

Queensland Clinical Guidelines

Translating evidence into best clinical practice

Maternity and Neonatal **Clinical Guideline**

Obesity in pregnancy

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- Advise consumers of their choice and ensure informed consent is obtained
- Provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct
- Apply standard precautions and additional precautions as necessary, when delivering care
- Document all care in accordance with mandatory and local requirements

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Flow Chart: Obesity in pregnancy

Pre and inter-conception

- Analysis of BMI and waist circumference
- Risk counselling – increased risk of adverse maternal and fetal outcome
- Discuss benefits of inter-pregnancy weight loss – refer to dietician, stabilise weight loss before conception
- Advise re lifestyle interventions – weight loss, activity, behaviour modification, smoking cessation
- Folic Acid 5 mg daily at least one month prior to conception

Antenatal

- Comprehensive history (including previous bariatric surgery)
- Document pre-pregnancy BMI
- Folic Acid 5 mg daily until 12 weeks
- Initial laboratory investigations (BMI >30 kg/m²):
 - OGTT or HbA1c at entry to care
 - Baseline liver and renal function, transaminases
 - Urine protein creatinine ratio
- Develop care plan with woman that identifies strategies to reduce risk
- Referrals:
 - Dietetic services for nutritional advice
 - If BMI > 35 kg/m², obstetric consult
 - If BMI > 40 kg/m², anaesthetic consult
 - Other specialist referrals as indicated
- Counsel about:
 - Maternal and fetal risks of obesity
 - Implications for birthing, model of care, breastfeeding and transfer of care
 - Recommended weight gain during pregnancy
 - Physical activity
- Clinical assessments:
 - Document GWG at each visit
 - Risk of VTE
 - Surveillance for preeclampsia – consider low dose aspirin
 - If initial OGTT/HbA1c negative, repeat OGTT at 24–28 weeks
 - Fetal surveillance to identify/exclude fetal malformations, macrosomia, growth restriction
 - Awareness of psychosocial wellbeing

Labour and birth

- Team approach with frequent communication between care providers
- Obesity alone not an indication for IOL or CS
- Ensure bariatric equipment available intra and postpartum
- Early consultation with anaesthetist/operating theatre
- Early assessment of IV access
- If BMI > 35 kg/m² water immersion not recommended
- If BMI > 40 kg/m² recommend continuous fetal monitoring
- If CS, give higher dose prophylactic antibiotics
- Surveillance for increased risk of shoulder dystocia/PPH
- Active third stage management
- Consider need for blood products

Postpartum

- Surveillance for risk of airway compromise (particularly after narcotics, sedatives)
- Encourage early mobilisation
- Actively assess risk of VTE and requirement for thromboprophylaxis
- Increased surveillance for wound infection
- Additional support for breastfeeding
- Advice re: bed sharing/co-sleeping
- Counselling/referral for ongoing lifestyle interventions
- If GDM, repeat OGTT at 6–12 weeks

Principles of care

- Plan care in consultation with the woman
- Use clinical judgement to provide a safe service
- Determine local criteria for safe care provision
- Liaise/consult early with anaesthetist
- Use multidisciplinary case review
- Ensure necessary resources available (human and equipment)
- Audit care

BMI calculation (kg/m²)

- Use pre-pregnancy weight to calculate BMI at entry to care
- As part of the overall assessment for safe birth:
 - Monitor GWG throughout pregnancy
 - Recalculate BMI at 36 weeks
- BMI impacted by ethnic variations

BMI classification (kg/m²)

• Underweight	< 18.5
• Normal	18.5–24.9
• Overweight	25.0– 29.9
• Obese I	30.0–34.9
• Obese II	35.0–39.9
• Obese III	> 40
• Extreme obesity	> 50

Gestational weight gain

Trimester 1	kg
• All women	0.5-2.0
Trimester 2+3	(kg/week)
• Underweight	0.45
• Normal	0.45
• Overweight	0.28
• Obese	0.22
Total GWG	kg
• Underweight	12.5–18
• Normal	11.5–16
• Overweight	7–11.5
• Obese	5–9

BMI: body mass index, **CS:** caesarean section, **GDM:** gestational diabetes mellitus **GWG:** gestational weight gain, **IOL:** induction of labour, **OGTT:** oral glucose tolerance test, **PPH:** postpartum haemorrhage, **VTE:** venous thromboembolism, > greater than, < less than

Abbreviations

AOR	Adjusted odds ratio
BMI	Body mass index
CI	Confidence interval
CS	Caesarean section
CTG	Cardiotocograph
GDM	Gestational diabetes mellitus
GWG	Gestational weight gain
HbA1C	Haemoglobin A1c (also referred to as glycated haemoglobin)
IOL	Induction of labour
LGA	Large for gestational age
OGTT	Oral glucose tolerance test
OR	Odds ratio
PTB	Preterm birth
SGA	Small for gestational age
USS	Ultrasound scan
VBAC	Vaginal birth after caesarean section
VTE	Venous thromboembolism

Definition of terms

Bariatric equipment	Refers to equipment intended for use with larger women. No specific BMI is defined. May also be commonly referred to as large patient equipment
Multidisciplinary team	As is relevant to the circumstances a multidisciplinary health care team may include: midwives, obstetricians, physicians, sonographers, maternal fetal medicine specialists, anaesthetists, dietitians, physiotherapists, occupational therapists, psychologists, social workers, lactation consultants, general practitioners, and other allied health care professionals. Membership is determined within the context of locally available resources and expertise. Additional expertise is sought when and/as required and may utilise a variety of communication modes (e.g. telehealth)
Weight management ¹	Includes: <ul style="list-style-type: none"> Assessing and monitoring body weight Assisting someone to avoid becoming overweight (body mass index (BMI) 25–29.9 kg/m²) or obese (BMI greater than or equal to 30 kg/m²) Helping someone to achieve and maintain a healthy weight before, during and after pregnancy by eating healthily, managing gestational weight gain and being physically active and gradually losing weight after pregnancy
Extreme obesity	Body mass index greater than or equal to 50 kg/m ²
Shared decision making	Shared decision making involves the integration of a woman's values, goals and concerns with the best available evidence about benefits, risks and uncertainties of treatment, in order to achieve appropriate health care decisions. It involves clinicians and patients making decisions about the woman's management together. In partnership with their clinician, patients are encouraged to consider available screening, treatment, or management options and the likely benefits and harms of each, to communicate their preferences, and help select the course of action that best fits these. ²

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1 Introduction

Obesity is a significant health issue for women during pregnancy and the puerperium. It is well recognised that maternal obesity is associated with an increased risk of antenatal, peripartum and neonatal complications.^{3,4} Obesity not only has direct implications for the health of the pregnancy but also impacts on the weight of the child in infancy and beyond.^{5,6}

There is little high level evidence on best practice management of obesity (i.e. body mass index greater than 30 kg/m²) in pregnancy and the puerperium from randomised trials. This guideline summarises current information and makes consensus recommendations.

