

Guidance for Healthy Weight Gain in Pregnancy

2014

The advice in this guidance is for health practitioners. Advice for pregnant women is available on the Ministry of Health's Your Health webpage (www.health.govt.nz/your-health/healthy-living/pregnancy).

Citation: Ministry of Health. 2014. *Guidance for Healthy Weight Gain in Pregnancy*. Wellington: Ministry of Health.

Published in June 2014
by the Ministry of Health
PO Box 5013, Wellington 6145, New Zealand

ISBN 978 0 478 42836-0 (online)
HP 5907

This document is available at www.health.govt.nz



MANATŪ HAUORA

Acknowledgements

This guidance was written by Dr Harriette Carr (Ministry of Health), with peer review by: Bronwen Pelvin, Kass Ozturk, Elizabeth Aitken, Aimee Hadrup, Dr Pat Tuohy and Alison Hussey (Ministry of Health).

The Ministry of Health would like to thank the following people and organisations that were involved in the development of the guidelines:

- Norma Campbell: Midwifery Advisor – Quality & Sector Liaison, New Zealand College of Midwives
- Dr Lesley Dixon: Midwifery Advisor – Practice Advice & Research Development, New Zealand College of Midwives
- Emma Jeffs: Dietitian, Canterbury District Health Board
- Helen Little: Clinical Manager Nutrition Services, Canterbury District Health Board and representative of Dietitians New Zealand
- Professor Lesley McCowan: Head of Department, Sub-specialist in Maternal Fetal Medicine, Department of Obstetrics and Gynaecology, Faculty of Medical and Health Science, University of Auckland and representative of the New Zealand Committee of the Royal Australian and New Zealand College of Obstetrics and Gynaecology
- Dr Helen Paterson: Senior Lecturer, Obstetrician and Gynaecologist, University of Otago
- Dr Frances Townsend: Senior Advisor Policy, The Royal New Zealand College of General Practitioners
- and a range of health practitioners and others who provided feedback during consultation phases.

Contents

Acknowledgements	iii
Introduction	1
Background	1
Context	2
Advice for health practitioners	3
Pre-pregnancy	3
During pregnancy	4
Postpartum	8
Glossary	9
Appendices	
Appendix 1: Useful resources about weight management and good nutrition during pregnancy	10
Appendix 2: Algorithm for weight management in non-pregnant adults	11
References and bibliography	12
List of tables	
Table 1: Recommendations for total and rate of weight gain during pregnancy, by pre-pregnancy BMI	5

Introduction

It is normal for women to gain some weight during pregnancy due to the growth of the fetus, placenta and amniotic fluid. However, too much extra weight during pregnancy can lead to adverse outcomes for the mother and/or baby. The amount of weight that a woman can expect to gain during pregnancy varies depending on the woman's existing weight and height. This document provides guidance to support optimal weight gain for the individual woman during pregnancy.

Healthy eating is especially important during pregnancy as it supports optimal fetal growth and development. Physical activity along with good nutrition will contribute to a healthy pregnancy weight. Advice for healthy eating and activity during pregnancy and throughout life is available in the Ministry's Food and Nutrition Guidelines series and is not repeated in detail here.

Links to useful guidelines, weight management tools and other relevant consumer information mentioned in this document can be found in Appendix 1: Useful resources about weight management and good nutrition during pregnancy.

Background

Obesity is affecting an increasing number of women of reproductive age. Many women enter pregnancy already overweight or obese, and this is associated with a range of complications for both mother and baby. Losing weight during pregnancy is not recommended due to the increased risk it poses of having a low birth weight baby (Catalano et al 2014). However, the amount of weight gained during pregnancy can be modified.

In 2009, the Institute of Medicine (IOM) published updated guidelines for weight gain during pregnancy (IOM and NRC 2009), recommending that women who are obese should aim for lower weight gains than had been recommended in previous guidelines.

Achieving optimal weight gain during pregnancy is associated with improved outcomes for the mother and the baby regardless of the mother's existing body mass index (BMI). Excessive gestational weight gain (GWG) using IOM criteria increases maternal risks for:

- pre-eclampsia
- gestational diabetes
- caesarean section
- weight retention postpartum with associated long-term health consequences (Nehring et al 2011; Alavi et al 2013).

Excessive GWG has also been associated with lifelong consequences for the baby, including a fourfold increased risk of large-for-gestational-age (LGA) infants (Chung et al 2013) and a consistent increase in BMI and blood pressure and an abnormal metabolic profile in childhood and early adult life (Fraser et al 2010; Mamun et al 2009; Oken et al 2007). Low GWG is associated with preterm birth and increased risk of small-for-gestational-age (SGA) infants (Alavi et al 2013; Chung et al 2013).

