of healthy policies and the creation or enhancement of supportive environments to address:
  - Healthy pregnancies

These efforts shall include:

- a. Conducting a situational assessment in accordance with the *Population Health Assessment and Surveillance Protocol, 2008* (or as current); and
  - b. Reviewing, adapting, and/or providing behaviour change support resources and programs.
- 
- The board of health shall increase public awareness of preconception health, healthy pregnancies, and preparation for parenting by:
    - a. Adapting and/or supplementing national and provincial health communications strategies; and/or
    - b. Developing and implementing regional/local communications strategies.
- 
- The board of health shall provide advice and information to link people to community programs and services on the following topics:
    - Healthy pregnancies

## Appendix 2- Physical Activity Motivators and Barriers Results

Survey Question*	N (#)	% True	% False
I want to be fit during this pregnancy	453	90	5
My husband/partner supports me to exercise during this pregnancy	449	86	6
My family and friends support me to exercise during this pregnancy	449	85	7
There are sidewalks, parks and trails near where I live	451	83	16
I know where in my community I can exercise during this pregnancy	448	81	13
My health care provider told me to exercise during this pregnancy	446	52	33
My health care provider explained how to exercise during pregnancy	445	45	40
When I exercise during pregnancy, I feel better	448	63	16
I like to exercise during this pregnancy	438	60	27
I have a medical reason why I cannot exercise during this pregnancy	444	8	88
I feel too tired to exercise during this pregnancy	427	47	46
I feel too sad or blue to exercise during this pregnancy	448	5	92
I feel too stressed to exercise during this pregnancy	447	10	87
I am too busy to exercise during this pregnancy	443	32	65
I think it is important to exercise during pregnancy	446	90	5
I know what exercises are safe in pregnancy	447	76	11
I can't afford to exercise (pay for clothes, shoes, programs etc.)	446	14	83

\*"Unsure" column not reported in Appendix, so totals may not equal 100%

## Appendix 3 – Nutrition Motivators and Barriers Results

Survey Question*	N (#)	% True	% False
I know how to cook healthy foods	439	95	3
I have lots of meal planning tips and recipes	437	75	22
I know what Canada's Food Guide recommends for pregnancy	438	76	15
I feel confident I am following Canada's Food Guide during this pregnancy	428	52	30
I don't know how to use Canada's Food Guide	433	15	81
I know how to use the Nutrition Facts tables on food packages	435	80	12
I like the taste of healthy foods during this pregnancy	430	88	7
It is important to eat healthy foods to have a healthy baby	435	99	--**
Near where I live, there is a farmer's market	432	58	31
If I cannot go to the grocery store, someone else is able to go for me	432	82	17
I crave high fat foods during this pregnancy	425	47	47
I feel too tired to cook healthy foods during this pregnancy	419	29	66
I like to eat whatever is quick to cook during this pregnancy	419	51	43
I feel too sad or blue to eat healthy foods during this pregnancy	432	3	96
I feel too stressed during this pregnancy to eat healthy foods	428	4	95
I am the only cook for my family	427	25	75
I can't afford to buy healthy foods during this pregnancy	432	9	90
I am too busy to prepare healthy foods during this pregnancy	425	12	85
I have an eating disorder	432	2	98
My health care provider told me to follow Canada's Food Guide	430	55	36
My health care provider explained how to use Canada's Food Guide	422	37	52

\*"Unsure" column not reported in Appendix, so totals may not equal 100%.

\*\*Figure too small to release.



## Appendix 4 – Consent Forms, HCP Instructions and Resources

### Food and Exercise in Pregnancy Survey

March 2011

Dear Mom-to-be:

On behalf of the Simcoe Muskoka District Health Unit, thank you for taking the time to read about the food and exercise in pregnancy survey . This survey asks about your eating and exercise habits as well as a bit of information about you during pregnancy. This information will help us to improve healthy pregnancy programs and resources in the community.

You are being asked to take part in this research study by completing the food and exercise in pregnancy survey. By answering the survey questions you are consenting to participate in our study.

**The survey is confidential:**

- do not put your name or any other identifying information on the survey
- individual answers will not be shared or reported
- all surveys will be stored in a locked space
- all surveys will be shredded after one year
- all electronic records will be destroyed after 7 years

**Completing the survey:**

- it will take 10-15 minutes, if you answer all the questions
- you may choose to answer *all* of the questions, some of them, or none
- the information collected from all the surveys may be shared with other researchers

**Risks:**

- the only inconvenience, risk or discomfort of participating is the time and attention you will use to answer the survey
- if you choose not to participate or you do not answer all the questions, there will be no negative consequences for you or your family

...2

**If you agree to participate:**

- remove the survey from the envelope
- answer the survey questions as time permits
- put the survey in the brown envelope and seal it shut
- return the sealed envelope to your health care provider or office staff member
- keep this information letter for your reference
- please accept a gift of a Simcoe Muskoka District Health Unit cloth bag as a token of our appreciation.