1.1 Body mass index

Table 1. Body mass index

Aspect	Consideration
Context	<ul style="list-style-type: none"> Body mass index (BMI) provides the most useful albeit crude population level measure of obesity and can be used to estimate the relative risk of disease in most people⁷ Other functional criteria of obesity may include: <ul style="list-style-type: none"> Weight and girth exceeds or appears to exceed the identified safe working load/capacity of standard hospital equipment Mobility is restricted due to size in terms of height or weight
BMI calculation	<ul style="list-style-type: none"> BMI calculation: weight in kilograms divided by the square of the height in metres (kg/m²) Calculate BMI at entry to care <ul style="list-style-type: none"> Use pre-pregnancy weight if known/available (self-reported or clinician measured) If pre-pregnancy weight is unknown or unreliable, use first weight measurement of current pregnancy (including by primary care givers) As part of the overall risk assessment for safe birth: <ul style="list-style-type: none"> Monitor gestational weight gain (GWG) throughout pregnancy Recalculate BMI at 36 weeks gestation as a practical aid to clinical decision making (note: there is no evidence related to BMI in late pregnancy and outcomes) Refer to Section 4.3 Weight measurement
Ethnic variations	<ul style="list-style-type: none"> Ethnic origin may impact on health risks associated with various BMI levels <ul style="list-style-type: none"> Asian populations: health risks associated with obesity may occur at lower BMI⁴ Polynesian populations: health risks associated with obesity may occur at higher BMI⁸

1.2 Classification of obesity

The World Health Organisation (WHO) classifies obesity according to BMI⁷ as outlined in Table 2. Classification of obesity. Additionally, in this document extreme obesity is used to denote a BMI greater than or equal to 50 kg/m².

Table 2. Classification of obesity

Classification	BMI (kg/m ²)
Underweight	Less than 18.5
Normal	18.5–24.9
Overweight	25–29.9
Obese I	30–34.9
Obese II	35–39.9
Obese III	Greater than or equal to 40

1.3 Incidence

Obese pregnant women are more likely to be of lower socioeconomic status, more likely to be single and to smoke.⁹ A dose-response relationship has been found between pre-pregnancy BMI and lower diet quality.¹⁰ Obesity is more prevalent in Indigenous women.¹¹ Refer to Table 3 for Queensland data by Indigenous status 2013.

Table 3. Mothers by BMI and Indigenous status in Queensland 2013

BMI Category (kg/m ²)	Indigenous		Not Indigenous		Not Stated		Total	
	No.	%	No.	%	No.	%	No.	%
Underweight (≤ 18)	278	7.4	2,053	3.5	-	-	2,331	3.7
Normal (19–24)	1,182	31.5	24,821	42.5	2	28.6	26,005	41.8
Overweight (25–29)	713	19.0	11,299	19.3	-	-	12,012	19.3
Obese class I (30–34)	478	12.8	5,389	9.2	1	14.3	5,868	9.4
Obese class II (35–39)	207	5.5	2,459	4.2	-	-	2,666	4.3
Obese class III (≥ 40)	123	3.3	1,644	2.8	-	-	1,767	2.8
Not Stated	766	20.4	10,750	18.4	4	57.1	11,520	18.5
Total	3,747	100	58,415	100	7	100	62,169	100

Source: Perinatal Data Collection, Department of Health (Extracted Jan 22, 2015)

1.4 Clinical standards

Table 4. Clinical standards

Aspect	Consideration
Principles of care	<ul style="list-style-type: none"> • Use the principles of shared decision making [refer to definition of terms] to plan and discuss care in consultation with the woman • Exercise clinical judgement to provide a safe service • Consider routine multidisciplinary case conference for obese women • Determine local criteria that will prompt individual case review (e.g. service and resource availability, comorbidities, BMI) • Incorporate into service delivery planning that at different times, there may be sufficient (or insufficient) local obstetric, medical and anaesthetic expertise to provide safe care • Establish processes to ensure early collaborative decision making by the anaesthetic and obstetric departments to determine the appropriate place for intrapartum care • Follow standard risk management practices for the care of bariatric women (e.g. manual handling, equipment safe working loads, risk assessment, transfer and movement procedures) • Use audit processes to monitor and review care provision and clinical outcomes of obese women
Anaesthetic consultation	<ul style="list-style-type: none"> • Identify and agree the referral pathway from antenatal clinic to anaesthetic pre-assessment • Identify local strategies to: <ul style="list-style-type: none"> ○ “Flag” the medical record of women with complex care needs (e.g. coexisting comorbidities, alerts related to previous anaesthetic, obstetric or neonatal history) following anaesthetic assessment ○ Notify the anaesthetic department of the admission of women in labour with a BMI greater than 40 kg/m²
Resource capabilities	<ul style="list-style-type: none"> • Ensure necessary resources (human and equipment) are available to provide the level of care required—ask: <ul style="list-style-type: none"> ○ Is the appropriate equipment available? ○ Are the staff, who are sufficiently skilled to manage anaesthetising and operating on the woman (should it be required) available? • Refer to Appendix B: Resource considerations and as required Table 5. Referral and transfer

1.5 Referral and transfer

Table 5. Referral and transfer

Aspect	Consideration
Local decision making	<ul style="list-style-type: none"> • Transfer or referral to higher level facilities may be required for safe provision of care • Develop local protocols relevant to service capabilities, that identify considerations for transfer <ul style="list-style-type: none"> ◦ Refer to Section 1.4 Clinical standards • Ideally, transfer decisions are made prior to the onset of labour • Involve all members of the multidisciplinary team and the family in the decision making process (including representatives from the facility to which the woman would be transferred if required)¹²
Transfer of care	<ul style="list-style-type: none"> • Consider the potential for transfer early in pregnancy and regularly review with the woman the considerations and decision points relevant to individual circumstances • When determining if transfer is indicated, consider: <ul style="list-style-type: none"> ◦ Capability of the service ◦ Resources available ◦ Individual clinical circumstances and co morbidities of the woman [refer to Sections 2 and 4 and their subsections] ◦ Risks associated with birthing away from family/community/country • Consider whether consultation with a higher level facility (as opposed to transfer) may be a safe option for care • When transfer of care is agreed, discuss with the receiving facility as soon as possible • Take into consideration restrictions on weight capacity of the various modes of transport • Refer to Appendix B: Resource considerations • If transfer declined, refer to Section 1.6 If care recommendations declined

1.6 If care recommendations declined

Table 6. If care recommendations declined

Aspect	Consideration
Assessment of risk	<ul style="list-style-type: none"> • Discuss risks, concerns and possible scenarios with the woman particularly with respect to the care that may not be immediately available should complications develop, for example (but not limited to): <ul style="list-style-type: none"> ◦ Difficulties with establishing IV access or epidural if emergency CS or operative birth required ◦ Limited availability of necessary equipment and/or skilled personnel if complications develop • Conduct an individual risk assessment and formulate a risk management plan in consultation with the woman
Documentation	<ul style="list-style-type: none"> • Where practical, involve the woman and her family with a documented acknowledgement of discussions • Make clear and detailed records of all conversations and plans in the health record

2 Risks associated with obesity in pregnancy

Pre-pregnancy BMI is a greater determinant of healthy outcomes for the woman and her newborn than gestational weight gain (GWG).¹ The higher the pre-pregnancy BMI the greater the associated risk.

