



INSTITUTE OF OBSTETRICIANS  
& GYNAECOLOGISTS  
ROYAL COLLEGE OF PHYSICIANS OF IRELAND

## **CLINICAL PRACTICE GUIDELINE**

### **Nutrition for Pregnancy**

Institute of Obstetricians and Gynaecologists,  
Royal College of Physicians of Ireland  
and  
Directorate of Clinical Strategy and Programmes,  
Health Service Executive

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## Key Recommendations

All women planning a pregnancy, or likely to become pregnant should be advised to:

1. Take a daily supplement of 400 micrograms (400µg/0.4mg) folic acid; higher doses are required for those with a history of neural tube defects or pre-existing diabetes mellitus.
2. Pregnant women and women planning pregnancy should be encouraged to eat a healthy, balanced diet incorporating foods based on the Health Service Executive (HSE) national Food Pyramid – Iron, calcium, vitamin D and long chain omega-3 polyunsaturated fatty acids are particularly important.
3. Avoid foods or food supplements which may be teratogenic or harmful to their baby.
4. All women booking for antenatal care should have their Body Mass Index calculated accurately.
5. Ideally women who are underweight, overweight or obese should be seen for pre-pregnancy dietary counseling in the community to optimise weight prior to conception and therefore reduce associated risks during pregnancy.

## 1. Purpose and Scope

The purpose of this guideline is to improve the management of nutrition during pregnancy while demonstrating a link between good nutrition during pregnancy and a favorable pregnancy outcome.

These guidelines are intended for healthcare professionals, particularly those in training, who are working in HSE-funded obstetric and gynaecological services. They are designed to guide clinical judgment but not to replace it. In individual cases a healthcare professional may, after careful consideration, decide not to follow a guideline if it is deemed to be in the best interest of the woman.

Separate guidelines are available for the management of obesity (HSE 2011 Obesity and Pregnancy Clinical Practice Guideline) and diabetes during pregnancy (HSE 2010 Guidelines for the Management of Pre-Gestational Diabetes Mellitus from Pre-Conception to the Postnatal Period).

## 2. Background and Introduction

Maternal nutrition at conception and during pregnancy influences the growth and potential development of the fetus and contributes to the maturity of a healthy baby.

It was commonly accepted that the fetus was nourished adequately at the expense of maternal stores and needs, however, it is becoming clear that this may not always be the case, and that fetal development can be less than optimal if certain nutrients are not available during particular sensitive windows of development (Zeisel, 2009). Nutrition during pregnancy effects not only fetal development, but also the risk of chronic diseases for that infant in adulthood (Koletzko, 2012, Silveira *et al*, 2007). The "Barker Hypothesis" first described the link between fetal development and later development of chronic diseases over 20 years ago (Barker, 1993; Barker *et al*, 1995). The critical "window of opportunity" seems to occur from conception until 24 months of age and is now commonly referred to as the "first 1000 days". Health professionals working with mothers and babies during this key time have a unique opportunity to influence lifelong health of mother, infant and the family unit, by encouraging an appropriate diet.

Poor in utero nutrition can increase adult risk of cardiovascular disease (Kajantie *et al*, 2005), high blood pressure (Huxley *et al*, 2000), obesity (Tounian, 2011; Boney, 2005) and metabolic syndrome (Barker *et al*, 2005). Even babies with seemingly normal birth weight have increased risk of cardiac death in later life if malnourished in utero (Barker *et al*, 2012). Obese women are more than twice as likely to give birth to a large for gestational age baby compared to a normal weight women (Sebire *et al*, 2001), which significantly increases the risk of complications associated with delivery (Boulet, 2003). Maternal diet can influence the type of fetal adipose tissue, which may explain the baby's risk of developing insulin resistance and subsequent diabetes in later life (Symonds *et al*, 2012). The fuel-mediated in utero hypothesis suggests that increased glucose and lipid intake during pregnancy results in obesity in later life for the baby (Koletzko *et al*, 2012). Improved diet and lifestyle regimens potentially

reduce this risk (Nelson *et al*, 2010; Moses *et al*, 2005). For example, replacement of high glycaemic index foods with low glycaemic index foods has been shown to significantly reduce gestational weight gain in obese women (Walsh *et al*, 2012).

