



# **Guidelines for Weight Gain During Pregnancy**

## **A Focused Practice Question**

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## Key Messages

1. The Institute of Medicine (IOM) has developed a high quality guideline that provides recommendations on the total amount and rate of weight gain during pregnancy.
2. The recommended amount of weight gain during pregnancy is a range that is based on a woman's pre-pregnancy body mass index (BMI). These ranges were established based on the weight gain associated with the lowest prevalence of adverse pregnancy outcomes and are applicable to all women with singleton pregnancies.
  - For women in the underweight category (BMI <18) prior to pregnancy, 12.5-18 kg (28-40 lbs) is the recommended weight gain during pregnancy.
  - For women in the normal weight category (BMI 18.5-24.9) prior to pregnancy, 11.5 - 16 kg (25-35 lbs) is the recommended weight gain during pregnancy.
  - For women in the overweight category (BMI 25.0-29.0) prior to pregnancy, 7-11.5 kg (15-25 lbs) is the recommended weight gain during pregnancy.
  - For women in the obese category (BMI  $\geq$  30) prior to pregnancy, 5 - 9 kg (11-20 lbs) is the recommended weight gain during pregnancy.
3. Provisional guidelines have been developed for gestational weight gain among women carrying multiples.

## 1. Issue & Context

National data indicate that approximately half of women with a healthy weight when they become pregnant gain too much weight during their pregnancy. (1) Among women who are overweight prior to pregnancy, 68% experience excessive gestational weight gain.(1) Similar trends are observed in Peel for the year 2014 and are being monitored as the quality of the data improve.(2)

The 2014 data for pre-pregnancy body mass index and gestational weight gain are reportable for a subpopulation of 51% of Peel women in the Better Outcomes Registry and Network (BORN). (2) Of these women, 49% were classified as normal weight prior to pregnancy, but almost 35% were overweight or obese. (2) More than half of women who were overweight prior to pregnancy gained more weight than recommended. In addition, 35% of women with a normal weight exceeded the recommended weight gain (Table 1). (2)

A woman's pre-pregnancy body mass index, as well as the weight she gains during pregnancy, is associated with adverse outcomes for both the mother and infant. These outcomes of interest may include, but are not limited to, pregnancy induced hypertension, gestational diabetes, preterm births, caesarean section, infant birthweight, and breastfeeding.

Based on available data and the potential impact of unhealthy weight gain on maternal and infant health, the Family Health Division has prioritized the need for pregnant women and women of childbearing age to achieve and maintain a healthy body weight.

**Table 1. Maternal Pre-Pregnancy Body Mass Index (BMI) and Maternal Weight Gain by Institute of Medicine (IOM) Guideline Recommendations, Peel, 2014**

Total weight gain by IOM Guideline (2009)	Women by maternal pre-pregnancy BMI category (kg/m <sup>2</sup> )								Total number of women
	Underweight (<18.5)		Normal (18.5-24.9)		Overweight (25.0-29.9)		Obese (≥30.0)		
	Number	%	Number	%	Number	%	Number	%	
Below recommendation	117	26.5	819	22.6	176	10.9	98	10.2	1,210
Within recommendation	176	39.9	1,173	32.4	405	25.3	208	21.6	1,962
Above recommendation	104	23.6	1,278	35.3	870	54.3	512	53.1	2,764
Total number of women	441		3,616		1,603		965		

\*Caution should be taken when interpreting data in the figure above. Missing responses are included for the main indicator presented. Maternal BMI Category was missing for 10.7% of singleton live birth records in Peel in 2014.

Note: In this region, we are able to report on 51% of women who have a pre-pregnancy BMI or gestational weight gain recorded in the BORN Information System for 2014.

BORN's Maternal Weight Gain Recommended Group variable best aligns with the recommended weight gain ranges outlined within the Institute of Medicine's (IOM) guideline. (4) Mothers who lost weight during their pregnancy were not included in the analysis.

Source: Public Health Unit Analytic Reporting Tool (Cube), BORN Information System (BIS), BORN Ontario. Information accessed on February 29, 2016

Currently, the Family Health Division's messaging regarding gestational weight gain is based on the *Prenatal Nutrition Guidelines for Health Professionals* from Health Canada.(3) This guideline from Health Canada is also commonly cited by other Canadian health agencies. Health Canada's recommendations for gestational weight gain are adapted from the Institute of Medicine's (IOM's) report *Weight Gain During Pregnancy: Re-examining the Guidelines*. (4) Given that staff uses the Health Canada guideline to inform their practice, they need to be aware of the quality of the IOM guideline on which Health Canada's recommendations are based as well as whether they align with other sources.

