

2.0 Antenatal nutrition

2.1 Nutrition during pregnancy (1,2,3,4,5)

Nutritious foods and an active lifestyle can help achieve optimal health throughout life. Good nutrition is important at all stages throughout life and particularly during pregnancy. The health and nutritional status of mothers and children are intimately linked (1).

Beginning pregnancy with a healthy diet is giving the baby the best possible nutritional advantage. A wide varied diet is vital in supporting the growth and development of the foetus and the maintenance of the woman's own health. Nutritional requirements for most nutrients increase during pregnancy, particularly folate, iron, zinc and vitamin C (2). There is only a small rise in energy requirements, which can be achieved by eating for example an extra 2 – 3 slices of bread per day (3).

Table 5 Food recommendations during pregnancy

Food group	Number of serves	1 serve
Bread, cereal , rice, pasta, noodles	4 – 6	2 slices bread 1 medium bread roll 1 cup cooked rice, pasta or noodles 1 cup breakfast cereal flakes or porridge ½ cup muesli
Fruit	4	1 piece medium sized fruit 2 pieces smaller fruit 8 strawberries 20 grapes or cherries ½ cup juice 1 cup diced/canned fruit 1 ½ Tbsp sultanas
Vegetables, legumes	5 – 6	1 medium potato/yam ½ medium sweet potato 1 cup lettuce or salad vegetables ½ cooked vegetables
Meat, fish, poultry, eggs, nuts and legumes	1½	65 – 100g cooked meat/chicken 80 – 120g cooked fish 2 small eggs ½ cup cooked dried beans, lentils, chick peas, split peas or canned beans ⅓ cup peanuts/almonds
Dairy	2	1 cup milk 40g (2 slices) cheese 200g yoghurt 1 cup custard
Extra foods	0 – 2½	1 Tbsp margarine or oil 1 can soft drink ½ small chocolate bar 4 plain sweet biscuits

Adapted from the *Australian Guide to Healthy Eating*

2.2 Sample meal plan

The following examples illustrate how the *Australian Guide to Healthy Eating* can be incorporated into a daily meal plan to meet minimum nutritional requirements.

Breakfast

1 cup breakfast cereal flakes/1 cup porridge
Milk (250ml)
1 cup strawberries/1 fresh orange/½ grapefruit

Morning tea

2 rice cakes/1 slice toast with 1 slice cheese and tomato

Lunch

Salmon/egg or tuna/and salad bread roll
1 piece fresh fruit

Afternoon tea

1 scone
½ cup fruit juice

Dinner

1 small steak (100g) with mixed vegetables (total 1½ cups)
1 small potato
1 cup fruit salad with 2 Tbsp yoghurt

Supper

2 slices raisin toast, scrape margarine



Parent handouts available at

qheps.health.qld.gov.au/ahwac/content/home_nemo.htm

Folate during pregnancy

Folate is a B group vitamin needed for healthy growth and development. Its requirements are increased during pregnancy for normal growth of the unborn baby. Adequate folate intake helps to prevent neural tube defects in the baby, such as spina bifida (2).

The vitamin is known as folate when it is found naturally in food and as folic acid when it is added to food or used in dietary supplements (4).

The recommended intake of dietary folate for pregnant women is 600 µg/day throughout pregnancy. However, to reduce the likelihood of neural tube defects in the baby, it is recommended that women consume an additional 400 µg/day folic acid through a supplement or in the form of fortified foods for at least 1 month before and 3 months after conception in addition to consuming food folate from a varied diet (2).

It is difficult to get enough folate from natural sources alone to reduce the risk of neural tube defects in pregnancy. Folic acid supplements are available over the counter. Women who have a family history of neural tube defects like spina bifida require medical advice before becoming pregnant (4) as they may need even higher amounts of folic acid.

Good sources of folate include leafy vegetables, whole grains, fortified cereals, peas, nuts, avocados and yeast extracts (eg *Marmite*, *Promite*, *Vegemite* etc).

For further information and parent handouts:

www.foodstandards.gov.au/foodmatters/pregnancyandfood.cfm



Check

- ✓ diet contains rich sources of folate before and during pregnancy
- ✓ advise women to take folate supplements for 1 month before conception and during the first trimester of pregnancy
- ✓ if dietary intake is poor, consider continuing folate supplement after the first trimester
- ✓ folic acid intakes should not exceed 800 – 1000 µg/day.

Iron during pregnancy

Iron is a component of haemoglobin, the component of blood which carries oxygen around the body. The peak iron requirement in pregnancy occurs throughout the second and third trimesters. This is to support the expansion of the maternal red blood cell mass, the growing foetus and the placenta. A lack of iron may result in anaemia. Women whose diet prior to pregnancy was low in iron, may have low iron stores. This increases their risk of developing iron deficiency anaemia during pregnancy. Dietary iron is used by the growing baby first, leaving the mother's stores depleted if her intake is inadequate. Low iron levels in early pregnancy have been linked to premature birth and low birth weight.

The RDI for iron in pregnancy is 27 mg/day (5). A mixed diet of animal and plant foods can help you achieve your iron intake. Absorption of iron is better from animal foods compared to plant sources and the recommended dietary intakes are based on a mixed Western diet.