Table 7. Risks of obesity in pregnancy

Period	Health risk
Preconception	<ul style="list-style-type: none"> • Infertility¹³ • Pre diabetes (e.g. impaired fasting glucose or impaired glucose tolerance) • Type 2 Diabetes
Antenatal	<ul style="list-style-type: none"> • Antepartum stillbirth¹⁴ • Miscarriage^{1,15} • Maternal mortality¹⁶ • Diabetes (Gestational diabetes mellitus and Diabetes in Pregnancy)¹⁴ • Preeclampsia¹⁴ • Obstructive sleep apnoea—may be related to adverse fetal outcomes¹⁴ • Thromboembolic disease¹⁴ • Cholecystitis¹⁴ • Depression⁴ • Difficulties with abdominal palpitation and obtaining adequate auscultation of fetal heart and cardiotocograph (CTG) • Suboptimal ultrasonography⁵ • Diagnosis of congenital abnormality¹⁷ • Preterm birth (PTB)—mostly associated with comorbidities^{14,18} • Increased odds of dizygous twinning¹⁹ • Small for gestational age (SGA)²⁰
Anaesthetic	<ul style="list-style-type: none"> • Increased failure of epidural analgesia during labour^{21,22} • Difficult intubations^{23,24} • Increased risk of gastroesophageal regurgitation²⁵
Intrapartum	<ul style="list-style-type: none"> • Vaginal birth after caesarean section is less likely¹⁴ • Induction of labour¹⁴ • Failed induction of labour¹⁴ • Caesarean section (CS)¹⁴ • Operative and complicated vaginal birth¹⁴ • Difficult surgical access²⁶ • Shoulder dystocia¹⁴ • Obstructed labour¹⁵ • Peripartum death
Postpartum	<ul style="list-style-type: none"> • Haemorrhage¹⁴ • Chest, genital tract, wound and urinary infections¹⁴ • Reduced rate of breastfeeding¹⁴ • Postnatal depression²⁷ • Thromboembolic disease
Neonatal/childhood	<ul style="list-style-type: none"> • Admission to neonatal intensive care units¹⁴ • Macrosomia¹⁴ • Congenital malformations¹⁷ • Obesity¹⁴ and metabolic syndrome²⁸ • Neurodevelopmental disorders (e.g. autism, developmental delays)²⁹ • Asthma³⁰

2.1 Association between outcome and BMI

The frequency of adverse outcome increases with increasing BMI. The following table is based on analysis of 75,432 women birthing at Mater Mothers Hospital Brisbane 1998–2009.²⁰

Table 8. Association between outcome and BMI

Variable	BMI (kg/m ²)					
	<18.5	18.5–<25	25–<30	30–<35	35–<40	≥40
Maternal outcome (%)						
Hypertension in pregnancy	1.1	1.7	3.3	5.1	7.0	9.6
GDM	1.0	1.2	2.1	3.4	5.5	6.9
Type 1 and 2 diabetes mellitus	0.2	0.5	0.3	1.7	2.8	4.1
Spontaneous vaginal birth	61	54.4	50.4	47.1	46.9	43.6
Assisted birth	13.3	12.9	10.0	8.4	5.9	4.9
CS	25.7	32.7	39.6	44.5	47.1	51.5
Neonatal outcomes (%)						
Perinatal death	0.5	0.7	1.0	1.1	1.5	1.8
Stillbirth	0.2	0.4	0.5	0.7	0.8	0.7
Neonatal death	0.3	0.3	0.5	0.5	0.7	1.1
Macrosomia	5.4	10.6	15.9	18.7	20.1	20.8
SGA	12.4	10.9	12.2	13.4	15.7	18.7
LGA	10.5	11.0	12.4	13.3	14.0	15.9
Preterm birth < 37 weeks	8.5	6.7	7.5	8.5	9.5	11.3
Respiratory distress syndrome	4.2	4.3	5.3	5.7	6.4	7.3
Mechanical ventilation	5.9	4.7	5.8	6.5	8.6	10.4
Jaundice	6.4	4.7	5.4	6.4	7.5	9.3
Hypoglycaemia	1.1	0.9	1.3	1.8	3.0	2.5

SGA = small for gestational age, LGA= large for gestational age, ≥ greater than or equal to, < less than,
Source: adapted from McIntyre HD, Gibbons KS, Flenady VJ, Callaway LK. Overweight and obesity in Australian mothers: epidemic or endemic? Med J Aust. 2012; 196(3):184-8.

2.1.1 Extreme obesity

Women with a BMI greater than 50 kg/m² are at increased risk of maternal and fetal adverse outcomes during the peripartum period when compared to class I and class II obese women.³¹ Therefore, clinical surveillance and screening for potentially modifiable outcomes (e.g. LGA, SGA, GDM, and preeclampsia) is particularly important in this group of women.

Additionally, logistic issues become more pronounced with increasing BMI including availability of:

- Appropriate clinical expertise after hours
- Equipment with appropriate safe working load
- Ancillary staff to support patient care

3 Planning pregnancy

Encourage weight reduction programs including diet, physical activity and behaviour modification before attempting the first pregnancy and between subsequent pregnancies.³²

Table 9. Pre and interconception counselling

Aspect	Consideration
Context	<ul style="list-style-type: none"> • Obesity is a modifiable risk factor ideally addressed preconception^{6,26} and between pregnancies • Preconception obesity is associated with an increased rate of congenital defects and a range of pregnancy complications³¹ • Pre-pregnancy obesity and excessive GWG are independent risk factors for fetal macrosomia in women with GDM³³ • Interconception weight loss can: <ul style="list-style-type: none"> ◦ Reduce the risk of GDM in subsequent pregnancies¹⁴ ◦ Improve vaginal birth after caesarean section (VBAC) rates³⁴ • Routinely offer referral to dietitian services • Bariatric surgery prior to pregnancy may improve pregnancy outcomes [refer to Section 4.2 Previous bariatric surgery]
Recommendation	<ul style="list-style-type: none"> • Encourage and support women of childbearing age to optimise their weight and BMI before conception through a balanced eating plan and participating in regular physical activity^{4,35,36} • Obtain accurate height and weight measurement and BMI calculation • Provide preconception counselling about the potential pregnancy complications of obesity¹⁵ • Encourage and support obese women to lose weight before beginning infertility treatment¹⁵ • Recommend stabilising weight (for 2–3 months) prior to conception, (especially after bariatric surgery) to avoid impact of weight loss on the developing fetus • If previous GDM, screen for diabetes prior to the next pregnancy • Screen for hypertension and Type 2 diabetes

3.1 Supplements

Table 10. Supplements

Aspect	Consideration
Folate	<ul style="list-style-type: none"> • Folate supplementation (usually as Folic Acid) is known to prevent neural tube defects¹⁷ • Obese women have lower serum concentrations of folate than non-obese women³⁷ • Recommend Folic Acid 5 mg daily, ideally commencing one month before conception and continuing until the end of the first trimester³⁷
Vitamin D	<ul style="list-style-type: none"> • Prepregnancy BMI is inversely associated with serum Vitamin D concentrations among pregnant women³⁷, therefore obese women are at increased risk of Vitamin D deficiency • There is no conclusive evidence on the benefits of maternal vitamin D supplementation on pregnancy outcomes, however supplementation in women who are vitamin D deficient may be beneficial for long term maternal health³⁸

4 Antenatal care

The management of obesity in pregnancy requires a multidisciplinary approach which may include access to a range of health care professionals. Assessment and care options will depend on the clinical circumstances, presence of comorbidities and the resources and services available at each facility. All routine antenatal care is indicated.