We need to determine optimal weight gain during pregnancy in order to interpret local data on gestational weight gain and describe the magnitude of the problem in Peel

Region. In addition, these recommendations may inform public health programming focused on healthy weight gain in pregnancy.

## **2. Literature Review Question**

What is the recommended amount of weight gain during pregnancy for women in the general population?

## **3. Literature Search**

We conducted a grey literature search of key websites to identify guidelines providing recommendations about the amount of weight that should be gained during pregnancy. The search included: Turning Research into Practice (TRIP) database, National Guideline Clearinghouse, National Institute for Health Care Excellence (NICE), Society of Obstetricians and Gynaecologists of Canada (SOGC), Health Canada, Public Health Agency of Canada, Public Health Ontario, Centers for Disease Control and Prevention (CDC), Institute of Medicine, and the World Health Organization. The search was completed in November 2015 and is outlined in Appendix A.

## **4. Relevance Assessment**

One reviewer completed the search and screened all titles and abstracts for inclusion. Six potentially relevant guidelines were reviewed in full text. If relevance was still unclear after full text review, a second reviewer was consulted. Any disagreements were discussed with a third party. The search results were assessed for relevance based on the following criteria:

- Inclusion criteria: guideline; English language; published in the last 10 years; pregnant women; provision of recommendations regarding amount of weight gain during pregnancy; settings similar to Canada
- Exclusion criteria: duplicates; focus exclusively on weight management during pregnancy

## **5. Results of the Search**

Ten websites were searched which resulted in 533 titles being screened. Six guidelines were reviewed in full and two relevant guidelines were identified for inclusion. Refer to Appendix B.

## **6. Critical Appraisal**

Two reviewers independently completed the critical appraisal of the two guidelines using the AGREE II tool. The two reviewers met to discuss the quality assessment results and disagreements were resolved with discussion until consensus was reached. The IOM guideline (4) was rated as high quality. The guideline from SOGC (5) was rated moderate given that the level of detail provided about the literature review was insufficient to determine if the guideline was developed using a systematic process.

## **7. Description of Included Studies**

Two relevant guidelines were included:

- Institute of Medicine (IOM) and National Research Council (NRC). (2009).  
Weight gain during pregnancy: Re-examining the guidelines.(4)

- Society of Obstetricians and Gynaecologists of Canada (SOGC). (2010). Clinical practice guideline: Obesity in pregnancy.(5)

### **IOM Guideline (2009)**

The IOM has developed a strong quality guideline that is referred to internationally. It provides guidance on the optimal amount and rate of weight gain during pregnancy according to a woman's pre-pregnancy body mass index (BMI). These recommendations are a revision of the previous guideline for gestational weight gain released by the IOM in 1990. The guideline is intended for use by health care providers, federal, state and local agencies, medical and public health organizations, as well as private voluntary organizations that have a role in the provision of prenatal care. The recommendations are intended for women in the United States. The guideline indicates that although the recommendations may be applicable to women in other developed countries they should not be used with populations that are substantially shorter or thinner than American women or in developing countries where obstetric services are not available.

The evidence used to inform this guideline included: a systematic review on the outcomes of gestational weight gain, a literature review of studies published before or after the systematic review, consultation with experts, and four commissioned data analyses. Some of the key outcomes considered in the systematic review included: gestational diabetes, hypertensive disorders, preterm birth, caesarean delivery, birthweight, macrosomia, large for gestational age, small for gestational age, breastfeeding initiation and postpartum weight retention (Refer to Appendix C).



The evidence included in the systematic review was observational research which demonstrated associations between gestational weight gain and specific outcomes of interest; however this research evidence could not be used to establish causal relationships. For this focused practice question, we concentrated on overall recommendations for optimal weight gain during pregnancy and did not extract data from the systematic review on outcomes associated with weight gain during pregnancy. Refer to the data extraction tables in Appendix C for further details about this guideline.

### **SOGC (2010)**

The SOGC guideline provides recommendations for counselling on and management of weight gain in obese pregnant women. It includes guidance on weight gain during pregnancy for women in all BMI categories. The guideline is intended for use by health professionals as well as federal and provincial health agencies in Canada. The authors conducted a literature review and consulted experts to develop recommendations; however, the methodology of the guideline development is not clearly described. The guideline outlines the impact of obesity in pregnancy on several key outcomes such as spontaneous abortion, hypertensive disorders of pregnancy, gestational diabetes, macrosomia, shoulder dystocia, caesarean section and thromboembolism. Refer to the data extraction table in Appendix C for further information regarding the SOGC guideline.