The limited evidence available suggests that ethnicity does not modify the association between GWG and the outcome of pregnancy, although further research is required (IOM and NRC 2009).

Context

The advice in this guidance has been developed for health practitioners to update them on the IOM guidelines for weight gain during pregnancy.

Clinical management of obstetric or medical conditions affecting obese pregnant women is beyond the scope of this guidance.

In 2009, the Ministry of Health published clinical guidelines for weight management in adults and children (Ministry of Health and Clinical Trials Research Unit 2009a, 2009b). Guidance for pregnant women was not included in those guidelines.

The Ministry's *Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women* (Ministry of Health 2006) recommended GWG based on the IOM's 1990 advice. The IOM has since updated its advice based on a comprehensive review of the literature (IOM and NRC 2009). The updated advice now uses World Health Organization (WHO) cut-off points for the BMI categories and includes a specific, relatively narrow range in recommended weight gain for obese women.

This guidance updates the advice provided in the *Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women* (Ministry of Health 2006) to align with the IOM (IOM and NRC 2009). This guidance also highlights the importance of attaining and maintaining a healthy weight both before and following pregnancy by linking with the New Zealand clinical guidelines for weight management (Ministry of Health and Clinical Trials Research Unit 2009a, 2009b).

Advice for health practitioners

Optimising a woman's nutritional status, fitness and weight before, during and between pregnancies (including while breastfeeding) has immediate and long-term benefits for the health of both the woman and her child/children. Weight gain is just one of many changes that a woman may experience during pregnancy. It is important to consider weight gain in the context of all factors in the woman's life. It is envisaged that health practitioners will tailor their advice with sensitivity to the woman's personal circumstances.

Pre-pregnancy

When a woman is planning a pregnancy, the health practitioner should discuss with the woman the most appropriate nutrition and activity choices to support pre-conceptual health.

For a woman who has a BMI that falls within the obese category, the health practitioner should recommend that the woman lose weight before becoming pregnant. This is because, when compared to women with a healthy pre-pregnancy weight, obese women who become pregnant are at increased risk of miscarriage, gestational diabetes, pre-eclampsia, venous thromboembolism, induced labour, caesarean section, anaesthetic complications and wound infections and are less likely to initiate or maintain breastfeeding (National Institute of Health and Care Excellence 2010; ACOG 2013; Yu et al 2006; Chu et al. 2007; McIntyre et al 2012; Myles et al 2002; Amir and Donath 2007). Being obese during pregnancy is also associated with an increase in the number of hospital admissions and an increase in duration of hospital stay, resulting in additional maternity costs (Denison et al 2014).

Babies of obese mothers are at an increased risk of stillbirth, congenital abnormalities, prematurity, macrosomia and neonatal death (Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists 2010).

The health practitioner should also consider other co-morbidities, such as hypertension and diabetes, and should prescribe folic acid for any woman planning a pregnancy.

Regular self-weighing has been identified as a key component in successful weight management in non-pregnant adults (Van Wormer et al 2009; Burke et al 2011), along with behaviour, activity and dietary changes, and should be utilised by women who are planning pregnancy (Ministry of Health and Clinical Trials Research Unit 2009a).

Women who have had bariatric surgery should be advised not to conceive in the first year post procedure during the period of dramatic weight loss (Guelinckx et al 2009).

Practice points for pre-pregnancy

All women of childbearing age should have their weight and height measured and documented and Body Mass Index (BMI) calculated as part of routine pre-pregnancy clinical practice, **and** advice should be given that is consistent with the Weight Management Guidelines for Adults (see Appendix 1 for a comprehensive list of useful resources, such as the Online Learning Tool, and Appendix 2 for an algorithm for weight management in non-pregnant women).

Where possible, women should have their height and weight measured with shoes off, standing erect. Their weight should be measured with them wearing light clothing.

Develop relationships that empower the women through respect and trust, seeking to understand and acknowledge their life situations, including social determinants, cultural imperatives and socioeconomic circumstances.

- Assess the clinical needs of the women.
- Identify opportunities with the women to address their clinical needs.
- Identify with the women options for actions that are realistic for them.
- Maintain appropriate contact and support.

Source: Adapted from *Clinical Guidelines for Weight Management in New Zealand Adults* (Ministry of Health and Clinical Trials Research Unit 2009a)

During pregnancy

The advice below applies to women with uncomplicated singleton pregnancies.