Obese women are at an increased risk of developing gestational diabetes mellitus (GDM) which further increases complications in pregnancy (Dennedy and Dunne, 2010). These risks include birth weight above 90th centile for gestational age, increased need for caesarean delivery, clinical neonatal hypoglycaemia, cord blood serum c-peptide level above 90th centile, premature delivery, shoulder dystocia, hyperbilirubinemia and pre-eclampsia. GDM patients who are overweight or obese, have higher risks of complications (Owens *et al*, 2010). Pre-pregnancy weight loss is recommended for all obese women and is particularly beneficial in nulliparous women considering their first pregnancy (Dennedy and Dunne, 2010). GDM recurs in second and subsequent pregnancies (Kim, 2007), where patients will require more intensive monitoring and management with dietary intervention indicated from the outset.

The national food pyramid provides a basis on which to plan a pregnant woman's diet however, she will require increased levels of certain nutrients including folic acid, iron and long chain omega-3 polyunsaturated fatty acids (LCPUFA). Sufficient dietary intake of calcium and vitamin D is also important throughout pregnancy. All pregnant women should receive up-to-date, evidence-based nutrition and lifestyle information during pregnancy. Groups identified as being at particular risk of nutritional deficiency, or who would benefit from nutritional intervention include adolescents, women living on low-incomes, women observed to have a low or high body mass index at the beginning of pregnancy and women at high risk of pre-eclampsia or diabetes. It is essential that support structures are put in place to assist these women. Women with underlying disease states, including type 1 and 2 diabetes, Phenylketonuria and coeliac disease, which warrant specific dietary advice should be seen by the dietitian.

Pregnancy is a time which provides a unique opportunity to influence the long term health of the infant and mother. Many women are self-motivated to make positive changes to diet and lifestyle while pregnant. Just as targeting pregnant women and their partners for smoking cessation interventions during the antenatal period has been shown to be particularly effective (National Service Framework, 2000), diet and lifestyle change should be promoted at this opportunity to improve long term health outcomes.

### 3. Methodology

- Medline, EMBASE and Cochrane Database of Systematic Reviews were searched using terms relating to nutrition in pregnancy, Fetal programming and nutrition, First 1000 days, diet and pregnancy.
- Searches were limited to humans and restricted to the titles of English language articles published between 1990 -2012
- Relevant meta-analyses, systematic reviews, intervention and observational studies were reviewed.

**Guidelines reviewed included:**

- FSAI 2011 Scientific Recommendations for a National Infant Feeding Policy, 2<sup>nd</sup> Edition.
- FSAI 2012 Best Practice for Infant Feeding in Ireland: From pre-conception through the first year of infant's life.
- HSE 2011. Obesity And Pregnancy Clinical Practice Guideline. Institute of Obstetricians and Gynaecologists, Royal College of Physicians of Ireland and Clinical Strategy and Programmes Directorate, Health Service Executive. April 2011.
- FSAI 2011. Healthy Eating and Active Living for Adults, Teenagers and Children Over 5 Years – A Food Guide for Health Professional and Catering Services.
- HSE 2010 Guidelines for the management of pre-gestational diabetes Mellitus from preconception to the postnatal period. July 2010 available at [www.hse.ie](http://www.hse.ie).
- DoH/HSE 2012 The National Healthy Eating Guidelines - Your Guide to Healthy Eating using the Food Pyramid.
- NICE 2008 Improving the nutrition of pregnant and breastfeeding mothers and children in low income families. NICE public health guidance.
- NICE 2008 (B) Maternal and Child Nutrition. PH11 available at <http://publications.nice.org.uk/maternal-and-child-nutrition-ph11/introduction>

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Finally, the guideline was reviewed and endorsed by the Programme's Clinical Advisory Group and National Working Party.