Table 11. Planning care

Aspect	Consideration
Care plan	<ul style="list-style-type: none"> • Consider an early booking visit to plan care (ideally as soon as pregnancy confirmed) • Discuss and develop a plan of care early in pregnancy with the woman in order to mitigate (where possible) antenatal, intrapartum and postnatal risks <ul style="list-style-type: none"> ○ Refer to Table 7. Risks of obesity in pregnancy • Identify the schedule of antenatal contacts/visits appropriate to the level of risk and/or presence of comorbidities <ul style="list-style-type: none"> ○ Consider increased frequency of antenatal visits in the third trimester due to the risk of preeclampsia and undetected growth restriction
Multidisciplinary referrals	<ul style="list-style-type: none"> • If BMI is greater than 35 kg/m² in the first trimester, recommend consultation with an obstetrician³⁹ • If BMI is greater than 40 kg/m², recommend anaesthetic consultation • Routinely offer obese women referral to: <ul style="list-style-type: none"> ○ A dietitian for nutritional support ○ Specialist lactation support/education (individual or group) • In the third trimester, consider an individual mobility assessment to identify equipment, workforce and procedural requirements for safe delivery of care • Consider the requirement for additional growth scans as clinical assessment can be unreliable in the obese woman • All other specialist referrals as clinically indicated
Documentation	<ul style="list-style-type: none"> • Discuss and document specific requirements regarding intended place of birth, and possible antenatal and intrapartum complications³⁷ • Include information on measured and documented body weight and BMI in referral letters and health records across reproductive health

4.1 Assessment

All routine antenatal assessments are indicated.

Table 12. Assessments

Aspect	Consideration
Review history	<ul style="list-style-type: none"> • Obtain a comprehensive medical, surgical, obstetric and social history • Consider cardiac evaluation with preexisting medical conditions especially smoking, Type 2 diabetes or hypertension • Assess clinical risk factors for preeclampsia: <ul style="list-style-type: none"> ○ Consider Aspirin 100 mg/day before 16 weeks gestation^{40,41} ○ Use an appropriate sized cuff to estimate blood pressure (BP) and document the cuff size in the medical record ○ Refer to Queensland Clinical Guideline <i>Hypertensive disorders of pregnancy</i>⁴²
Initial investigations	<ul style="list-style-type: none"> • Test for diabetes in pregnancy⁴³: <ul style="list-style-type: none"> ○ Oral Glucose Tolerance Test (OGTT) or HbA1C at the initial antenatal visit or in the first trimester ○ If initial OGTT or HbA1C negative, repeat OGTT at 24–28 weeks ○ Refer to Queensland Clinical Guideline <i>Gestational diabetes mellitus</i>⁴³ • Establish baseline renal and liver function: <ul style="list-style-type: none"> ○ Assists in distinguishing chronic renal dysfunction secondary to maternal chronic hypertension and/or diabetes from pregnancy associated hypertensive disorders²⁶ ○ Repeat renal and liver function tests for clinical indications (e.g. hypertensive features) • Laboratory investigations—include: <ul style="list-style-type: none"> ○ Transaminases (for non-alcoholic steatohepatitis (NASH)) • Urine protein creatinine ratio
VTE prophylaxis	<ul style="list-style-type: none"> • BMI greater than 30 kg/m² is a known risk factor for venous thromboembolism (VTE): <ul style="list-style-type: none"> ○ Actively assess for clinical risk for VTE⁴⁴ ○ Refer to Queensland Clinical Guideline <i>Venous thromboembolism prophylaxis in pregnancy and the puerperium</i>⁴⁴
Anaesthetic assessment	<ul style="list-style-type: none"> • Obese women are over represented in maternal deaths related to anaesthesia¹⁶ • An antenatal anaesthetic consultation is recommended for women with a BMI greater than 40 kg/m² • The complexity of anaesthetic management increases with increasing BMI. Consider: <ul style="list-style-type: none"> ○ Potentially difficult intubation ○ Potentially difficult neuraxial techniques ○ Difficult intravenous access ○ Difficulties with noninvasive blood pressure monitoring ○ Appropriate postoperative monitoring ○ Access to ultrasound is required to facilitate neuraxial and vascular access • Develop an anaesthetic management plan and/or plan for birth in consultation with the treating obstetric team

4.2 Previous bariatric surgery

Bariatric surgical procedures can be classified as:

- Restrictive (e.g. gastric banding, sleeve gastrectomy),
- Malabsorptive (e.g. biliopancreatic diversion with or without duodenal switch)
- Combination of restrictive and malabsorptive (e.g. gastric bypass)

Restrictive procedures are generally less invasive and have less complications in pregnancy than malabsorptive or combination procedures.

Table 13. Previous bariatric surgery

Aspect	Consideration
Context	<ul style="list-style-type: none"> • Bariatric surgery is the only therapy with evidence of sustained weight loss for Class II and Class III obesity, although it has well recognised complications^{45,46} • Ascertain the type of bariatric surgery and document in the clinical notes • A multidisciplinary health care approach is required
Pregnancy outcomes associated with previous bariatric surgery	<ul style="list-style-type: none"> • Reduced risk of: <ul style="list-style-type: none"> ○ Gestational diabetes mellitus [OR 0.25 95% CI 0.13–0.47]⁴⁷ ○ Excessive fetal growth [OR 0.33, 95% CI 0.24–0.44]⁴⁷ ○ Preeclampsia [OR 0.45, 95% CI 0.25–0.80]⁴⁸ • Increased risk of⁴⁷: <ul style="list-style-type: none"> ○ SGA [OR 2.20 95% CI 1.64–2.95] • Evidence is unclear/inconclusive about⁴⁸: <ul style="list-style-type: none"> ○ Effect on neonatal mortality (stillbirth and neonatal death)⁴⁷ ○ Premature rupture of membranes ○ CS
Clinical surveillance	<ul style="list-style-type: none"> • Intestinal obstruction as a complication of bariatric procedures may present as abdominal complaints (e.g. pain or distension/bloating), morning sickness, reflux or uterine contractions⁴⁹ • Early pregnancy nausea and vomiting may require partial or complete deflation of laparoscopic–adjustable gastric banding^{6,14,50} • For women who have had malabsorptive procedures, the OGTT may contribute to dumping syndrome <ul style="list-style-type: none"> ○ Refer to <i>Queensland Clinical Guideline: Gestational diabetes mellitus</i>⁴³ for alternative tests • Bariatric surgery is not a contraindication to breastfeeding
Nutritional supplementation	<ul style="list-style-type: none"> • Nutritional deficiencies are common after malabsorptive bariatric surgery⁵¹ • Consider evaluation of nutritional deficiencies and correction by appropriate supplements⁵⁰ • Encourage continuation of prescribed nutritional supplements • Refer to Appendix C: Nutrient requirements in pregnancy post bariatric surgery
Recommendation	<ul style="list-style-type: none"> • Routinely refer to a dietitian as part of the multidisciplinary health care approach • Recommend a routine fetal ultrasound scan (USS) at 28–32 weeks gestation to assess fetal growth • Seek expert advice and/or refer to a bariatric surgeon as required • Maintain a high index of suspicion⁴⁹ for complications of bariatric surgery as they may present as common pregnancy complaints

4.3 Weight measurement

Include assessment and management of GWG as part of routine antenatal care for all women⁴