A higher pre-pregnancy BMI is associated with an increased risk of excessive GWG in pregnancy regardless of education levels. However, women who have not had access to educational advantage have a higher risk of excessive GWG in pregnancy even with a healthy pre-pregnancy BMI. Tailoring the antenatal information to meet the needs of individual women is recommended (Hollowko et al 2014). Healthy weight women who overestimate and overweight/obese women who underestimate their pre-pregnancy body weights are also at higher risk of excess GWG (Herring 2008).

A recent New Zealand survey (Hooker 2013) found that over two-thirds of pregnant women (69.4%) incorrectly identified appropriate weight gain for pregnancy compared to IOM (2009) recommendations. Overweight and obese women were significantly more likely to overestimate appropriate weight gain compared to healthy weight women (Hooker 2013).

Height and weight should be measured at the booking or first visit. It is not sufficient to use self-reported measures of height and weight (National Institute for Health and Care Excellence 2010; Jeffs et al 2014).

Optimal weight gain during pregnancy

Pregnant women should be made aware of the IOM's recommendations for GWG to assist them to make informed, healthy choices. The recommendations, based on available evidence from observational studies, have been widely adopted internationally. They should be used in combination with professional judgement and a discussion with the woman regarding nutrition and physical activity (IOM and NRC 2009).

Table 1: Recommendations for total and average rate of weight gain during pregnancy, by pre-pregnancy BMI

Pre-pregnancy BMI (kg/m ²)	Total weight gain range (kg)	Rates of weight gain 2nd and 3rd trimester (mean range in kg/week) ¹
Underweight (< 18.5)	12.5–18	0.51 (0.44–0.58)
Healthy weight (18.5–24.9)	11.5–16	0.42 (0.35–0.50)
Overweight (25.0–29.9)	7–11.5	0.28 (0.23–0.33)
Obese (≥ 30.0)	5–9	0.22 (0.17–0.27)

¹ Calculations assume a 0.5–2 kg weight gain in the first trimester (based on Siega-Riz et al 1994; Abrams et al 1995; Carmichael et al 1997).

Source: IOM and NRC 2009.

Weight monitoring during pregnancy

Women should be encouraged to monitor their own weight gain at regular periods during pregnancy and discuss with their health practitioner as part of their care plan.

Davis et al (2012) found that women considered that if the issue of weight was not raised by their health practitioner, then it was not important.

Advised and target weight gains for pregnant women have been strongly associated with actual weight gain (Cogswell et al 1999). A review (Phelan et al 2011a) of nine studies that involved weight monitoring reported no adverse effects, and all nine studies reported either positive effects on GWG overall or positive effects on the subgroups of low income, overweight (Jeffries et al 2009) or healthy weight women (Phelan et al 2011b; Polley et al 2002).

Evidence to date suggests that strategies shown to be effective for weight control in non-pregnant women may also promote better weight control in pregnancy, but further research is recommended (Phelan et al 2011a).

Physical activity during pregnancy

Pregnant women should aim to do at least 150 minutes of moderate intensity physical activity spread throughout the week, for example, 30 minutes most days a week. For women who are not usually physically active, 10–15 minutes of daily activity can be gradually increased to 30 minutes a day. The talk test is a simple way to measure relative intensity: as a guide, a pregnant woman should be able to carry out a conversation but not sing while doing moderate intensity activity. For more detailed information, refer to the *Pregnancy and Activity* factsheet (SPARC 2003) (currently under review by the Ministry of Health).

Healthy eating during pregnancy

Encourage and support pregnant women to eat healthily. Refer to Appendix 1 for further resources particularly the *Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women* Ministry of Health 2006 (partially revised 2008), which provides detailed nutrition information.

Practice points for pregnancy

- Health practitioners should advise all pregnant women on recommended weight gain according to the 2009 IOM guidelines.
- Body Mass Index (BMI) should be calculated from **measured** height and **measured** weight at booking/first visit (ideally before 10 weeks gestation) by the referring GP or the Lead Maternity Carer (LMC). If the woman presents after 10 weeks gestation, the BMI can still be calculated from measured height and weight and weight gain can still be advised based on best estimate of pre-pregnancy BMI.
- Women should be encouraged, where appropriate, to monitor (using the same scales each time) and record their own weight regularly (for example, monthly) during pregnancy and in the postpartum period and bring a copy of this information to antenatal visits for discussion as part of their care plan. If it is not possible for a woman to record their own weight, they can ask to be weighed at antenatal visits.
- Dieting to lose weight is not recommended during pregnancy (National Institute for Health Care Excellence 2010).