## 8. Synthesis of Findings

- **The recommended amount of weight that a woman gains during her pregnancy is a range that is based on her pre-pregnancy body mass index (BMI).**
- **For women with a normal weight, 11.5 - 16 kg (25-35 lbs) is the recommended weight gain during pregnancy.**
- **These ranges are applicable to all women with singleton pregnancies.**
- **Provisional guidelines have been developed for gestational weight gain among women carrying multiples.**

Both guidelines included in this evidence review provide weight gain recommendations specific to a woman's pre-pregnancy BMI category. These BMI categories for underweight, normal weight, overweight and obese were developed by the World Health Organization and have been adopted internationally to classify weight status for all adults.(4) The optimal amount of weight gain during pregnancy is corroborated in the guidelines that were reviewed. However, one minor difference is that the SOGC guideline advises pregnant women in the obese category (BMI  $\geq 30.0$ ) to gain 7kg (15 lbs) total (5) and the IOM guideline indicates that obese women should gain in the range of 5-9 kg (11-20lbs) total during pregnancy (see Table 2).

**Table 2. Comparison of recommended maternal weight gain for singleton pregnancies**

Pre-pregnancy BMI	Weight gain range in kg	
	<b>IOM</b>	<b>SOGC</b>
Underweight <18.5	12.5 - 18	12.5 - 18
Normal weight 18.5-24.9	11.5 - 16	11.5 - 16
Overweight 25.0-29.9	7 - 11.5	7 - 11.5
Obese ≥ 30.0	5 - 9	7

It is important to note that the amount of weight gain for obese women proposed by the SOGC still falls within the weight-gain range recommended by the IOM.

The IOM guideline examined the evidence to determine if specific subgroups may need different weight gain recommendations for pregnancy (e.g. women of short stature, adolescents, racial/ethnic groups, obesity class II and III, parity, and smokers).(4) There was no evidence available at the time that this guideline was developed that indicated different gestational recommendations were necessary for particular subpopulations.

Based on the IOM's review of available research, modified guidelines were justified for women expecting multiples. (4) Limited evidence indicates that similar to singleton pregnancies, optimal weight gain for women expecting twins varies by pre-pregnancy BMI. The IOM included provisional guidelines for weight gain during pregnancy among women carrying multiple fetuses based on the limited data available (see Table 3). At the time that the IOM guideline was developed, no data were available to formulate recommendations for underweight women expecting twins or for women carrying more than two fetuses.

**Table 3. Provisional guidelines for maternal weight gain for women with multiples. (4)**

Pre-pregnancy BMI	Recommended total weight gain (kg)
Normal weight 18.5-24.9	17 - 25
Overweight 25.0-29.9	14 - 23
Obese ≥ 30.0	11 - 19

## **9. Recommendations**

Given that the recommendations for optimal weight gain during pregnancy are consistent, it is recommended that the Family Health Division:

1. Use the IOM guideline to interpret local data and determine if there is a problem of excessive gestational weight gain in Peel Region and monitor this data on an ongoing basis to observe trends over time.
2. Refer to the IOM guidelines when developing or revising Peel Public Health resources that provide information about healthy weight gain during pregnancy.
3. Inform Family Health staff of the purpose, findings and recommendations from this evidence review by way of written advisory given that a significant change in practice is not required.
4. Share the findings of this evidence review with BORN. There is a lack of clarity in the BORN data dictionary about which guideline was used to calculate the proportion of women who gained more or less weight than gestational weight gain recommendations. Exploratory analyses were performed to determine the weight gain recommendations used. The results of this evidence review and exploratory

analyses should be shared with BORN to clarify which guideline is being used to determine appropriate weight gain and to recommend that the guideline used should be included in future data dictionary release.

5. Determine if it is necessary to review additional research evidence: i) to understand the effect of the current IOM guidelines on maternal and child health outcomes from studies published after 2009 when the IOM guideline was last updated and ii) to identify effective public health interventions to promote optimal weight gain among pregnant women that are applicable to Peel Region.

## References

- 1) Public Health Agency of Canada. What mothers say: The Canadian maternity experiences survey. Ottawa, 2009.
- 2) Public Health Unit Analytic Reporting Tool (Cube). BORN Information System (BIS), BORN Ontario. Information accessed on February 29, 2016.
- 3) Health Canada. Prenatal nutrition guidelines for health professionals: Gestational weight gain [Internet]. Ottawa: Health Canada; 2010. Available from: [http://www.hc-sc.gc.ca/fn-an/alt\\_formats/pdf/nutrition/prenatal/ewba-mbsa-eng.pdf](http://www.hc-sc.gc.ca/fn-an/alt_formats/pdf/nutrition/prenatal/ewba-mbsa-eng.pdf)
- 4) Institute of Medicine (IOM) and National Research Council (NRC). Weight gain during pregnancy: Re-examining the guidelines. Washington, DC: The National Academies Press; 2009. Available from: <http://iom.nationalacademies.org/en/Reports/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines.aspx>
- 5) Society of Obstetricians and Gynaecologists. Clinical practice guideline: Obesity in pregnancy. J Obstet Gynaecol Can. 2010 Feb; 32(2):165-73. [Internet] Available from: <http://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf>
- 6) Viswanathan M, Siega-Riz AM, Moos MK, Deierlein A, Mumford S, Knaack J, Thieda P, Lux LJ, Lohr, KN. (2008) Outcomes of maternal weight gain. Evidence report/Technology assessment number. 168. Rockville, MD: Agency of Healthcare Research and Quality (AHRQ).