There are two types of iron in food: iron from animal foods (called haem iron) and iron from plant foods (called non-haem iron).

Haem iron is taken up by the body about 10 times better than non-haem iron. Meats are the best source of iron. The redder the meat, the higher it is in iron. This means beef and lamb are higher in iron than pork, chicken or fish. Coloured flesh fish, such as tuna and mullet are higher in iron than reef fish, such as barramundi.

Non-haem iron is found in some plant foods such as:

- wholegrain and iron fortified breads and cereals foods, eg. breakfast cereal with added iron
- legumes, eg. kidney beans, baked beans
- green leafy vegetables, eg. spinach and broccoli
- nuts and dried fruit.

Remember that iron from these foods is not taken up by the body as well as iron from animal foods. You will need to eat more of these foods if they are your only iron source.

Adding a glass of fruit juice or other foods rich in vitamin C (such as tomato, broccoli or capsicum) to a meal will increase the amount of iron the body absorbs. In contrast, tea, coffee and unprocessed bran can inhibit iron absorption.

Indicators of iron deficiency

Iron status is determined by measuring blood levels of haemoglobin, serum ferritin and serum transferrin. Serum ferritin is the best indicator of iron stores. Low serum ferritin levels indicate depleted iron stores. Haemoglobin is not a sensitive indicator of iron status, with levels decreasing often only when ferritin stores are severely depleted. In addition, haemoglobin levels decrease during the third trimester of pregnancy due to haemodilution effects. Ferritin levels remain unchanged during this time. Serum transferrin transports iron in the blood. Transferrin values increase with iron deficiency and decrease with iron overload. Iron intake should be increased when serum ferritin levels are low. Ideally the diet should be examined for adequate iron intake. If the diet appears to provide adequate iron despite low ferritin levels, supplements may be considered.

Check

- ✓ if serum ferritin levels are low, iron intake needs to be increased
- ✓ iron supplements may cause constipation. Constipation may be minimised by consuming adequate intakes of dietary fibre and fluid. Foods from the meat/meat alternatives group provide the best sources of iron. Vegetarians need to consume vitamin C rich foods with meals to increase iron absorption and eat a good variety of non-haem iron sources.

Iodine

The RDI for iodine in pregnancy is 220 ug/day (5). Iodine deficiency in pregnancy can affect growth and development in the unborn child, increase the chance of miscarriage and have serious implications for intellectual development. Iodine can be found in dairy products ie milk and yoghurt, bread baked with iodised salt and saltwater fish. It is very important for mothers to consume sufficient iodine from the time of conception, just as it is for the more well-known nutrients of iron and folate (5).

Multivitamin supplements

Apart from the recommended folate supplement, it is best to obtain nutrients from a healthy diet. Multivitamins not designed for pregnancy are not recommended as there are dangers associated with excessive doses of nutrients such as Vitamins A, D and B6 (2).

Alternative and herbal remedies

Most herbal and homeopathic remedies have not been tested to determine their safety during pregnancy. Many herbal preparations have a drug-like effect and should be used with the same caution as with other drugs during pregnancy. Herbal preparations should be avoided during the first trimester. The National Prescribing Service (NPS) Medicines line can provide information regarding alternative treatments in pregnancy, phone 1300 888 763.

Patient handouts available at

qheps.health.qld.gov.au/ahwac/content/home_nemo.htm



2.3 Special considerations during pregnancy

Listeria

Listeria are bacteria carried in some foods that can cause an infection called listeriosis. The bacteria commonly inhabit soil, water, plants and sewerage. The infection may cause few or no symptoms in healthy people, including pregnant women. However, the risk of transmission from the infected pregnant woman to her unborn child is higher. Infection of the foetus can lead to miscarriage, stillbirth, premature birth or severe illness in newborn babies (2).

The best ways to avoid listeria infections include hygienic preparation, storing and handling of food. Foods should be eaten fresh, or thoroughly cooked, or well washed if eaten raw (fruit and vegetables). Leftovers can be eaten if they have been refrigerated immediately and stored for less than 24 hours.

The foods most likely to carry the bacteria, increase the risk of infection and therefore should be avoided, include:

- soft and semi soft cheeses, eg. brie, camembert, ricotta, blue, fetta
- soft serve ice cream
- unpasteurised dairy products
- pate
- chilled seafood
- salads - fruit/vegetable, eg. prepared, prepackaged, smorgasbord/salad bars
- cold meats, including chicken, eg. deli, sandwich bars, and packaged ready-to-eat.

Healthy tips

- ✓ always wash hands before preparing or serving food and after handling animals or visiting the toilet
- ✓ animals can carry the toxoplasmosis parasite which can cause disease in humans so keep them out of the kitchen; avoid touching faeces and wear rubber gloves under garden gloves
- ✓ wash cookware and utensils well after use
- ✓ store raw foods down low in the fridge and check fridge temperature regularly
- ✓ foods and leftovers that belong in the fridge should always be refrigerated as soon as possible
- ✓ thaw frozen meats in the fridge
- ✓ once cooked, pasta and rice should be stored in the fridge
- ✓ look for 'best before' and 'use by' dates on packaged foods.