Examples of healthy weight-gain tips that you could discuss with pregnant women

- In the first 12 weeks, you don't need to eat any more food than you would usually eat when not pregnant, but it is important that you eat nutritious food.
- If you are of healthy weight, the total amount of extra food you need each day after the twelfth week of your pregnancy is about the same energy value as a wholegrain cheese and tomato sandwich, or a wholegrain peanut butter sandwich and a banana. If you were obese before pregnancy, the extra energy you require is about one slice of wholegrain bread or two apples per day.
- Drink water rather than sweetened drinks, fizzy drinks or fruit juices.
- Drink low-fat (trim (green top)) or calcium-extra (yellow top)) or light blue milk instead of full-fat (blue or silver top) milk.
- Eat wholegrain bread instead of white bread.
- Eat a healthy breakfast every day, such as wheat biscuits or porridge with low-fat milk or two slices of wholegrain toast.
- Have at least four servings¹ of vegetables and two² servings of fruit every day. Buy vegetables and fruits that are in season, or buy frozen vegetables to help reduce cost, wastage and preparation time.
- Prepare and eat meals at home. Have takeaways no more than once a week.
- Choose healthy snacks such as unsweetened low-fat yoghurt, fruit, cheese and crackers, a small bowl of cereal, home-made popcorn or a small wholegrain sandwich.
- Aim to do at least 30 minutes of moderate intensity activity five or more days a week, for example, brisk walking or swimming (or as advised by your doctor, midwife or physiotherapist).

(Adapted from the Canterbury District Health Board *Healthy Weight Gain in Pregnancy* record (Jeffs 2013) and the *Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women* (Ministry of Health 2006).)

¹ Examples of vegetable and fruit serving sizes: ½ cup of peas, broccoli or carrots; one medium sized potato, banana, orange, or apple, or a large kiwifruit.

² If vegetable/fruit juice or dried fruit is consumed, it contributes a maximum of only one serving of the total recommended number of daily servings for fruit/vegetables.

Postpartum

Excessive GWG and/or postpartum weight retention can lead to an increased BMI for subsequent pregnancies. An increase in a woman's pre-pregnancy weight from overweight to obese between a first and second pregnancy can result in a threefold increased risk of pre-eclampsia, while a reduction in pre-pregnancy weight between a first and second pregnancy from obese to normal BMI can decrease the risk of caesarean and large-for-gestational-age infants (Getahun et al 2007a, 2007b, 2007c).

Returning to pre-pregnancy weight

Breastfeeding has many benefits for both the mother and baby, and it is important to encourage and support initiation and continuation of breastfeeding. Breastfeeding has been associated with postpartum weight loss, and if further research confirms the effect on maternal weight, it will be an additional reason to support breastfeeding (Neville et al 2013; Butte et al 2003).

A healthy diet and regular, moderate-intensity physical activity and gradual weight loss will not adversely affect a woman's ability to breastfeed or the quantity or quality of her breast milk (National Institute for Health and Care Excellence 2010).

Lifestyle interventions, particularly those that include both nutrition and physical activity, can reduce postpartum weight retention (Nascimento et al 2013; Van der Pligt et al 2013). A systematic review found that the physical activity interventions that were most effective in reducing weight in postpartum women were exercise programmes with objectively defined goals, such as the use of heart-rate monitors or pedometers, or programmes that included intensive dietary intervention (Nascimento et al 2013).

Practice points for postpartum

- Discuss healthy eating, physical activity and breastfeeding as strategies for encouraging a return to pre-pregnancy weight with all postpartum women (Queensland Health 2010). Opportunities for this include during antenatal visits and routine postnatal checks.
- Advise women who are overweight or obese of the benefits of weight loss pre-pregnancy and between pregnancies and take action consistent with the Weight Management Guidelines for Adults (see Appendix 1: Useful resources about weight management and good nutrition during pregnancy).
- Women who are healthy weight should be encouraged to maintain a healthy weight between pregnancies (Maternity and Newborn Clinical Network 2011).