Table 14. Weight measurement

Aspect	Consideration
Context	<ul style="list-style-type: none"> Appropriate steady weight gain during pregnancy is important to optimise the health outcomes (short and long term) for the woman and her baby^{4,36} <ul style="list-style-type: none"> Steady weight gain helps avoid adverse effects on specific fetal organ systems during critical periods³⁶ Overweight and obese women who have GWG within recommendations have less preeclampsia and emergency CS⁵²
Initial assessment	<ul style="list-style-type: none"> Calculate BMI at entry to care <ul style="list-style-type: none"> Refer to Table 1. Body mass index Utilise standard procedures for routine measurement to improve consistency of serial measurements⁴
Recommended GWG	<ul style="list-style-type: none"> Refer to Table 15. Target weight gains for recommended GWG⁴ Teenagers, short women and racial and ethnic groups have the same GWG ranges as those recommended for the whole population⁴ Optimal GWG for twin pregnancy is uncertain. Institute of Medicine (IOM) recommend GWG⁴: <ul style="list-style-type: none"> Normal: 16–24 kg Overweight: 14–23 kg Obese: 11–19 kg Seek expert guidance if tailoring individual recommendations for GWG
Lower GWG	<ul style="list-style-type: none"> Lower GWG during pregnancy can occur with adoption of a healthy lifestyle, although there is limited evidence about safety, particularly long term neonatal outcomes^{53,54} Lower GWG or weight loss may reflect inappropriate restriction of dietary intake and/or improved diet quality and is associated with: <ul style="list-style-type: none"> Increased risks of PTB and SGA^{52,54,55} Decreased risks of LGA, gestational hypertension, preeclampsia⁵⁴ Advising lower GWG so as to avoid facility BMI transfer thresholds is not recommended and requires further study before it can be supported
Weight monitoring	<ul style="list-style-type: none"> Discuss with the woman and document in the health record the range of desirable total weight gain and rate of gain^{4,56} Weigh at each antenatal consultation⁵² Review the pattern and rate of gain relative to desired GWG⁵³ Plot weight against gestation to assist identification of trends⁴ <ul style="list-style-type: none"> A Queensland Health weight tracker is available for free download⁵⁷: Document GWG in the health record(s) Discuss with the woman how BMI informs clinical decision making (e.g. recommendation for anaesthetic consultation and continuous intrapartum fetal monitoring if BMI 40 kg/m² or more) <ul style="list-style-type: none"> Each 3 kg of weight gain equates to an increase of approximately 1 unit of BMI (e.g. a pre-pregnancy BMI 39 kg/m² with 9 kg total GWG, increases BMI to 42.7 kg/m²)

Table 15. Target weight gains

Pre-pregnancy BMI (kg/m ²)	Rate of gain 2 nd and 3 rd trimester (kg/week)*	Recommended total gain range (kg)
Less than 18.5	0.45	12.5–18
18.5 to 24.9	0.45	11.5–16
25.0 to 29.9	0.28	7–11.5
Greater than or equal to 30.0	0.22	5–9

* Calculations assume a 0.5–2 kg weight gain in the first trimester

4.4 Psychosocial support

Table 16. Psychosocial support

Aspect	Consideration
Information	<ul style="list-style-type: none"> • Provide women and their families with comprehensive information about obesity including: <ul style="list-style-type: none"> ○ Maternal and fetal risks ○ Implications for care provision ○ Nutritional and physical activity recommendations ○ The importance of breastfeeding for mother and baby
Healthy lifestyle	<ul style="list-style-type: none"> • Pregnancy is a significant life event when interventions to address obesity may be most effective⁶ • Offer referral and support access to healthcare professionals who are: <ul style="list-style-type: none"> ○ Able to assist with the adoption of a healthy lifestyle ○ Experienced in the management of maternal obesity • Counsel about the benefit of modifiable lifestyle choices including smoking cessation
Weight stigma	<ul style="list-style-type: none"> • Overweight and obese women may experience discrimination and prejudice due to their body weight and appearance • Experiencing weight stigma has a negative effect on multiple domains of life including mental health (e.g. depression, anxiety, disordered eating, self-esteem, exercise avoidance)^{58,59} • Healthcare provider beliefs and attitudes about obesity can impact interactions with obese women, the care they receive and their outcomes⁶⁰ • A positive therapeutic relationship and communication behaviours such as empathy, encouragement and rapport building, improve patient satisfaction and can support behaviour changes and adherence to care recommendations⁶¹ • Minimise weight stigma by ensuring: <ul style="list-style-type: none"> ○ A non-judgmental, sensitive approach to care ○ Comfort, modesty and privacy are maintained with appropriately sized equipment and gowns ○ Measurement and discussion of body weight and weight gain occurs in private ○ Engage in self-reflection about perceptions and attitudes to obesity and the care of obese women
Childhood trauma	<ul style="list-style-type: none"> • Adults who report childhood trauma (physical, emotional sexual, general) are significantly more likely to be obese [OR 1.28, 95% CI 1.13–1.46] and there is a positive dose-response association⁶² • Maintain an awareness that childhood trauma may be implicated in obesity and can impact on relationships, intimate examinations, breastfeeding and compliance with care
Psychosocial wellbeing	<ul style="list-style-type: none"> • Perform a psychosocial assessment and refer to services for support and/or counselling as required • Maintain an awareness that depression, is a well-known key determinant of weight gain and obesity²⁷

4.5 Fetal surveillance

Table 17. Fetal surveillance

Aspect	Consideration
Context	<ul style="list-style-type: none"> Maternal obesity can limit the accuracy and effectiveness of antenatal clinical and ultrasound examinations of the fetus and the estimation of fetal weight.²⁸ This: <ul style="list-style-type: none"> Increases the likelihood of an undetected fetal structural abnormality on USS^{56,63} May lead to unrecognised growth restriction (which is associated with stillbirth⁶⁴) Prenatal diagnostic procedures such as chorionic villus sampling (CVS) or amniocentesis may be more difficult Development of bariatric imaging pathways may minimise the risk of workplace injury to sonographers and improve diagnostic abilities Transvaginal ultrasound assessment may improve visualisation of fetal structures
Recommendation	<ul style="list-style-type: none"> Include BMI on all requests for USS If BMI greater than 40 kg/m² <ul style="list-style-type: none"> Routine Nuchal scan between 11 weeks 4 days and 13 weeks 6 days gestation Ultrasound assessment between 14–16 weeks gestation to reduce the problem of impaired acoustic window and may allow for early morphological assessment of some structures Morphology scan at 20–22 weeks gestation (slightly later than is routine for non-bariatric women at 19 weeks) as fetal structures are often larger in size <ul style="list-style-type: none"> Take into account the potential for delay of detection of structural anomalies and subsequent care requirements Where clinical assessment is limited by obesity, growth scan at 28–32 weeks gestation to aid detection of late onset fetal growth restriction Consider serial scans if there is a demonstrated growth issue

4.6 Nutrition

Table 18. Nutrition

Aspect	Consideration
Context	<ul style="list-style-type: none"> There is evidence that dietary interventions can reduce excessive GWG and may improve selected outcomes^{65,66} There is increasing awareness of the importance of perinatal nutrition on the development of disease in adulthood and in relation to cognitive development and future bone mass in the fetus³⁶ Australian Dietary Guidelines recommend: <ul style="list-style-type: none"> Eat a wide variety of nutritious foods from the five food groups (vegetable, fruit, grain, lean meat, dairy) and to drink plenty of water Limit intake of foods and drinks containing saturated fat, added salt, and added sugars For women who are pregnant or breastfeeding, not drinking alcohol is the safest option
Recommendation	<ul style="list-style-type: none"> Provide nutritional advice as per the Australian Dietary Guidelines³⁶ Offer nutritional consultation¹⁵ ideally with a dietitian Advise not to restrict dietary intake below the recommended food group requirements for pregnancy^{4,36} Encourage adherence to target weight gains⁵⁶ Consider cultural food practices/preferences when discussing nutrition Advise to cease prescription and over the counter weight loss medications and preparations

4.7 Physical activity

Use clinical judgement when advising individual women as to the type, intensity, duration and frequency of physical activity.⁶⁷ A physiotherapy/exercise physiologist consultation may assist with assessment and individual physical activity prescription.