For further information:



www.foodstandards.gov.au/foodmatters/pregnancyandfood.cfm

Mercury

Fish is a safe and important part of the Australian diet. It contains an excellent source of protein, is low in saturated fat, high in omega 3 fish oils and is an excellent source of iodine. There has been some concern regarding the level of mercury in fish, specifically accumulation of mercury in fish that are higher up the food chain.

Food Standards Australia and New Zealand (FSANZ) advises pregnant women, and women planning pregnancy, to eat a variety of fish as part of a healthy diet. However, pregnant women should limit their intake of certain types of fish.

Table 6. Recommendations of fish consumption during pregnancy

Pregnant women and women planning pregnancy (1 serve = 150 g)
1 serve per fortnight of shark (flake) or billfish (swordfish/broadbill and marlin) and NO other fish that fortnight
OR
1 serve per week of orange roughy (deep sea perch) or catfish and NO other fish that week
OR
2 – 3 serves per week of any other fish and seafood not listed above

Adapted from *Food Standards Australia and New Zealand*

For further information:

www.foodstandards.gov.au/foodmatters/pregnancyandfood.cfm



Caffeine

Caffeine is a chemical found in many foods and drinks, including coffee, tea and cola. It affects the nervous system and can cause irritability, nervousness and sleeplessness. During pregnancy it takes longer to breakdown caffeine.

While having large amounts of caffeine does not appear to cause birth defects, drinking high amounts of caffeine may make it more difficult to become pregnant and may increase the risk of miscarriage.

It is best to limit the daily amount of caffeine to:

- 2 cups of coffee, or
- 4 cups of tea, or
- 4 cups of cola drink, or
- less than 1 cup of cola or energy drinks that contain extra caffeine, or
- decaffeinated varieties are an option which contains little caffeine however safe levels of decaffeinated products for pregnant women are unknown.

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Artificial sweeteners

The use of only some artificial sweeteners is considered to be safe during pregnancy. FSANZ has listed aspartame (marketed in food products as *Equal*, *Hermesetas* and *Nutrasweet*) and sucralose (*Splenda*) as safe to use during pregnancy (2).

Alcohol

During pregnancy alcohol crosses the placenta and can lead to physical, growth and mental problems in some babies. Babies affected by alcohol tend to have low birth weights. They may also have physical and behaviour problems at birth and throughout childhood. (2)

There are no known safe levels of alcohol consumption in pregnancy. Therefore, it is best to avoid drinking alcohol during pregnancy as much as possible.

The Australian National Health and Medical Research Council (NHMRC) has made the following recommendations for women who are pregnant or planning a pregnancy:

Women may consider not drinking alcohol at all

It is most important not to become intoxicated

Women who choose to drink should have less than 7 standard drinks per week

Women should have at least 2 alcohol free days a week

On any 1 day no more than 2 standard drinks should be consumed. These drinks should be spread over at least 2 hours.

Drinking larger quantities at any one time may affect the developing foetal brain.

- 1 standard drink is equal to:
- 100 ml wine
- 1 'pot' of beer (285 ml)
- 1 can/stubbie (375 ml) low alcohol beer
- 1 nip of spirits (30 ml)
- 60 ml fortified wine (port or sherry).

Check

- ✓ **alcohol consumption is reduced to nil where possible. If alcohol is consumed, the intake should not exceed more than 2 standard drinks per day.**

Morning sickness

Morning sickness is a common symptom of early pregnancy and, in many cases, goes away by the end of the first trimester. It is caused by changes in hormones during pregnancy and may make eating difficult. Although it is called 'morning sickness', nausea (with or without vomiting) can happen at any time of the day. A small number of women experience severe vomiting which can lead to dehydration and electrolyte imbalances. Such women require medical assistance and possibly hospital admission for correction. In other cases, frequent and prolonged nausea/vomiting can lead to an inadequate energy intake which results in weight loss. This weight loss usually ceases once nausea reduces and appetite improves.

Check

- ✓ **adequate energy intake to prevent weight loss**
- ✓ **if morning sickness persists with vomiting more than twice daily for more than 2 days, medical intervention should be sought as hospitalisation may be required. Ensure adequate fluid replacement to avoid dehydration.**



Patient handouts available at

qheps.health.qld.gov.au/ahwac/content/nemo_review.htm

The following page can be used as a parent handout.

Morning sickness



Morning sickness does not usually cause any problems for the unborn baby. Some food and eating suggestions that may help manage symptoms of morning sickness or nausea include:

- eat smaller meals more often. missing meals can make nausea worse
- avoid large drinks. have frequent small drinks between meals
- limit fatty, spicy and fried foods
- food has a stronger odour or smell when it is heated, which may make nausea worse. if possible, have other people help with cooking, or prepare your food at times of the day when you feel better
- try eating a dry biscuit before you get out of bed in the morning
- eat a healthy snack before you go to bed at night. this might include fruit (fresh, tinned, dried), crackers with hard cheese or yoghurt
- avoid foods if their taste, smell or appearance make you feel sick
- if vomiting, it is important to drink enough fluids. It may be easier to have lots of small drinks than to try and drink a large amount in one go. Try a variety of fluids such as water, fruit juice, lemonade and clear soups. Sometimes it can be helpful to try crushed ice, slushies, ice blocks or even suck on frozen fruit such as grapes or orange segments.