## **Appendices**

**Appendix A: Search Strategy**

**Appendix B: Grey Literature Search Flowchart**

**Appendix C: Data Extraction Tables**

## Appendix A: Search Strategy

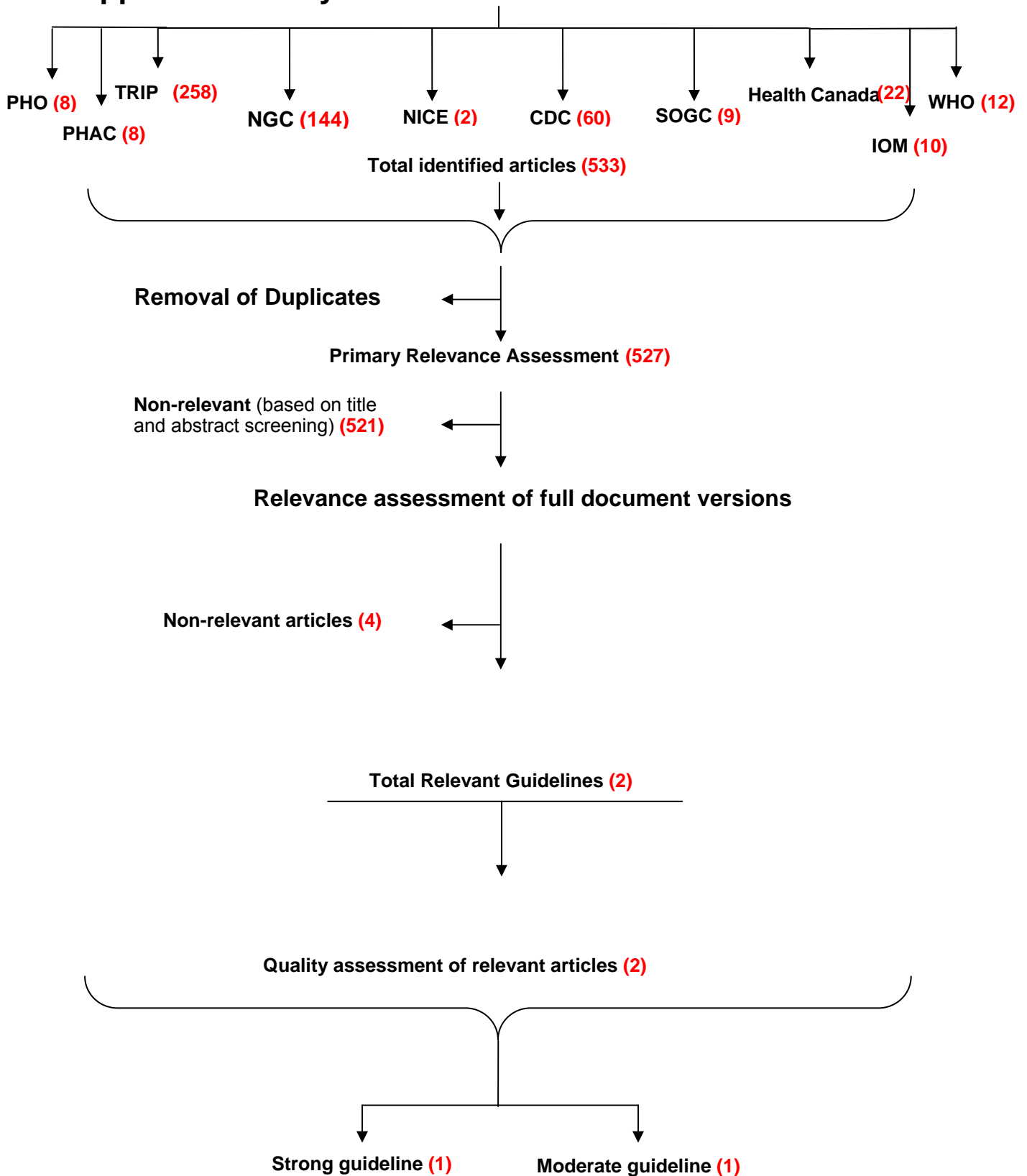
Searches conducted in November 2015

Database	Search Terms	Results
<b>1. TRIP</b>	<p>("gestational weight gain"), limit to guidelines</p> <p>("gestational" OR "pregnan*") AND ("weight gain"), limit to guidelines</p> <p>Also tried: ("gestational" OR "pregnan*") AND ("weight"), limit to guidelines – TOO MANY HITS (1,096) – first 50 not relevant therefore this search string was not used.</p>	<p>10</p> <p>248</p> <p>n/a</p>
<b>2. National Guideline Clearinghouse</b>	<p>("gestational weight gain")</p> <p>("gestational" OR "pregnan*") AND ("weight")</p>	<p>36</p> <p>108</p>
<b>3. NICE</b>	<p>("gestational weight gain")</p>	<p>2 (1 duplicate)</p>
<b>4. CDC</b>	<p>("gestational weight gain") AND ("guideline*")</p> <p>("gestational" OR "pregnan*") AND ("weight")</p>	<p>~ 30</p> <p>~30 Exact # of hits not provided – reviewed first two pages of results for each search and found none relevant</p>
<b>5. Society of Obstetricians and Gynaecologists of Canada</b>	<p>"weight"</p> <p>Site had primitive search functions</p> <p>Also scanned all titles of clinical practice guidelines</p>	<p>9 (1 duplicate)</p>
<b>6. Health Canada</b>	<p>("gestational weight gain")</p> <p>("gestational" OR "pregnan*") AND ("weight")</p>	<p>13</p> <p>9</p>



<b>7. Public Health Agency of Canada</b>	("gestational weight gain")	7
	("gestational" OR "pregnan*") AND ("weight")	1
<b>8. Public Health Ontario</b>	("gestational weight gain")	8
	("gestational" OR "pregnan*") AND ("weight")	0
<b>9. World Health Organization</b>	("gestational weight gain")	12
	("gestational" OR "pregnan*") AND ("weight")	
<b>10. Institute of Medicine</b>	("gestational weight gain")	10
	<b>TOTAL</b>	<b>533</b>

## Appendix B: Grey Literature Search Flowchart



## Appendix C: Data Extraction Tables

<b>Data Extraction for Guidelines</b>	
Last revised: 2016-02-07	
<b>Guideline #1</b> Weight Gain During Pregnancy: Re-examining the Guidelines <a href="http://iom.nationalacademies.org/en/Reports/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines.aspx">http://iom.nationalacademies.org/en/Reports/2009/Weight-Gain-During-Pregnancy-Reexamining-the-Guidelines.aspx</a>	