Glossary

Body mass index (BMI)	An indicator of body fatness, calculated from the formula: weight divided by height squared, where weight is in kilograms, and height is in metres.
Gestational diabetes mellitus (GDM)	A form of diabetes found in pregnant women. It occurs when the pregnant woman's body cannot produce enough insulin, resulting in high blood sugar.
Gestational weight gain (GWG)	The average weight gain in pregnancy.
Healthy weight	Having a BMI greater than or equal to 18.5 kg/m ² but less than 25 kg/m ² . Also called normal weight range.
Institute of Medicine (IOM)	Established in 1970, IOM is the health arm of the National Academy of Sciences, an independent, non-profit organisation that works to provide unbiased and authoritative advice to decision makers and the public.
Large for gestational age (LGA)	A term used to describe a baby who is larger than the usual size for the number of weeks of pregnancy. These infants usually have weights above the ninetieth percentile for infants of the same gestational age.
Macrosomia	More than 4000 g at birth.
Obese	Having a BMI greater than or equal to 30.0 kg/m ² .
Overweight	Having a BMI greater than or equal to 25.0 kg/m ² but less than 30 kg/m ² .
Pre-eclampsia	The new onset of hypertension, proteinuria and pathologic oedema during gestation. Although the precise placental factors that cause pre-eclampsia are unknown, the end result is vasospasm and endothelial injury in multiple organs.
Small for gestational age (SGA)	A term used to describe a baby who is smaller than the usual size for the number of weeks of pregnancy. These infants usually have weights below the tenth percentile for infants of the same gestational age.
Underweight	Having a BMI less than 18.5 kg/m ² .
Venous thromboembolism	When a blood vessel is blocked by a blood clot (embolus) that has been carried in the bloodstream from the site of its formation. Venous thromboembolism (VTE) is a disease that includes both deep vein thrombosis (DVT) and pulmonary embolism (PE).

Appendix 1: Useful resources about weight management and good nutrition during pregnancy

Weight Management Guidelines for Adults (Ministry of Health and Clinical Trials Research Unit 2009a) www.health.govt.nz/system/files/documents/publications/weight-management-adults-guidelines.pdf

Weight management website (includes recent research, tools, information and services)
<http://weightmanagement.hiirc.org.nz/section/8958/weight-management/>

Quick reference guide (includes algorithm in Appendix 2) <http://weightmanagement.hiirc.org.nz/section/15130/fab-tools/?tab=4058>

Online learning tool (for weight management) <http://learnonline.health.nz/course/view.php?id=48>

The Ministry of Health Food and Nutrition Guidelines series
www.health.govt.nz/our-work/preventative-health-wellness/nutrition/food-and-nutrition-guidelines

Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women: A background paper (Ministry of Health 2006: published (online) April 2006; reprint and revisions November 2008, update to recommendations March 2009)

www.health.govt.nz/publication/food-and-nutrition-guidelines-healthy-pregnant-and-breastfeeding-women-background-paper

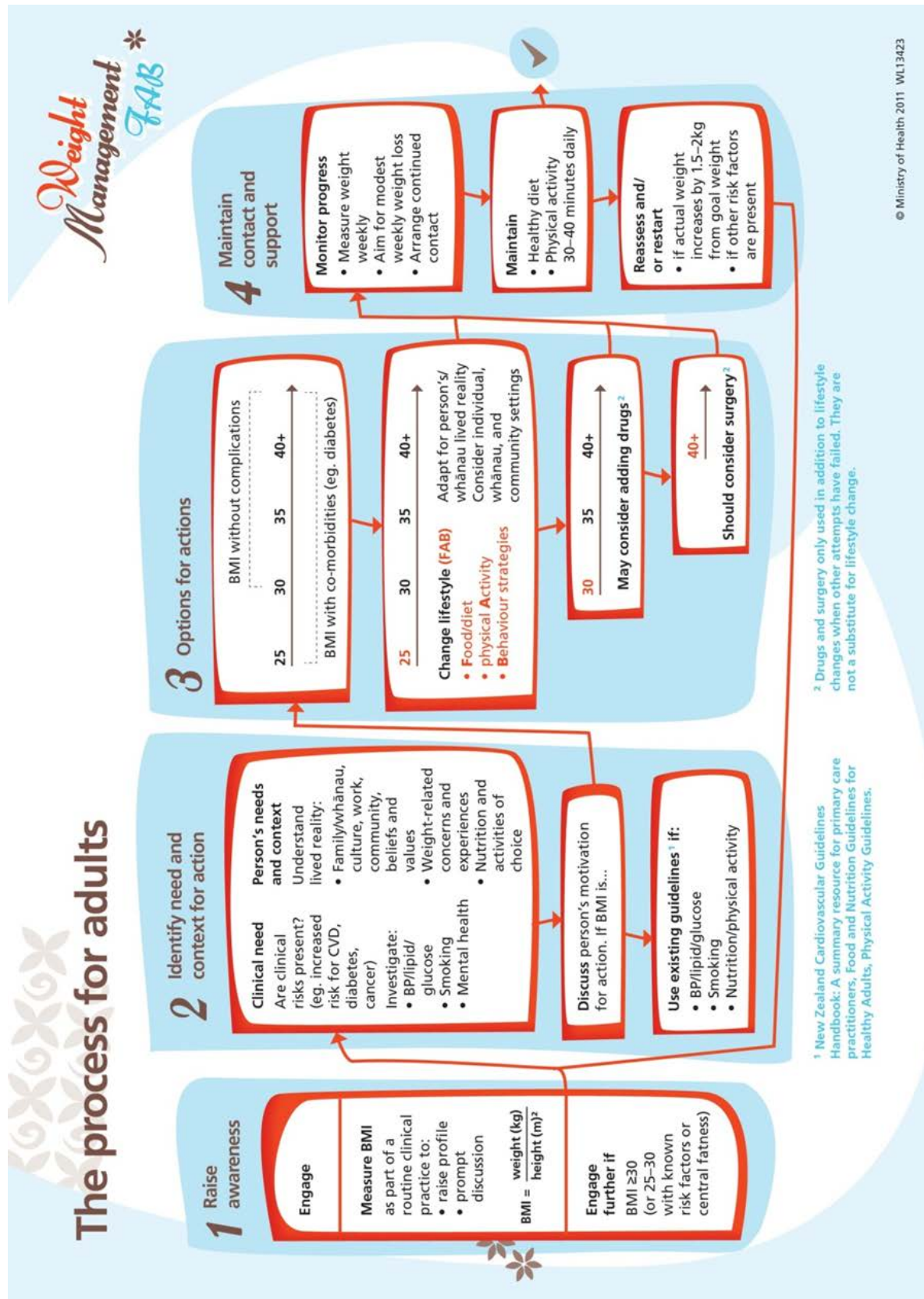
Healthy Weight Gain in Pregnancy (consumer information)
www.health.govt.nz/your-health/healthy-living/pregnancy