Note: The stomach acids in vomiting can soften teeth enamel.

It is best not to use a toothbrush to clean the teeth straight after vomiting as this may damage them. Have a drink of water to clean your mouth.

Constipation

Constipation is common in pregnancy for the following reasons:

- Intestinal muscle appears to lose tone, making it difficult for food to pass through:
- the baby in latter pregnancy, places pressure on the intestine, exacerbating the problem
- iron supplementation may cause constipation in some women.

Constipation can be minimised by ensuring:

- adequate exercise
- high fibre intake
- adequate fluid intake (1.5 – 2 L per day).

Check

- ✓ ensure adequate fibre intake by eating fruit, vegetables and wholemeal/wholegrain breads and cereals
- ✓ ensure adequate fluid intake (ie. 1.5 l/day)
- ✓ regular activity
- ✓ regular use of laxatives is not recommended.



Parent handouts available at

http://qheps.health.qld.gov.au/ahwac/content/nemo_review.htm

Heartburn

Heartburn occurs for a number of reasons including:

- Relaxation of the oesophageal muscles during pregnancy (under hormonal influences) allows acid to run into the oesophagus, and pressure from the growing baby on the stomach causes a backflow of acid. Some suggestions for relief of heartburn include:
 - Eat smaller meals frequently
 - Chew food well
 - Avoid fatty and spicy foods which may irritate the condition
 - Drink fluids separately to meals
 - Snack on dry biscuits or toast
 - Sipping milk may ease heartburn temporarily
 - Relax while eating
 - Avoid lying down or bending over directly after meals
 - Don't smoke
 - Avoid alcohol
 - Care needs to be taken to ensure none of the food groups are omitted from the diet, since this can reduce the nutritional adequacy of the diet
 - Some antacids are safe to take during pregnancy, but may inhibit iron absorption. Recommend use under medical supervision.



Parent handouts available

qheps.health.qld.gov.au/ahwac/content/nemo_review.htm
www.foodstandards.gov.au/foodmatters/pregnancyandfood.cfm

2.4 Weight gain during pregnancy

A healthy weight gain during pregnancy can vary between individuals and depends on pre-pregnant weight. It is recommended women who are planning a pregnancy should attempt to reach a healthy body weight before they become pregnant as being overweight or obese, or underweight, prior to conception is associated with an increased risk of a number of complications.

An average weight gain during pregnancy for a person of a healthy weight is 10-15 kg. The breakdown of this weight gain is illustrated in Tables 7 and 8. The maternal fat stores are used later in the production of breastmilk. Healthy weight gain is mostly seen in the second and third trimesters (after the first 3 months) of pregnancy. This is the time of pregnancy when mother's energy (kilojoule) requirements increase. However, it is best to focus on food quality rather than quantity to meet the nutritional needs in pregnancy. There is no reason to increase food quantity to the point of 'eating for two' as this is likely to lead to extra weight gain.

However it must be stressed that pregnancy is not the time for weight loss diets. Restricting food and nutrient intake compromises both the development of the baby and the mother's nutritional status. Women who are underweight or have some form of eating disorder place their baby and themselves at nutritional risk. If the mothers' diet is inadequate, maternal stores will be depleted. This can compromise the mothers' health, since the baby takes the nutrients it requires first.

The Institute of Medicine (IOM) recommends weight gain ranges based on pre-pregnancy body mass index (BMI) (8). Research has shown pregnancy weight gain within these ranges is associated with the best outcome for both mothers and infants. To calculate BMI use the following equation or refer to Figure 3.

$$\text{BMI} = w \text{ (kg)} / \text{ht} \text{ (m)}^2$$

Figure 3 Body Mass Index chart

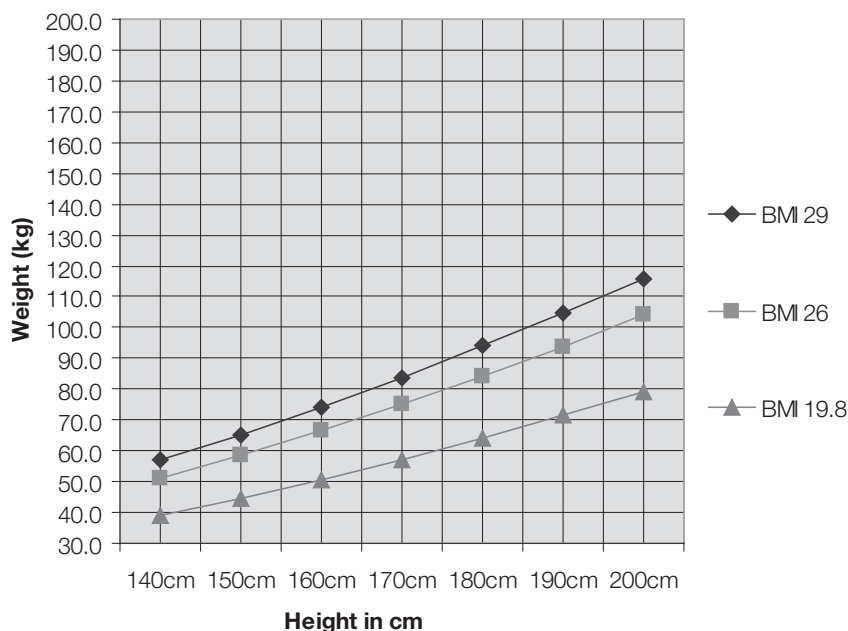


Table 7 Recommended total weight gain during pregnancy, proportional to weight for height