If you have any questions about healthy eating, exercise in pregnancy or your health during pregnancy please contact *Your Health Connection* at 705-721-7520 or talk to your health care provider.

Sincerely,

Original copy signed by

Lori Webel-Edgar, RN, BScN, MN  
Reproductive Health Manager  
Simcoe Muskoka District Health Unit

*This information is collected under the authority of the Health Protection and Promotion Act, 1990 s.5. The information will be used for the purposes of program planning and service delivery. Questions regarding the collection and use of personal information should be directed to the Office of the Privacy Officer, Simcoe Muskoka District Health Unit, 15 Sperling Drive, Barrie ON L4M 6K9, (705) 721-7520 or 1-877-721-7520.*

**A Description of Healthy Eating and Physical Activity Behaviours of Pregnant Women  
in the SMDHU Area  
PERINATAL HEALTHCARE PROVIDERS**

**CONSENT FORM**

I consent to support my prenatal clients to participate in a research project entitled "A Description of Healthy Eating and Physical Activity Behaviours of Pregnant Women in the SMDHU Area" led by the Simcoe Muskoka District Health Unit. I understand that participation in this project is entirely voluntary and can be withdrawn at any time.

I agree to have my office staff distribute the attached survey to all of my prenatal patients aged 18 and over and at least 14 weeks gestation when they are in the office.

I understand that all completed surveys will be handled in accordance with SMDHU policy and will be kept strictly confidential. Consent forms will be destroyed after seven years. I also understand that no identifying personal information about any perinatal healthcare provider will be released.

I will direct any questions or concerns about the research project itself or the methods used, to Becky Blair, Public Health Nutritionist at (705) 721-7520, Ext. 7409 or [becky.blair@smdhu.org](mailto:becky.blair@smdhu.org).

**CONSENT:**

I have read this letter and I agree to have my practice participate in this survey as described above. I understand the purpose of the research project and I am aware that all my patients' responses will be kept confidential.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(yyyy/mm/dd)

Name of Family Physician, Nurse Practitioner, Midwife or Obstetrician (please print):  
\_\_\_\_\_

The "Description of Healthy Eating and Physical Activity Behaviours of Pregnant Women in the SMDHU Area" results will be analyzed at the Simcoe Muskoka District Health Unit level. We anticipate presenting the results of our survey to all interested healthcare providers in the fall of 2011.

☐ Please check if you are interested in receiving the results of the survey.

February 23, 2011

<input type="checkbox"/> <b>Barrie:</b> 15 Sperling Drive Barrie, ON L4M 6K9 (705) 721-7520 FAX (705) 721-1495	<input type="checkbox"/> <b>Collingwood:</b> 280 Pretty River Pkwy. Collingwood, ON L9Y 4J5 (705) 445-0804 FAX (705) 445-6498	<input type="checkbox"/> <b>Cookstown:</b> 2-25 King Street S. Cookstown, ON L0L 1L0 (705) 458-1103 FAX (705) 458-0105	<input type="checkbox"/> <b>Gravenhurst:</b> 2-5 Pineridge Gate, Gravenhurst, ON, P1P 1Z3 (705) 684-9090 FAX (705) 684-9887	<input type="checkbox"/> <b>Huntsville:</b> 34 Chaffey St. Huntsville, ON P1H 1K1 (705) 789-8813 FAX (705) 789-7245	<input type="checkbox"/> <b>Midland:</b> 1156 St. Andrew's Dr. Box 626, Midland, ON L4R 4L3 (705) 526-9324 FAX: (705) 526-1513	<input type="checkbox"/> <b>Orillia:</b> 12-575 West St., S. Orillia, ON L3V 7N6 (705) 325-9565 FAX (705) 325-2091
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*Your Health Connection*

## **A Description of Healthy Eating and Physical Activity Behaviours of Pregnant Women in the SMDHU Area.**

### **Health Care Provider Office Staff Overview and Instructions**

Simcoe Muskoka District Health Unit (SMDHU) is doing a research project on the eating and exercise habits of pregnant women who meet the following criteria:

- *at least 14 weeks pregnant*
- *at least 18 years old*
- *read English*

**Each envelope** has information for the pregnant woman on the outside and contains:

1. An information letter for pregnant woman to read.
2. Blank survey for pregnant woman to complete.

#### **Instructions for Office Staff:**

1. Inform eligible pregnant women that:
  - SMDHU is doing a research project about the eating and exercise habits of pregnant women.
  - All answers are considered confidential and will be anonymous.
  - Participants will receive a SMDHU canvas bag as a gift of appreciation.
  - Information about the survey is on the information letter.
2. Please emphasize that all responses are considered to be anonymous and confidential i.e. "There is no way your answers can be traced back to you".
3. Offer an envelope containing information letter and survey to every eligible pregnant woman. Each envelope should be placed on a clipboard with the attached picture of examples of ½ cup and one cup measures. The survey is meant to be completed while women are waiting to be seen by their Perinatal Healthcare Provider.
4. For women who refuse the survey, please mark a large X through the envelope and return this survey to the box with the other completed surveys.



5. Provide each woman who participates with a canvas bag from the health unit.
6. Request that each participant put their completed survey in the envelope, seal it shut and return it to you.
7. Once received, please write the date on the sealed survey envelope and place it in a box that is out of sight of patients.
8. Store all completed surveys in a locked cabinet while the office is closed. They will be picked up periodically by a local public health nurse, as negotiated.

**Important:**

1. You are not expected to assist participants with completion of the survey. It is okay if not all questions are completed.
2. Surveys must not be removed from the office.
3. A pregnant woman can only complete the survey once.
4. If a participant is unable (or unwilling) to complete the survey, please ask her to put her partially completed survey in the envelope, seal it shut and return it to you. Please include it with the completed surveys.

**If you have ANY questions, please contact Becky Blair, Public Health Nutritionist at 705-721-7520 ext. 7409 or [becky.blair@smdhu.org](mailto:becky.blair@smdhu.org).**

**Thank you for your help with our survey!**

February 17, 2011

## Healthy Weights in Pregnancy

### ***Resources for Health Care Professionals***

#### **Health Canada's Gestational Weight Gain Guidelines:**

Prenatal Nutrition Guidelines for Health Professionals: Gestational Weight Gain  
<http://hc-sc.gc.ca/fn-an/nutrition/prenatal/ewba-mbsa-eng.php>

#### **Other Clinical Practice Guidelines related to Gestational Weight Gain:**

SOGC Clinical Practice Guidelines: Obesity in Pregnancy (2010)  
<http://www.sogc.org/guidelines/documents/gui239ECPG1002.pdf>

Association of Ontario Midwives CPG No.12: The Management of Women with a High or Low Body Mass Index (2010)  
[http://www.aom.on.ca/files/Health\\_Care\\_Professionals/Clinical\\_Practice\\_Guidelines/CPG\\_BMI\\_July\\_2010\\_FINAL.pdf](http://www.aom.on.ca/files/Health_Care_Professionals/Clinical_Practice_Guidelines/CPG_BMI_July_2010_FINAL.pdf)

#### **Health Canada's Prenatal Nutrition Guidelines:**

Prenatal Nutrition Guidelines for Health Professionals: Background on CFG  
<http://www.hc-sc.gc.ca/fn-an/pubs/nutrition/guide-prenatal-eng.php>

Prenatal Nutrition Guidelines for Health Professionals: Folate  
<http://hc-sc.gc.ca/fn-an/pubs/nutrition/folate-eng.php>

Prenatal Nutrition Guidelines for Health Professionals: Iron  
<http://hc-sc.gc.ca/fn-an/pubs/nutrition/iron-fer-eng.php>

Prenatal Nutrition Guidelines for Health Professionals: Fish and Omega-3s Fatty Acids  
<http://hc-sc.gc.ca/fn-an/pubs/nutrition/omega3-eng.php>

#### **Physical Activity during Pregnancy Clinical Practice Guidelines:**

Joint SOGC/CSEP Clinical Practice Guidelines: Exercise in Pregnancy and the Postpartum Period  
<http://www.sogc.org/guidelines/public/129E-JCPG-June2003.pdf>

PARmed-X for Pregnancy (Physical Activity Readiness Medical Examination)  
<http://www.csep.ca/cmfiles/publications/parq/parmed-xpreg.pdf>

**Have questions? Contact *Your Health Connection*: (705) 721-7520 or 1-877-721-7520 .**

## Appendix 5 – Map of Simcoe Muskoka