Nutrition during Pregnancy (consumer information on the Ministry of Health, Your health webpage)
www.health.govt.nz/your-health/healthy-living/pregnancy/nutrition-during-pregnancy

Eating for Healthy Breastfeeding Women (consumer information and link to downloadable booklet)
<https://www.healthed.govt.nz/resource/eating-healthy-breastfeeding-womenng%C4%81-kai-totika-m%C4%81-te-%C5%ABkaip%C5%8D>

Pregnancy and Activity (consumer information)
www.sportnz.org.nz/Documents/Communities%20and%20Clubs/push%20play/pp_brochure_pregnancy.pdf

Appendix 2: Algorithm for weight management in non-pregnant adults



References and bibliography

Abrams B, Carmichael S, Selvin S. 1995. Factors associated with the pattern of maternal weight gain during pregnancy. *Obstetrics and Gynecology* 86(2): 170–76.

ACOG. 2013. *Obesity in Pregnancy: Committee Opinion Number 549*. Washington: American College of Obstetricians and Gynecologists.

Alavi N, Haley S, Chow K, et al. 2013. Comparison of national gestational weight gain guidelines and energy intake recommendations. *Obesity Reviews* 14: 68–85.

Amir LH, Donath S. 2007. A systematic review of maternal obesity and breastfeeding intention, initiation and duration. *BMC: Pregnancy and childbirth* 7: 9.

Burke L, Wang J, Sevick M. 2011. Self-monitoring in weight loss: a systematic review of the literature. *Journal of the American Dietetic Association* 111(10): 92–102.

Butte NF, Ellis KJ, Wong WW, et al. 2003. Composition of gestational weight gain impacts, maternal fat retention and infant birth weight. *American Journal of Obstetrics and Gynecology* 189(5): 142–32.

Carmichael S, Abrams B, Selvin S. 1997. The pattern of maternal weight gain in women with good pregnancy outcomes. *American Journal of Public Health* 87(12): 1984–88.

Catalano PM, Mele L, Landon MB, et al. 2014. Inadequate weight gain in overweight and obese pregnant women: what is the effect on fetal growth? *American Journal of Obstetrics and Gynecology*. 11 February. pii: S0002-9378(14)00121-5. doi: 10.1016/j.ajog.2014.02.004. [Epub ahead of print]

Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists. 2010. *Management of Women with Obesity in Pregnancy. CMACE/RCOG Joint Guidelines*. England: Centre for Maternal and Child Enquiries and Royal College of Obstetricians and Gynaecologists.

Chu SY, Kim SY, Schmid CH, et al. 2007. Maternal obesity and risk of Caesarean delivery: a meta-analysis. *Obesity Reviews* 8(5): 385–94.

Chung GY, Taylor RS, Thompson JMD, et al. 2013. Gestational weight gain and adverse pregnancy outcomes in a nulliparous cohort. *European Journal of Obstetrics and Gynaecology and Reproductive Biology* 167(2): 149–53.