Weight-for-height category	Recommended total gain (kg)
Low (BMI<19.8)	12.5-18
Normal (BMI 19.8-26.0)	11.5-16
High (BMI >26-29.0)	7-11.5
Obese (BMI >29.0)	> 6.0

Table 8 The general guide to the pattern of weight gain during pregnancy

Trimester	Healthy weight	Underweight	Overweight	Obese
1st	0-2	1-3	0-1	0-1
2nd	4-6	5-8	3-4	2-3
3rd	4-6	5-8	3-4	2-3
Total	11-16kg	12-18kg	7-11kg	< 7kg

The pattern of weight gain varies for each woman and each pregnancy. Specific advice for individual needs should be sought from a qualified dietitian or health professional.

Healthy eating to increase weight gain

Sometimes if women suffer from morning sickness early in pregnancy it may be difficult to gain weight and sometimes may lose a small amount. This is not cause for concern as long as weight gain starts in the second trimester of the pregnancy.

Inadequate weight gain in pregnancy can adversely affect the health of mother and baby. If not gaining enough weight suggest these ideas:

- Eat 3 meals a day
- Include snacks between meals
- Enjoy healthy snack foods such as:
 - Fresh or dried fruit
 - Yoghurt
 - Nuts and seeds
 - Muesli bars
 - Biscuits and cheese
 - Milk drinks

Healthy eating to control weight gain

Pregnancy is not a time for strict dieting. However, excessive weight gain during pregnancy can cause problems with high blood pressure, gestational diabetes for the mother, a large for gestational age baby and delivery complications. If mother is overweight it is important control weight gain in pregnancy.

Limit the amount of fat eaten

- Limit intake of biscuits and cakes
 - Limit intake of chips and crisps
 - Reduce the amount of fat used in cooking
 - Choose low fat dairy products including milk, yoghurt, and cheese
 - Avoid cream and sour cream
 - Trim all the fat off meat before cooking
 - Remove the skin from chicken
 - Limit high fat take-away foods

Limit high sugar foods

- Drink water not soft drink or cordial
- Use “diet” or low joule products
- Limit fruit juices to once a day, these are high in sugar
- Limit chocolates, lollies and sweets
- Limit intake of desserts
- Minimise snacking
- Increase physical activity

Check

- ✓ weight loss is not recommended during pregnancy
- ✓ weight gain education provided based on pre-pregnant BMI.

Returning to pre-pregnant weight

Many women are concerned about weight gained during pregnancy and are keen to return to their pre-pregnancy weight as soon as possible after their baby is born. It is important to remember that a woman’s nutritional requirements remain increased while breastfeeding. It is essential that intake is not restricted to a point where nutritional requirements are not met.

Women who gain excessive weight during pregnancy are at risk of post partum weight retention (9). The greatest amount of weight loss occurs in the first 3 months after birth and then continues at a slow and steady rate until 6 months after birth (9).

Healthy eating tips for those trying to lose weight

Exercising is a good way of stimulating weight loss. Not only does it have physical benefits eg. weight loss and improved general health, but also psychological benefits for the mother. The exercise need not be vigorous. In fact, regular walking is a very good form of activity. Encourage mothers to exercise regularly - at least 5 times a week for 30 minutes at a time.

Frequent breastfeeding can be beneficial for weight loss and increases with the length of the lactation course.

The extra energy required to breast feed can often be significant. The surplus fat stores laid down during pregnancy (ie. around hips) can be used to meet these additional energy needs.

Encourage mothers to eat regular meals. Skipping meals can result in snacking between meals. It can also slow down the body's metabolism, making it more difficult to lose weight.

Avoid choosing foods with a high fat content ie choose lean cuts of meat, skinless chicken and fish; choose cooking methods that use minimal fat; choose low fat products where possible; use less margarine, butter, oil; avoid cakes, biscuits, chocolates, lollies, cordials and soft drinks.

Healthy eating tips for those trying to gain weight

Some women also lose a lot of weight while they are breastfeeding and find it difficult to maintain an acceptable weight. This is NOT an indication that breastfeeding should stop. The following lists give some ideas for gaining and maintaining weight.

- Don't skip meals.
- Have three main meals and three between meal snacks.
- Keep easy to prepare nutritious snacks on hand eg crackers and cheese, fresh fruit, yoghurt, nuts, seeds, dried fruit, canned beans, flavoured milk, fruit smoothies, breakfast cereals and milk.
- Prepare a packed lunch or variety of snacks to have in a container beside you when baby feeds.
- Prepare and freeze meals in advance when possible (or ask your friends/family to help).