Authors, Date, Country	Institute of Medicine, 2009 United States of America
Quality Assessment	Rated 6/7 (strong) and recommended for use by two independent appraisers (JM & SL) using AGREE II tool.  The critical appraisal revealed that the editorial independence of the guideline developers is not discussed and a schedule for updating the guideline is not provided.
Generalizability	These guidelines are intended for use among women in the United States. They may be applicable to women in other developed countries however they are not intended for use in areas of the world where women are substantially shorter or thinner than American women or where adequate obstetric services are unavailable. (p. 242)
<b>Details of the Guideline</b>	
Focus & Objective(s)	To review evidence on the relationship between weight gain patterns before, during and after pregnancy and maternal and child health outcomes and recommend revisions to existing guidelines where necessary.
Target Audience	Health care providers, those who provide prenatal care, federal, state and local agencies, private voluntary organizations, medical and public health organizations.
Evidence Used to Develop the Guideline	<ul style="list-style-type: none"> <li>• Systematic review of outcomes of gestational weight gain (6)</li> <li>• Literature review (of studies published before or after the date limits used for the systematic review).</li> <li>• Consultation with experts</li> <li>• Four additional data analyses commissioned by the guideline developers:               <ol style="list-style-type: none"> <li>i. Analyses from the Danish National Birth Cohort on low and very high categories of gestational weight gain (GWG), as well as data for obese class I, II and III women and subgroups pregnant women, such as primiparous, short and young women, and smokers.</li> <li>ii. Analysis of data from the 1988 National Maternal and Infant Health Survey (NMIHS) on the association between GWG and pregnancy outcomes by race and on the association between GWG and postpartum weight retention.</li> <li>iii. Data on adverse outcomes associated with GWG stratified by racial/ethnic group using births data from 1995-2003 in New York City.</li> <li>iv. Quantitative analysis of risk trade-offs between maternal and child health outcomes associated with GWG.</li> </ol> </li> </ul>