Cogswell ME, Perry GS, Schieve LA, et al. 2001. Obesity in women of childbearing age: risks, prevention, and treatment. *Primary Care Update for OB/GYNS* 8(3): 89–105.

Cogswell ME, Scanlon KS, et al. 1999. Medically advised, mother's personal target, and actual weight gain during pregnancy. *Obstetrics and Gynecology* 94(4): 616–22.

Davis D, Raymond J, Adams C, et al. 2012. Addressing obesity in pregnancy: the design and feasibility of an innovative intervention in NSW, Australia. *Women and Birth* 25(4): 174–80.

Denison FC, Norwood P, Bhattacharya S, et al. 2014. Association between maternal body mass index during pregnancy, short-term morbidity, and increased health service costs: a population-based study. *British Journal of Obstetrics and Gynaecology* 121(1): 72–82.

Fraser A, Tilling K, Macdonald-Wallis C, et al. 2010. Association of maternal weight gain in pregnancy with offspring obesity and metabolic and vascular traits in childhood. *Circulation* 121(23): 2557–64.

- Getahun D, Ananth CV, Oyelese Y, et al. 2007a. Primary pre-eclampsia in the second pregnancy: effects of changes in pre-pregnancy body mass index between pregnancies. *Obstetrics and Gynecology* 110: 1319–25.
- Getahun D, Ananth CV, Peltier MR, et al. 2007b. Changes in pre-pregnancy body mass index between the first and second pregnancies and risk of large-for-gestational age birth. *American Journal of Obstetrics and Gynecology* 196: 530 e1–8.
- Getahun D, Kaminsky LM, Elsasser DA, et al. 2007c. Changes in pre-pregnancy body mass index between pregnancies and risk of primary caesarean delivery. *American Journal of Obstetrics and Gynecology* 197: 376 e1–7.
- Guelinckx I, Devlieger R, Vasant G. 2009. Reproductive outcome after bariatric surgery: a critical review. *Human Reproduction Update* 15(2): 189–201.
- Herring SJ, Oken E, Haines J, et al. 2008. Misperceived pre-pregnancy body weight status predicts excessive gestational weight gain: findings from a US cohort study. *BMC Pregnancy Childbirth* 8: 54.
- Holowko N, Mishra G, Koupil I. 2014. Social inequality in excessive gestational weight gain. *International Journal of Obesity* 38: 91–6.
- Hooker (Jeffs) EM. 2013. *Women's Knowledge and Perceptions of the Risks of Excess Weight in Pregnancy*. MHealthSc thesis. Dunedin: University of Otago.
- IOM (Institute of Medicine) and NRC (National Research Council). 2009. *Weight Gain during Pregnancy: Re-examining the guidelines*. Washington DC: The National Academies Press.
- Jeffries K, Shub A, Walker SP, et al. 2009. Reducing excessive weight gain in pregnancy: a randomised controlled trial. *Medical Journal of Australia* 191(8): 429–33.
- Jeffs E. 2013. *Healthy Weight Gain in Pregnancy Record*. Christchurch: Canterbury District Health Board. URL: <http://cdhb.health.nz/Hospitals-Services/Health-Professionals/Midwifery-Professional-Development/Documents/Healthy%20Weight%20Gain%20in%20Pregnancy-%20record.pdf> (accessed 12 May 2014).
- Jeffs E, Sharp B, Gullum J, et al. 2014. Weight and height measurement: potential impact in obstetric care. *The New Zealand Medical Journal* 127(1392).
- Mamun AA, O'Callaghan M, Callaway L, et al. 2009. Associations of gestational weight gain with offspring body mass index and blood pressure at 21 years of age: evidence from a birth cohort study. *Circulation* 119(13): 1720–7.
- Maternity and Newborn Clinical Network. 2011. *Maternity and Newborn Clinical Network Statewide Clinical Guideline: Care of the obese pregnant woman and weight management in pregnancy*. Victoria: Maternity and Newborn Clinical Network.
- McIntyre HD, Gibbons KS, Flenady VJ, et al. 2012. Overweight and obesity in Australian mothers: epidemic or endemic? *MJA* 196(3): 184–8.
- Ministry of Health. 2006 (partially revised 2008). *Food and Nutrition Guidelines for Healthy Pregnant and Breastfeeding Women: A background paper*. Wellington: Ministry of Health.
- Ministry of Health. 2011. *Quick Reference Guide for FAB Weight Management: Algorithm for adults*. Wellington: Ministry of Health.
URL: <http://weightmanagement.hiirc.org.nz/section/15130/fab-tools/;jsessionid=B5CE42DE4E40BC31460448CE9307C9A2?tab=4058> (accessed 10 May 2014).
- Ministry of Health and Clinical Trials Research Unit. 2009a. *Clinical Guidelines for Weight Management in New Zealand Adults*. Wellington: Ministry of Health.
- Ministry of Health and Clinical Trials Research Unit. 2009b. *Clinical Guidelines for Weight Management in New Zealand Children*. Wellington: Ministry of Health.