Check

- ✓ if client is experiencing problems returning to healthy weight range recommend consultation with a dietitian/ nutritionist.

2.5 Groups requiring special attention during pregnancy

Vegetarian and vegans

Vegetarianism means different things to different people. Table 9 outlines the various eating practices of different groups of vegetarians and their major food sources (refer to sample vegetarian meal plan below). It is possible to meet nutrient requirements while following a vegetarian meal plan. However, time must be spent ensuring the nutritional adequacy of the diet, particularly with the increased requirements of pregnancy and lactation. The following nutrients require particular attention when planning a balanced vegetarian meal plan.

Table 9 Types of vegetarians and major food sources

Foods eaten	No red meat	Lacto-ovo vegetarian	Ovo-vegetarian	Lacto vegetarian	Vegan
Plants	✓	✓	✓	✓	✓
Animal meats	(Chicken and fish)				
Eggs	✓	✓	✓		
Milk and milk products	✓	✓		✓	

Energy

Because vegetarian diets tend to be high in fibre they increase satiety and cause people to 'fill up' quicker. It is, therefore, important to ensure adequate food is provided and weight gain is appropriate. High energy vegetarian foods include nuts, nut or other seed pastes eg. tahini, peanut butter and dried fruits.

Protein

Essential or 'indispensable' amino acids must be obtained from the diet as the body is unable to make them. Animal foods including; milk, milk products, fish and meat are complete proteins as they contain all the essential amino acids in the proportions required. In contrast, plant foods are incomplete protein sources as they do not contain the correct balance of the essential amino acids. It is, therefore, important that vegetarians who are avoiding animal products, consume a variety of plant foods to ensure all the essential amino acids are obtained. Iron, zinc, calcium and vitamin B12 are nutrients that may be lacking.

Zinc (2)

Zinc is a component of various enzymes that help maintain structural integrity of proteins and help regulate gene expression: Therefore, getting enough is particularly important for the rapid cell growth that occurs during pregnancy. The RDI for zinc during pregnancy is 11mg/day. Zinc can be found in lean meat, wholegrain cereals, milk, seafood, legumes and nuts.

Vitamin B12

Significant amounts of B12 are usually found in animal products, so intake could be limited. A good amount can be consumed by having at least two serves of soy milk fortified with B12 daily. Food fermented by micro-organisms (soy sauce, miso, tempeh), manure-grown mushrooms, spirulina and yeast may contain small amounts of vitamin B12, but this is not sufficient to meet requirements for vitamin B12.

A sample vegetarian meal plan:

Breakfast

- ½ cup muesli or 2 wheat biscuits
- Milk
- 1 slice wholemeal toast with peanut butter
- 1 orange

Morning tea

- 2 wholemeal crackers with tomato and cheese
- Fresh fruit

Lunch

- Wholemeal roll, 1 - 2 cups of salad with an avocado
- Milk and 2 tsp *Milo*

Afternoon tea

- ½ cup almonds and 4 Tbsp raisins

Dinner

- 1 cup kidney beans
- 2 - 3 cups serves vegetables including broccoli
- Fruit yoghurt

Supper

- 2 slices of raisin toast with margarine
- Soy beverage, fortified with calcium and vitamin B12 could replace milk in vegan meal plans

Check

- ✓ foods from the meat, fish, poultry, eggs, nuts, legumes groups and iron fortified cereals should be consumed each day for adequate iron and zinc intake. Soy beverages should be fortified with calcium (containing at least 115mg per 100mL) and B12
- ✓ ensure sufficient energy is consumed and appropriate weight gained
- ✓ consider supplementation with a multivitamin (which includes iron, zinc, calcium and B12) if needs are not being met
- ✓ refer to dietitian for individual assessment and advice.

Teenagers

The nutrient requirements of pregnant teenagers are increased. Not only must they eat to provide the nutrients required for the pregnancy, but also to provide for their own growth and development during puberty. Pregnant teenagers should be treated as a separate group. There are specific RDIs for pregnant teenagers between 14-18 years. Girls with a low gynaecological age (difference between age of menarche and age at conception) require additional nourishment as they are often still growing. Even if they have stopped growing, teenage girls with a low gynaecological age are likely to have inadequate nutrient stores, because it takes about 2 years to build up stores after menarche (10).

It is important to ensure teenage mothers have an appropriate weight gain during pregnancy. Pregnant adolescents are at risk of both inadequate and excessive weight gain (11). They are at risk for adverse outcomes including low birth weight, preterm delivery, anaemia, and excessive post partum weight retention due to a combination of physiological, socioeconomic, and behavioural factors (11). It is worth bearing in mind that at this time in a teenager's life, there are a number of other factors which impact on their eating patterns, for example: peer pressure, social supports, lack of shopping and cooking skills and a fear of gaining weight and becoming "fat".