<p>Overall Relevant Recommendations from the Guideline</p> <p>Note: Only recommendations that answered the focused practice question were extracted</p>	<p>Ranges of optimal gestational weight gain for each pre-pregnancy BMI category are based on EXPERT CONSENSUS informed by a systematic analysis of the sources of evidence listed above.</p> <p>Recommended ranges were formulated based on the gestational weight gain values associated with the lowest prevalence of the most significant maternal and infant outcomes of weight gain in pregnancy based on findings from the review of evidence. These key outcomes included: i) caesarean delivery, 2) postpartum weight retention, 3) preterm birth, 4) small or large for gestational age, and 5) childhood obesity.</p> <p>For each category of pre-pregnancy BMI, the guideline development committee considered:</p> <ul style="list-style-type: none"> <li>○ Incidence or prevalence of each of the key outcomes</li> <li>○ Whether the outcomes were permanent or potentially modifiable</li> <li>○ The quality of available data</li> <li>○ Risk analysis</li> <li>○ Acceptability by clinicians and clients</li> </ul> <p>Recommended weight gain for singleton pregnancies:</p> <p style="text-align: center;"><b>Total and rate of weight gain during pregnancy, by pre-pregnancy BMI</b></p> <table border="1" data-bbox="532 1073 1479 1650"> <thead> <tr> <th rowspan="2">Pre-pregnancy BMI</th> <th colspan="2">Total weight gain</th> <th colspan="2">Rates of weight gain* 2<sup>nd</sup> &amp; 3<sup>rd</sup> trimester</th> </tr> <tr> <th>Range in kg</th> <th>Range in lbs</th> <th>Mean (range) in kg/week</th> <th>Mean (range) in lbs/week</th> </tr> </thead> <tbody> <tr> <td>Underweight &lt;18.5 kg/m<sup>2</sup></td> <td>12.5-18</td> <td>28-40</td> <td>0.51 (0.44-0.58)</td> <td>1 (1-1.3)</td> </tr> <tr> <td>Normal weight 18.5-24.9 kg/m<sup>2</sup></td> <td>11.5-16</td> <td>25-35</td> <td>0.42 (0.35-0.50)</td> <td>1 (0.8-1)</td> </tr> <tr> <td>Overweight 25.0-29.9 kg/ m<sup>2</sup></td> <td>7-11.5</td> <td>15-25</td> <td>0.28 (0.23-0.33)</td> <td>0.6 (0.5-0.7)</td> </tr> <tr> <td>Obese ≥ 30.0 kg/ m<sup>2</sup></td> <td>5-9</td> <td>11-20</td> <td>0.22 (0.17-0.27)</td> <td>0.5 (0.4-0.6)</td> </tr> </tbody> </table> <p>*Calculations assumed a 0.5-2 kg (1.1-4.4 lbs) weight gain in the first trimester (based on Siega-Riz et al., 1994; Abrams et al., 1995; Carmichael et al., 1997)</p>	Pre-pregnancy BMI	Total weight gain		Rates of weight gain* 2 <sup>nd</sup> & 3 <sup>rd</sup> trimester		Range in kg	Range in lbs	Mean (range) in kg/week	Mean (range) in lbs/week	Underweight <18.5 kg/m <sup>2</sup>	12.5-18	28-40	0.51 (0.44-0.58)	1 (1-1.3)	Normal weight 18.5-24.9 kg/m <sup>2</sup>	11.5-16	25-35	0.42 (0.35-0.50)	1 (0.8-1)	Overweight 25.0-29.9 kg/ m <sup>2</sup>	7-11.5	15-25	0.28 (0.23-0.33)	0.6 (0.5-0.7)	Obese ≥ 30.0 kg/ m <sup>2</sup>	5-9	11-20	0.22 (0.17-0.27)	0.5 (0.4-0.6)
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	<p><b>Provisional guidelines for gestational weight gain for women with multiple fetuses</b></p> <table border="1" data-bbox="532 296 1474 573"> <thead> <tr> <th rowspan="2">Pre-pregnancy BMI</th> <th colspan="2">Recommended total weight gain</th> </tr> <tr> <th>kg</th> <th>lbs</th> </tr> </thead> <tbody> <tr> <td>Normal weight 18.5-24.9</td> <td>17-25</td> <td>37-54</td> </tr> <tr> <td>Overweight 25.0-29.9</td> <td>14-23</td> <td>31-50</td> </tr> <tr> <td>Obese ≥ 30.0</td> <td>11-19</td> <td>25-42</td> </tr> </tbody> </table> <p>“Data sources do not provide sufficient information to develop provisional guidelines for underweight women. These provisional guidelines reflect the interquartile (25<sup>th</sup>-75<sup>th</sup>) range among women who delivered their twin, who weighed ≥2,500g on average, at 37-42 weeks gestation.” p. 252</p>	Pre-pregnancy BMI	Recommended total weight gain		kg	lbs	Normal weight 18.5-24.9	17-25	37-54	Overweight 25.0-29.9	14-23	31-50	Obese ≥ 30.0	11-19	25-42
Pre-pregnancy BMI	Recommended total weight gain														
	kg	lbs													
Normal weight 18.5-24.9	17-25	37-54													
Overweight 25.0-29.9	14-23	31-50													
Obese ≥ 30.0	11-19	25-42													
Comments/Limitations	<p>The observational studies used to inform this guideline demonstrate relationships between GWG and specific outcomes; however these associations do not demonstrate causal relationships.</p> <p>In addition it should be noted that this guideline has not been updated and the guideline authors do not provide a plan to review and/or update the guideline.</p>														
<p>NOTE: The following outlines the methods of the systematic review and literature review that were conducted to inform this guideline. The information below does not include details of the consultation with experts or additional data analyses.</p>															
<p><b>Details of the systematic review(6) and literature review</b></p>															
Focus of the systematic review and literature review that informed this guideline	<ol style="list-style-type: none"> <li>1. Systematic review <ul style="list-style-type: none"> <li>• Outcomes of gestational weight gain with specific attention to: <ul style="list-style-type: none"> <li>○ Weight gain during pregnancy and association with i) birth outcomes, ii) infant health outcomes, and iii) maternal health outcome and their confounders and effect modifiers.</li> <li>○ Gestational weight gain within or outside the 1990 Institute of Medicine (IOM) guidelines for weight gain during pregnancy.</li> <li>○ Risks and benefits of weight gain recommendations for pregnant women.</li> <li>○ Anthropometric measure of weight gain in pregnancy.</li> </ul> </li> </ul> </li> <li>2. Literature review <ul style="list-style-type: none"> <li>• Consequences of gestational weight gain for the mother and infant described in literature published before and after the date limits used for the systematic review.</li> </ul> </li> </ol>														
Date of Search	<ol style="list-style-type: none"> <li>1. 1990-October 2007</li> <li>2. Before 1990, after October 2007 until 2009</li> </ol>														
Databases Searched	<ol style="list-style-type: none"> <li>1. Systematic review <ul style="list-style-type: none"> <li>• MEDLINE, Cochrane Collaboration, CINAHL, Embase.</li> <li>• Hand-searched reference lists of relevant articles and consulted with experts to identify any additional studies or any research underway and not yet published.</li> </ul> </li> <li>2. Medline, Science Direct, WorldCat/First Search</li> </ol>														