- Myles TD, Gooch J, Santolaya J. 2002. Obesity as an independent risk factor for infectious morbidity in patients who undergo Caesarean delivery. *Obstetrics and Gynecology* 100(5 Pt 1): 959–64.
- Nascimento SL, Pudwell J, Surita FG, et al. 2013. The effect of physical exercise strategies on weight loss in postpartum women: a systematic review and meta-analysis. *International Journal of Obesity*. Doi: 10.1038/ijo.2013.183 [epub ahead of print] (accessed 9 January 2014).
- National Institute for Health and Care Excellence. 2010. Weight management before, during and after pregnancy. *NICE Public Health Guidance 27*. Manchester, UK: National Institute for Health and Care Excellence.
- Nehring I, Schmoll S, Beyerlein A, et al. 2011. Gestational weight gain and long-term postpartum weight retention: a meta-analysis. *American Journal of Clinical Nutrition* 94: 1225–31.
- Neville CE, McKinley MC, Holmes VA, et al. 2013. The relationship between breastfeeding and postpartum weight change – a systematic review and critical evaluation. *International Journal of Obesity* 1–14. Doi: 10.1038/ijo.2013.132. [epub ahead of print] (accessed 9 January 2014).
- Oken E, Taveras EM, Kleinman KP, et al. 2007. Gestational weight gain and child adiposity at age 3 years. *American Journal of Obstetrics & Gynecology* 196(4): 322 e1–8.
- Phelan S, Jankovitz K, Hagobian T, et al. 2011a. Reducing excessive gestational weight gain: lessons from the weight control literature and avenues for future research. *Women's Health (London)* 7(6): 641–61.
- Phelan S, Phipps MG, Abrams B, et al. 2011b. Randomized trial of a behavioural intervention to prevent excessive gestational weight gain: the fit for delivery study. *American Journal of Clinical Nutrition* 93(4): 772–9.
- Polley BA, Wing RR, Sims CJ. 2002. Randomized controlled trial to prevent excessive weight gain in pregnant women. *International Journal of Obesity and Related Metabolic Disorders* 26(11): 1494–502.
- Queensland Health. 2010 (amended 2013). *Queensland Maternity and Neonatal Clinical Guideline: Obesity*. Brisbane: State of Queensland, Queensland Health.
URL: www.health.qld.gov.au/qcg/documents/g_obesity.pdf (accessed 10 May 2014).
- Royal Australian and New Zealand College of Obstetricians and Gynaecologists. 2013. Management of obesity in pregnancy. *RANZCOG College Statement: C-Obs 49*.
URL: www.ranzcog.edu.au/college-statements-guidelines.html (accessed 10 May 2014).
- Siega-Riz AM, Adair LS, Hobel CJ. 1994. Institute of Medicine maternal weight gain recommendations and pregnancy outcome in a predominantly Hispanic population. *Obstetrics and Gynecology* 84(4): 565–73.
- SPARC. 2003. *Pregnancy and Activity: A safe guide to being active during pregnancy*. Wellington: Sport and Recreation New Zealand.
URL: www.sportnz.org.nz/Documents/Communities%20and%20Clubs/push%20play/pp_brochure_pregnancy.pdf (accessed 10 May 2014).
- Van der Pligt P, Willcox J, Hesketh KD, et al. 2013. Systematic review of lifestyle interventions to limit postpartum weight retention: implications for future opportunities to prevent maternal overweight and obesity following childbirth. *Obesity Reviews* 14(10). Doi: 10.1111/obr. 12053. Epub 2013 Jun 17 (accessed on 9 January 2014).
- Van Wormer J, Martinez A, Martinson B, et al. 2009. Self-weighing promotes weight loss for obese adults. *American Journal of Preventive Medicine* 36(1): 70–3.
- Welsh EM, Sherwood NE, Van Wormer JJ, et al. 2009. Is frequent self-weighing associated with poorer body satisfaction? Findings from a phone-based weight loss trial. *Journal of Nutrition Education Behaviour* 41(6): 425–28.

Yu CK, Teoh TG, Robinson S. 2006. Obesity in pregnancy. *British Journal of Obstetrics and Gynaecology* 113(10): 1117–25.