Table 19. Physical activity

Aspect	Consideration
Context	<ul style="list-style-type: none"> • Assess levels of current physical activity⁶⁸ <ul style="list-style-type: none"> ○ If minimal increase duration of moderate physical activity slowly • Physical activity can include aerobic exercise (such as walking, stationary cycle, swimming, aquatic activities, exercise machines, antenatal exercise classes) and light or moderate resistance exercises^{68,69} and can be broken up into shorter time periods • Avoid activities that^{68,70}: <ul style="list-style-type: none"> ○ Involve lying flat on the back ○ Increase the risk of falling or abdominal trauma (e.g. contact sports, most racquet sports, horseback riding, water skiing) ○ Are at extreme altitudes (e.g. scuba diving, mountain climbing) ○ Involve excessive stretching • Discuss modifications to the physical activity program as pregnancy progresses (particularly in the third trimester as the body's centre of gravity is altered)
Recommendation	<ul style="list-style-type: none"> • Recommend 30 minutes of physical activity on most days of the week⁶⁹ • Advise women that moderate physical activity is associated with a range of health benefits and is not associated with adverse outcomes^{68,69} • Individually assess and discuss contraindications and indications to stop physical activity

4.7.1 Cautions for physical activity

Consider individual circumstances with advising about physical activity.

Table 20. Cautions for physical activity

Aspect	Consideration
Cautions	<ul style="list-style-type: none"> • Hemodynamically significant heart conditions • Restrictive lung conditions • Incompetent cervix/ cerclage • Multiple gestation at risk for premature labour • Persistent second or third trimester bleeding • Placenta praevia after 26 weeks of gestation • Premature labour during the current pregnancy • Ruptured membranes • Preeclampsia • Intrauterine growth restriction
Advise to cease, and seek advice if:	<ul style="list-style-type: none"> • High heart rate • Dyspnoea prior to or during exertion • Dizziness, faintness, nausea • Headache • Decreased fetal movements • Uterine contractions, vaginal bleeding, amniotic fluid leakage • Back or pelvic pain • Chest pain • Muscle weakness • Calf pain or swelling or sudden swelling of ankles, hands and/or face

4.8 Timing and mode of birth

Table 21. Timing and mode of birth

Aspect	Consideration
Previous caesarean section	<ul style="list-style-type: none"> • VBAC is less likely for obese women • There are higher operative and anaesthetic risks^{32,37} • Women with BMI greater than 40 kg/m² (obesity class III) have an increase in composite maternal morbidity and risk of neonatal injury compared to women in overweight or obese classes I and II⁷¹ • Discuss risks in a manner that supports shared decision making • Anaesthetic consultation early in labour is recommended • Document the discussion and decision regarding mode of birth in the health record • Refer to the Queensland Clinical Guideline: <i>Vaginal birth after caesarean section</i>⁷²
Induction of labour (IOL)	<ul style="list-style-type: none"> • There is a higher incidence of IOL among obese women compared to women of normal BMI⁷³, likely due to the increased: <ul style="list-style-type: none"> ◦ Association with prolonged pregnancy [AOR:1.69 95%, CI 1.23–2.31]¹⁸ ◦ Preexisting medical comorbidities and pregnancy related complications • Obese women have increased rates of failed IOL compared to women of normal BMI, which may be associated with their: <ul style="list-style-type: none"> ◦ Increased failure to achieve active labour with prostaglandin alone⁷⁴ ◦ Increased dose and duration of Oxytocin requirements⁷⁴ ◦ Slower progress of labour and greater time to transition to active labour⁷⁵ • Refer to Queensland Clinical Guideline: <i>Induction of labour</i>⁷⁶
Recommendation	<ul style="list-style-type: none"> • Involve the multidisciplinary team in discussions • Individualise decision making about mode and timing of birth based on assessment of potential risk factors for poor birth outcomes⁷⁷ [refer to Section 2 Risks associated with obesity in pregnancy] • In the absence of other obstetric or medical indications, obesity alone is not an indication for elective CS or IOL³⁷ however, a low threshold for IOL at term may be appropriate because of the increased risk of stillbirth

5 Intrapartum care

Individualise decision making based on assessment of potential risk factors for poor birth outcomes⁷⁷

Table 22. Intrapartum care

Aspect	Consideration
Communication	<ul style="list-style-type: none"> • A multidisciplinary team approach that includes frequent communication between care providers is essential • Notify anaesthetic and theatre staff when a woman with a BMI greater than 35 kg/m² presents to birth suite in labour or for induction (or as recommended in anaesthetic preassessment review) • Ensure bariatric equipment is accessible in the intrapartum and postnatal period (for example bed, hoists, limb lifters, transfer equipment)
Anaesthetic considerations	<ul style="list-style-type: none"> • Labour and opioid analgesia delay gastric emptying, especially of food⁷⁸ • For women with a BMI greater than 40 kg/m², ensure: <ul style="list-style-type: none"> ○ Early notification of anaesthetic team ○ Early insertion of cannula for IV access ○ Early consideration of epidural analgesia where acceptable to the woman • Restriction of oral intake to clear high-calorie fluids during active labour, preferably isotonic drinks⁷⁸ • H₂-receptor antagonists oral every 6 hours for antacid prophylaxis in labour⁷⁸ • If anaesthesia is required for birth, give an H₂-receptor antagonist IV (if not already administered) to reduce the risk of aspiration at extubation⁷⁸
Fetal monitoring	<ul style="list-style-type: none"> • Ultrasonography may be required to accurately determine fetal position • If greater than 40 kg/m² continuous intrapartum fetal monitoring is recommended⁷⁹ • If 30–40 kg/m² and pregnancy is otherwise uncomplicated, there is no specific requirement for continuous fetal monitoring • If a satisfactory recording cannot be obtained by external fetal monitoring, consider internal fetal monitoring • Refer to Queensland Clinical Guideline: <i>Intrapartum fetal surveillance</i>⁸⁰
Maternal care	<ul style="list-style-type: none"> • Obese nulliparous and multiparous women have longer duration and slower progression of the latent phase of the first stage of labour than normal weight women but there is no difference in median time of labour progression after 6 cm dilation^{35,81} • Increasing BMI is not associated with longer second stage⁸² • Maintain an awareness of the increased risk of shoulder dystocia • Water immersion is not recommended if BMI is greater than 35 kg/m² <ul style="list-style-type: none"> ○ Refer to Queensland Clinical Guideline: <i>Normal Birth</i>⁸³
Third stage	<ul style="list-style-type: none"> • Maintain an awareness of the increased risk of postpartum haemorrhage • Recommend active third stage management <ul style="list-style-type: none"> ○ Consider factors which may impact on the effectiveness of uterotonic drugs, including the site of administration and the length of the needle used • Consider the possible requirement for additional blood products¹⁵ <ul style="list-style-type: none"> ○ Consider Blood Group and Hold • Refer to Queensland Clinical Guidelines: <i>Normal birth</i>⁸³ and <i>Primary postpartum haemorrhage</i>⁸⁴