Inclusion and Exclusion Criteria	<p>Systematic review &amp; literature review:</p> <p><u>Inclusion</u>: women of any age with singleton pregnancies, pre-pregnancy body mass index (BMI) or weight must be accounted for in relationship between maternal weight gain and outcome, studies conducted in developed nations: United States, Canada, Western Europe, Japan, Australia, New Zealand, publication after 1990 (when last guidelines for GWG were released), English language, Study designs: Systematic reviews, meta-analyses, Controlled trials (n≥40), nonrandomized controlled trials (n≥40), prospective trials with historical controls (n≥40), prospective or retrospective observational cohort studies (n≥40), and medium to large case series (n≥100)</p> <p><u>Exclusion</u>: studies with a small sample size (case series &lt;100 and cohorts &lt;40), studies that failed to control for pregravid weight, studies limited to women with pre-existing health conditions</p>
Number of Studies	<ol style="list-style-type: none"> <li>1. Systematic review <ul style="list-style-type: none"> <li>• 150 studies</li> </ul> </li> <li>2. Literature review <ul style="list-style-type: none"> <li>• 33 additional studies not included in the systematic review</li> </ul> </li> </ol>
Types of Studies included	<p>Systematic review &amp; literature review</p> <ul style="list-style-type: none"> <li>• RCTs, Prospective cohort, retrospective cohort and case-control studies</li> </ul>
Outcomes Included	<p><b>Maternal outcomes</b></p> <p><u>Antepartum period</u>: abnormal glucose metabolism and gestational diabetes, maternal discomforts in pregnancy, hyperemesis, hypertensive disorders, gallstones.</p> <p><u>Intrapartum period</u>: premature rupture of membranes, preterm labour, postterm pregnancy, induction of labour, length of labour, mode of delivery, vaginal birth after caesarean, vaginal lacerations, shoulder dystocia, cephalopelvic disproportion, complications of labour and delivery.</p> <p><u>Postpartum period</u>: lactation, weight retention, premenopausal breast cancer, postpartum depression and maternal mortality.</p> <p><b>Birth outcomes</b>: preterm birth, birthweight, low birthweight, macrosomia, large for gestational age, small for gestational age, apgar scores.</p> <p><b>Infant outcomes</b>: perinatal mortality, birth defects, breastfeeding initiation and maintenance, neonatal hypoglycemia, neonatal distress, hyperbilirubinemia, neonatal hospitalization, other infant morbidity, infant BMI, infant growth, childhood weight status, childhood hospitalizations.</p>