Aboriginal and Torres Strait Islander women

See Aboriginal and Torres Strait Islander section

Obese pregnant women

Maternal overweight and obesity is now an important issue in about one third of all pregnancies in the Australian context (13). Increased maternal body mass index (BMI) at conception is associated with a range of adverse maternal, obstetric and neonatal outcomes. Hypertensive disorders of pregnancy, impaired glucose metabolism, gestational diabetes, hyperlipidemia, caesarean section delivery, prolonged maternal hospitalization, foetal and neonatal death, birth defects and neonatal intensive care admission are all consequences of maternal obesity (13,14,15).

Overweight and obesity has been associated with reduced initiation and duration of breastfeeding (16,17). The causes for this may be multifactorial. Factors to consider in poor lactation performance include:

- Socio-cultural factors, such as concern about body shape, low self esteem and poor mental health (16)
- Physical factors for example, women with large breasts may have mechanical difficulties with breastfeeding (16)
- Physiological factors such as reduced prolactin response to suckling (18)

Check

- ✓ overweight and obese women identified as high risk during pregnancy
- ✓ advice about appropriate weight gain
- ✓ oral glucose tolerance test (OGTT) taken 24 – 28 weeks gestation
- ✓ targeted for post partum lactation consultant assistance with breastfeeding.

Women with diabetes in pregnancy

Pre-existing Type 1 and Type 2 diabetes

Women with pre existing diabetes can have a healthy and successful pregnancy. However they need close monitoring by a team including an obstetrician, endocrinologist (or physician experienced in diabetes care during pregnancy), diabetes educator and dietitian to ensure the diabetes is well managed during the pregnancy.

Women with pre-existing diabetes have a higher risk of infants:

- having a birth defect;
- being born prematurely;
- having a low birth weight or being macrosomic;
- having dangerously low blood sugar levels after birth.

It is important that women control their blood sugar levels before becoming pregnant and throughout the pregnancy to minimise these risks.

Gestational diabetes

In some women during pregnancy their ability to utilise glucose becomes impaired. The hormones produced by the placenta cause insulin resistance. If the body is unable to meet the increased need for insulin gestational diabetes develop usually around the 24th – 28th week of gestation.

Gestational diabetes is more likely to occur in (19):

- Women over 30 years of age
- Women with a family history of Type 2 diabetes
- Women who are overweight
- Aboriginal and Torres Strait Islander women
- Certain ethnic groups are also at increased risk: Indian, Chinese, Polynesian/Melanesian, Vietnamese, Middle Eastern
- Women who have had gestational diabetes during previous pregnancies
- Women who have had difficulty carrying a pregnancy to term.

Gestational diabetes is diagnosed after a Glucose Challenge Test (GCT) which is a screening test. If this is abnormal an Oral Glucose Tolerance Test (OGTT) is necessary.

If gestational diabetes is untreated there is increased risk of a large for gestational age baby, delivery complications and low blood sugar levels of the baby at birth.

There are four basic components to treatment of gestational diabetes: dietary modifications, physical activity, medications and monitoring blood glucose levels.

These women should be referred to a dietitian for individualised nutritional advice. The most important points are for regular carbohydrate distribution and low glycemic index (GI) diet.

After the birth of the baby, the mother's blood sugar levels should return to normal and an OGTT at around 6 weeks post partum should be done to confirm this.

Women who develop gestational diabetes are at increased risk of developing Type 2 diabetes later in life with a 30% – 50% chance of developing it within 15 years after pregnancy (19).

2.6 Exercise during pregnancy (20,21,22)

Regular exercise during pregnancy is in most cases, safe for both mother and baby. Women should be encouraged to initiate or continue exercise during this time to obtain the health benefits associated with such activities.

A doctor, physiotherapist or exercise physiologist can provide individual advice for women about exercise during pregnancy.

Benefits of exercising regularly throughout pregnancy include:

- resistance to fatigue
- reduced back pain, constipation, bloating and swelling
- improved posture
- improved weight control
- stress relief
- improved sleep
- preparation for physical demands of labour
- faster recuperation after labour
- faster return to pre-pregnancy fitness and healthy weight.

Body changes during pregnancy

Hormones produced during pregnancy, such as relaxin, soften the ligaments that support joints, resulting in joints being more mobile and increasing the risk of joint injury.

Extra abdominal weight shifts the body's centre of gravity, placing stress on the pelvis and lower back joints, and can affect balance.

Pregnancy increases resting heart rate.

General exercise suggestions

- Aim for 4 to 5 exercise sessions per week.
- Don't try to exercise too far beyond current fitness level.
- Warm up and cool down for around 10 minutes.
- Try to exercise on soft surfaces, such as grass or carpet.
- Avoid exercising in the middle of the day or hot humid conditions—take care not to overheat.
- Maintain a moderate intensity—keep heart rate below 140 beats per minute.
- Rest frequently, particularly if feeling breathless.
- Wear a supportive bra and footwear.
- Where cool, loose fitting clothing.
- Change positions slowly and gradually.