5.1 Caesarean section

Table 23. Caesarean section

Aspect	Considerations
Risks	<ul style="list-style-type: none"> In the absence of other obstetric or medical indication, obesity alone is not an indication for elective CS CS is frequently technically more difficult Women with BMI greater than or equal to 30 kg/m² have an increased risk of wound infection³⁷ and excessive blood loss¹⁵ following CS compared with healthy weight women Consult with specialist postoperative wound care teams as required
Procedure	<ul style="list-style-type: none"> CS on a woman with BMI greater than 40 kg/m² is complex surgery <ul style="list-style-type: none"> Ensure sufficiently skilled, experienced and credentialed staff are available Consider the requirement for procedures and devices to elevate the panniculus (e.g. Alexis Retractor, panniculus taping procedures) Consider use of negative pressure dressings on closure⁸⁵ to reduce fluid collection in wound For women who have more than 2 cm subcutaneous fat, suturing the subcutaneous tissue space reduces the risk of wound infection and wound separation^{15,37}
Antibiotics	<ul style="list-style-type: none"> Adjust routine preoperative antibiotic prophylaxis according to BMI^{74,86} <ul style="list-style-type: none"> Less than 30 kg/m² or (weight 80–120 kg) give Cefazolin 2 g IV More than 30 kg/m² or (weight greater than 120 kg) give Cefazolin 3 g IV

6 Postpartum care

Table 24. Postpartum care

Aspect	Consideration
Clinical surveillance	<ul style="list-style-type: none"> More frequent clinical observations may be required due to the increased risk of aspiration from airway compromise and/or obstructive sleep apnoea (particularly following narcotic and sedative medications) <ul style="list-style-type: none"> Consider bed allocation that facilitates close clinical surveillance Due to the increased risk of infection (chest, urinary, wound or breast) increase clinical surveillance for signs of infection including: <ul style="list-style-type: none"> Regular wound care (abdominal and perineal) Thorough assessment of elevated maternal temperature Actively assess the requirement for postpartum thromboprophylaxis <ul style="list-style-type: none"> Refer to Queensland Clinical Guideline <i>Venous thromboembolism (VTE) prophylaxis in pregnancy and the puerperium</i>⁴⁴
Rh immunoglobulin	<ul style="list-style-type: none"> There is limited evidence that higher BMI is associated with lower serum peak levels of anti-D Ig following IM administration⁸⁷ The Australian Red Cross Blood Service Consensus Statement recommends⁸⁸: <ul style="list-style-type: none"> No specific additional testing is required for women with a BMI greater than 30 kg/m² Consider factors which may impact on the adequacy of the injection, including the site of administration and the length of the needle used
Mobilisation	<ul style="list-style-type: none"> Encourage early mobilisation: <ul style="list-style-type: none"> Review and update mobility assessment as required Consider regular physiotherapy to encourage mobilisation, particularly following caesarean birth Consider pressure area care requirements during periods of immobility
Bed sharing/co-sleeping	<ul style="list-style-type: none"> The risk of sudden infant death associated with shared sleep surface environments is significantly increased by maternal obesity⁸⁹ Provide information about safe shared sleeping and the danger of falling asleep while breastfeeding lying down (risk of smothering/overlying)⁹⁰

6.1 Breastfeeding

Table 25. Breastfeeding

Aspect	Consideration
Context	<ul style="list-style-type: none"> • Obese women are more likely to experience reduced initiation, duration and exclusivity of breastfeeding than normal weight women⁹¹ • Contributing factors include mechanical, delayed onset of lactogenesis II, hormone imbalances, psychosocial factors (e.g. reduced confidence, body image concerns, childhood trauma) and mammary hypoplasia⁹¹ • The effect of diet and exercise on lactation is inconclusive⁹² but weight loss of approximately 0.5 kg per week during lactation has not been found to compromise the quality or quantity of breast milk or the health of the newborn⁹³ • The additional energy requirements of breastfeeding may help some women return to their pre-pregnancy weight¹ • There is growing evidence that breastfeeding has short and long term benefits for mothers with Type 2 and gestational diabetes mellitus <ul style="list-style-type: none"> ○ Refer to Queensland Clinical Guideline <i>Gestational diabetes mellitus</i>⁴³ • Breastfeeding is reported to have a small but consistent protective effect against obesity in children⁹⁴
Recommendation	<ul style="list-style-type: none"> • Encourage and support breastfeeding • As appropriate: <ul style="list-style-type: none"> ○ Refer to a lactation consultant (antenatal and/or postpartum) ○ Provide early postpartum feeding support ○ Time discharge so as to allow for establishment of breastfeeding prior to discharge • Refer to or continue access to breastfeeding support services post discharge

6.2 Discharge

Table 26. Discharge

Aspect	Consideration
Discharge planning	<ul style="list-style-type: none"> • Apply usual discharge criteria in determining readiness for discharge • If hormonal methods of contraception are considered, conduct a risk assessment for venous thromboembolism • Refer for specialist follow up as required • Encourage women to continue with weight management postpartum
Information	<ul style="list-style-type: none"> • Provide information to women with GDM about the importance of OGTT screening at 6–12 weeks postpartum <ul style="list-style-type: none"> ○ Refer to Queensland Clinical Guideline <i>Gestational diabetes mellitus</i>⁴³ • Provide information about the benefits of inter-pregnancy weight loss • Assist with identification of community supports to achieve a healthy lifestyle (e.g. GP, postnatal depression support, weight management, physical activity, infant feeding support) • Women may be eligible for a referral from their GP to allied health support under the Team Care Arrangements

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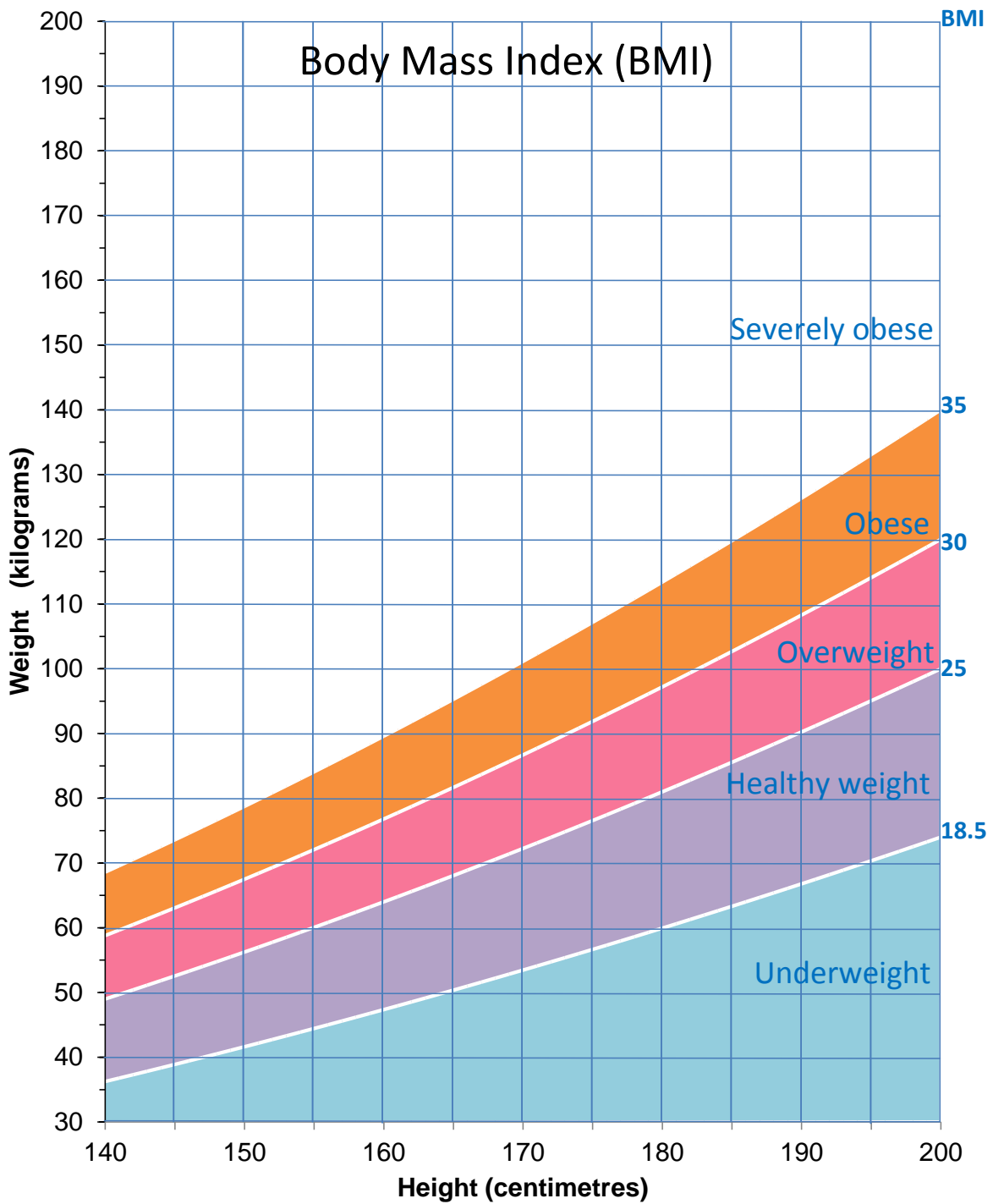
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Appendix A: BMI graph