<b>Data Extraction for Guidelines</b>																						
Last revised: 2016-02-07																						
<b>Guideline #2</b>																						
Clinical Practice Guideline: Obesity in Pregnancy <a href="http://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf">http://sogc.org/wp-content/uploads/2013/01/gui239ECPG1002.pdf</a>																						
Authors, Date, Country	Society of Obstetricians and Gynaecologists of Canada (SOGC), 2010 Canada																					
Quality Assessment	Rated 4/7 (moderate) by two appraisers (JM & SL) using AGREE II tool.																					
Generalizability	Intended for obese pregnant women in Canada																					
<b>Details of the Guideline</b>																						
Focus & Objective(s)	To review the evidence and provide recommendations for the counselling and management of obese parturients.																					
Target Audience	Healthcare professionals																					
Evidence Used to Develop the Guideline	<ul style="list-style-type: none"> <li>Literature review</li> </ul>																					
Overall Relevant Recommendations from the Guideline	<p style="text-align: center;"><b>Pregnancy weight gain based on BMI</b></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>BMI range</th> <th>Suggested weight gain (kg)</th> </tr> </thead> <tbody> <tr> <td>Underweight</td> <td>&lt;18.5</td> <td>12.5-18</td> </tr> <tr> <td>Normal weight</td> <td>18.5-24.9</td> <td>11.5-16</td> </tr> <tr> <td>Overweight</td> <td>25.0-29.9</td> <td>7-11.5</td> </tr> <tr> <td>Obese class I</td> <td>30.0-34.9</td> <td>7</td> </tr> <tr> <td>Obese class II</td> <td>35.0-39.9</td> <td>7</td> </tr> <tr> <td>Obese class III</td> <td>≥40.0</td> <td>7</td> </tr> </tbody> </table> <p>EXPERT CONSENSUS</p>		BMI range	Suggested weight gain (kg)	Underweight	<18.5	12.5-18	Normal weight	18.5-24.9	11.5-16	Overweight	25.0-29.9	7-11.5	Obese class I	30.0-34.9	7	Obese class II	35.0-39.9	7	Obese class III	≥40.0	7
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Note: Only recommendations that answered the focused practice question were extracted																						
Comments/Limitations	The guideline authors do not provide details about the studies included in the literature review, process for determining what evidence was included/excluded, quality assessment, data extraction, or how the specific recommendations for optimal weight gain were determined. The information contained within this guideline should be used with caution.																					
NOTE: The following outlines the methods of the literature review that were conducted to inform this guideline.																						
<b>Details of the literature review:</b>																						
Focus of the review that informed this guideline	<ul style="list-style-type: none"> <li>Impact of maternal obesity on the provision of antenatal and intrapartum care, maternal morbidity and mortality, and perinatal morbidity and mortality.</li> </ul>																					
Date of Search	<ul style="list-style-type: none"> <li>Up until April 2009</li> </ul>																					
Databases Searched	<ul style="list-style-type: none"> <li>Statistics Canada, Medline, Cochrane library</li> <li>Grey literature: health technology assessment websites/agencies, clinical practice guideline collections, clinical trial registries, national and international medical speciality societies.</li> </ul>																					
Inclusion and Exclusion Criteria	<p><u>Inclusion</u>: systematic reviews, randomized controlled trials/controlled clinical trials and observational studies. No date or language restrictions</p> <p><u>Exclusion</u>: none specified</p>																					
Number of Studies	<ul style="list-style-type: none"> <li>Not specified</li> </ul>																					
Types of Studies included	<ul style="list-style-type: none"> <li>Cohort studies (prospective or retrospective), case control studies,</li> </ul>																					

	descriptive studies and expert opinion from reports, respected authorities or expert committees.
Outcomes Included	<p>Outcomes associated with maternal obesity</p> <p><b>Maternal:</b> Spontaneous abortion, hypertensive disorders of pregnancy, gestational diabetes.</p> <p><b>Intrapartum:</b> Macrosomia, shoulder dystocia, Caesarean section, Thromboembolism</p> <p><b>Infant:</b> Stillbirth, childhood obesity</p>