Suggested activities

- Water activities
- Walking
- Swimming
- Yoga
- Dancing
- Pilates
- Pregnancy exercise classes
- Cycling on a stationary bike

Exercises to avoid

- Contact sports or those activities where there is potential for loss of balance that could result in trauma to baby.
- Exercising in water where the temperature is greater than 32° C.
- Activities that involve jolting, jarring or rapid changes of direction, particularly in the latter stages of pregnancy.
- After 16 weeks avoid activities involving lying flat on back—the weight of the uterus and baby compress the main artery back to the heart. This can lower blood pressure and result in feelings of dizziness and light headedness.
- Scuba diving - babies are not protected from decompression sickness.
- Don't exercise when ill.

Conditions requiring medical supervision while exercising in pregnancy

- Cardiac disease
- Restrictive lung disease
- Persistent bleeding in the second and third trimesters
- Pre-eclampsia or pregnancy-induced hypertension
- Preterm labour (previous/present)
- Intrauterine growth restriction
- Cervical weakness/cerclage
- Placenta praevia after 26 weeks
- Preterm pre labour rupture of membranes
- Heavy smoker (more than 20 cigarettes a day)
- Orthopaedic limitations
- Poorly controlled hypertension
- Extremely sedentary lifestyle
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Multiple gestation (individualised and medically supervised)
- Poorly controlled thyroid disease
- Malnutrition or eating disorder
- Poorly controlled diabetes mellitus
- Poorly controlled seizures
- Anaemia.

Warning signs to cease exercise

- Excessive shortness of breath
- Chest pain or palpitations
- Pre-syncope or dizziness
- Painful uterine contractions or preterm labour
- Leakage of amniotic fluid
- Vaginal bleeding
- Excessive fatigue
- Abdominal pain, particularly in back or pubic area
- Pelvic girdle pain
- Reduced fetal movement
- Dyspnoea before exertion
- Headache
- Muscle weakness
- Calf pain or swelling

Medical advice should be sought if any of the above symptoms occur.

Pelvic floor exercise should be done before, during and after pregnancy.

Care should be taken with back support.

Whenever changing position, bending and lifting:

- tighten abdominal muscles - particularly the transverse abdominal muscle which forms a natural corset in the lower part of the abdomen
- tighten pelvic floor muscles
- use leg muscles.

Information sheet can be found at:

www.betterhealth.vic.gov.au



Check

- ✓ women have no contraindications to exercise
- ✓ advise of benefits of exercising in pregnancy
- ✓ inform of criteria to cease exercise.

2.7 Antenatal breastfeeding education

Health professionals often leave discussion of breastfeeding until later in the pregnancy. Research demonstrates that the earlier in the pregnancy a decision to breastfeed is made the more likely the breastfeeding will be successful (23). The decision is usually made before pregnancy and is based on life experiences, beliefs and attitudes of family and others to breastfeeding (24).

Antenatal education should include:

- **importance of exclusive breastfeeding for the first 6 months (including the nutritional and protective benefits)**
- **basic breastfeeding management**
- **coping with minor problems (23).**

Mothers should be encouraged to become familiar and comfortable with handling their breasts (23).

Virtually every mother can breastfeed, but for some it is not so easy and learning and patience are necessary (23).

Benefits of breastfeeding for mother

- Helps uterus return to pre-pregnant state faster
- Can help with weight loss after baby
- Reduces likelihood of ovarian and premenopausal breast cancer
- Lessens likelihood of mothers with gestational diabetes developing Type 2 diabetes (24).

Formula feeding increases the risk of baby developing:

- Infections and diseases such as urinary tract infections, gastrointestinal infections (eg. diarrhoea) and respiratory illnesses (eg. asthma) and some childhood cancers
- Allergies and food intolerances such as coeliac disease
- Obesity, diabetes and heart disease later in life.

Benefits of breastfeeding to the community

- Reduced health care costs from illness and chronic disease prevention
- Reduced ecological damage from production, packaging, and disposal of breastmilk substitutes and containers. It also saves food resources, fuel and energy.

Guide to education

Early pregnancy

Ask questions 'how do you plan to feed your baby?'

Importance of decision about feeding choice

Assess knowledge and perceptions regarding breastfeeding

Reasons mothers choose

Explore and identify concerns and feelings

Acknowledge and validate feelings

Educate using targeted messages to address individual concerns

Benefits of breastfeeding (infant, mother, community)

Risks of formula-feeding

Ease of breastfeeding, difficulties that may be encountered

Breastfeeding with modesty

Family involvement

Lack of dietary restrictions and lifestyle changes

Feasibility with employment

Availability of people to assist

Identify breastfeeding resource network (family and friends, health care providers and mother-to-mother support groups).

Later in pregnancy

Practical skills on how to breastfeed

Possible difficulties and how to overcome these

Importance of skin-to-skin contact and rooming in

More information can be found on the following sites

How do I start breastfeeding?

www.health.qld.gov.au/phs/documents/cyhu/28099.pdf

Breastfeeding Getting Started

www.health.qld.gov.au/phs/documents/cyhu/28098.pdf



Antenatal checklist

- ✓ education on healthy eating and special considerations in pregnancy provided
- ✓ calculate pre-pregnant BMI - provide education on appropriate weight gain
- ✓ breastfeeding education provided
- ✓ glucose screen for gestational diabetes at 24-28 weeks gestation.

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