Source: Queensland Clinical Guidelines

Appendix B: Resource considerations

Aspect	Consideration
Service capability	<ul style="list-style-type: none"> Consider the physical and service delivery capabilities of the facility in determining appropriate care, referral or transfer of obese women, including (but not limited to): <ul style="list-style-type: none"> Facility design (e.g. width of access doors and pathways, turning circles for bariatric equipment, availability of suitable accommodation) Availability of bariatric equipment with appropriate safe working loads (SWL) and widths Workforce capabilities (e.g. access to a range and number of appropriately skilled health care professionals) Capability to manage the potential risks and complications of obesity Develop a facility or Hospital and Health Service management plan that outlines the facility's response to the planned or unplanned admission of an obese woman⁹⁵ Inform the community of limitations within the service regarding the care of obese women
Equipment	<ul style="list-style-type: none"> Calibrated bariatric scales Large blood pressure cuffs Bariatric equipment that has sufficient SWL and appropriate size/width to accommodate patient girth is required (for example hoists, beds, shower chairs, lateral transfer devices, wheelchairs, bed-side chairs) Maintain an inventory of bariatric equipment including equipment location, accessibility and contact person Clearly label bariatric equipment with SWL Develop standard operating procedures for the safe use, movement and storage of all bariatric equipment
Workforce	<ul style="list-style-type: none"> Additional workforce may be required to care for obese women Access to a range of allied health staff is recommended Provide task specific training, including safe handling procedures and the use of bariatric equipment to all staff involved in the care of obese women Consider work allocation and rotation of staff to minimise physical strain on the workforce Support clinical staff to develop communication skills that enable positive and non-judgemental discussions about obesity and weight gain with pregnant women^{1,96}

Transport weight restrictions for Retrieval Services Queensland

Mode of transport	Maximum weight (kg)	Comment
Road ambulance stretcher	160	
Fixed wing aircraft	160	Width of patient (hip to hip) not greater than 80 cm to allow entrance through aircraft door
Rotary Helo A139	180	No width restrictions through aircraft door
Rotary Helo Bell 412	250	No width restrictions through aircraft door
Bariatric ambulance	300	Only two in Queensland—both in Brisbane

Appendix C: Nutrient requirements in pregnancy post bariatric surgery

Surgery Type	Recommendation
Lap band	Pregnancy specific supplement usually suffices
Bypass or Gastric sleeve	In addition to pregnancy specific supplements: <ul style="list-style-type: none"> • 1-2 adult multivitamin plus mineral (each containing iron, folic acid and thiamine) supplements in chewable form • Calcium 600–1000 mg (citrate form) • B₁₂ 1000 microgram oral/day • Vitamin D 1500 IU (or more, dependent on pathology and amount in Multivitamin) • Iron (dependent on pathology and amount in Multivitamin)

Underlined and bolded text in the table below indicates the appropriate amount to recommend/prescribe for each nutrient per day to pregnant women post bariatric surgery. May be derived from diet and/or supplements as indicated.

	Post-surgery requirements* (per day)	Recommended dietary intake in pregnancy# (per day)	Upper limit in pregnancy# (per day)	Comment
Iron	<u>45-60 mg</u>	27 mg	45-70 mg	Increased requirement due to decreased absorption (less gastric acid and bypass of sites). Deficiency risk is high due to decreased gastric acid and less intrinsic factor (for Bypass and Gastric sleeve). Estimate that patients only absorb 1% from oral form.
B₁₂	<u>1000 microgram</u>	2.6 microgram	Not determined	Aim for 600 microgram/day from dietary sources. Additional 400-500 mg from supplemental form.
Folate	400 microgram	<u>600-800 microgram</u>	1000 microgram (as Folic Acid)	Titrate according to biochemistry.
Vitamin D	<u>3000 IU</u>	2000 IU	Not determined	Decreased efficiency of absorption as less gastric acid and bypass of absorption sites (not in Lap Band). Derive from diet and as citrated supplement in divided doses not greater than 600 mg/dose. Avoid taking with iron sources.
Calcium	<u>1200-1500 mg</u>	1000–1300 mg	2500 mg	High risk of deficiency with frequent vomiting. Needs prompt treatment if suspected.
Thiamine	<u>1-3 mg</u>	1.4 mg	Not determined	Supplement 150 microgram/day.
Iodine	N/A	<u>220 microgram</u>	1100 microgram	Increased requirement in pregnancy, though high levels increase risk of teratogenicity. Unlikely increased risk of deficiency unless malabsorption occurs. Unless a good reason to suspect deficiency, prudent to avoid supplements with Retinol or Retinyl esters. Betacarotene or mixed carotenoids are safe.
Vitamin A	Increased requirement in pregnancy, though high levels increase risk of teratogenicity. Unlikely increased risk of deficiency unless malabsorption occurs. Unless a good reason to suspect deficiency, prudent to avoid supplements with Retinol or Retinyl esters. Betacarotene or mixed carotenoids are safe.			
Vitamin E, K	May be compromised especially in Bypass surgery. More likely if fat malabsorption present. Monitor biochemistry			
Zinc, Copper	Increased requirement, important to ensure patients are meeting recommended daily intake.			

IU = international unit, mg = milligram

Adapted from a presentation by Fiona Sammut, Accredited Practising Dietitian, Queensland (2014)

* American Society for Metabolic & Bariatric Surgery (2013), *Clinical practice guidelines for the perioperative nutritional, metabolic and nonsurgical support of bariatric surgery patient*

Australian Government National Health and Medical Research Council (2006) *Nutrient reference values for Australia and New Zealand including recommended dietary intakes*.

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