## 4. Clinical Guidelines

### 4.1 Weight Gain

It is advisable that all women should have their BMI calculated at the first antenatal visit, ideally in the first trimester (Institute of Obstetricians and Gynaecologists *et al*, 2011). Anthropometric measurements taken during pregnancy should be used to evaluate potential physiological stress and identify those who would benefit from nutritional intervention (World Health Organisation, 1995). These measurements need to be taken early enough to allow time for intervention. Weight can be affected by nutritional intake, gestation, physiological stress and genetic factors and these should be taken into consideration on assessment (World Health Organisation, 1995).

Women should have their height measured with their shoes off standing straight using a wall-mounted metre-stick (to the nearest 0.1 cm). Their weight should be measured wearing light clothing (to the nearest 0.1 kg), and the BMI calculated.

Weight (Kg) = BMI kg/m<sup>2</sup>

Height (m<sup>2</sup>)

#### Example:

Weight (Kg) = BMI kg/m<sup>2</sup>

Height (m<sup>2</sup>)

Weight = 63kg

Height = 1.6 m

$$\frac{63}{1.6^2} = \frac{63}{3} = 21 \text{ kg/m}^2$$

Therefore normal weight

BMI is a surrogate marker of adiposity and does not measure adipose tissue directly. As a result, it has limitations and provides no information on fat distribution (Fattah *et al*, 2010; Prentice and Jebb, 2001). Self-reporting of height and weight has been shown to be unreliable (Fattah *et al*, 2010);



therefore it is essential to check maternal weight and height at an antenatal booking visit. Although it is recognised that BMI is not an ideal anthropometric measurement it offers an affordable and safe guide to estimate a women's weight category, which, is essential in future screening for diabetes and pre-eclampsia. Short stature and low weight have been associated with small for gestational age, risk for caesarean section and in intra uterine growth retardation (WHO,1995), while overweight and obesity increases risks of complications in delivery guideline on maternal obesity (Institute of Obstetrics and Gynaecologists 2011) and of chronic diseases in the infant (Barker, 2012). Therefore, BMI checks at booking visit should be used as a screening mechanism for those at increased risk (WHO, 1995).

There is no international consensus on appropriate weight gain per weight category in pregnancy (Alavi et al, 2013, NICE 2010). However, in the absence of such data the institute of medicine guidelines (2009) which are based on observational data in the USA are widely used as a guide (see Appendix 2) and evidence suggests that women who gain weight within these ranges have better outcomes (Siega-Riz et al, 2009).

Women who are overweight or obese at booking tend to gain weight at a slower rate than normal weight women (Farah et al, 2011). Weight loss in pregnancy is not recommended (Arendras *et al*, 2008) preferably pre-pregnancy and postnatal intervention on weight loss is likely to be the most appropriate target time for treatment of obesity, as women who restrict their intake during pregnancy are at risk of insufficient nutrient intake without a dietetic consultation (HSE, 2011). Maternal obesity rather than the rate of gestational weight gain is associated with increased risk of pregnancy complications (O'Dwyer et al, 2013). Weight loss in the postnatal period before subsequent pregnancies is an effective strategy for improved outcomes (Karl *et al*, 2006), women from lower socioeconomic backgrounds are at higher risk of developing obesity postnatally and should be targeted for weight loss interventions (Turner and Layte, 2013).

It is important that information about obesity and its risks are communicated in an informative, yet sensitive manner (Schmied *et al*, 2010; Furber and McGowan, 2011). Women who are underweight are also likely to be sensitive about their weight and sensitivity is equally important with this patient group. Underweight women should be encouraged to meet requirements during pregnancy and may benefit from a dietetic consultation to ensure these needs are met.

When assessing weight gain in pregnancy, clinical judgment should be used to assess other clinically relevant causes for change in weight for example oedema, as well as fetal growth assessment before recommending modifications to change the gestational weight (Rasmussen and Yaktine, 2009). Table 1 shows the composition of biological components contributing to weight gain in pregnancy (American College of Obstetricians and Gynecologists, 2000).

**Ideally women who are underweight, overweight or obese should be seen for pre-pregnancy dietary counseling in the community to optimise weight prior to conception and therefore reduce associated risks during pregnancy.**

**Distribution of weight gain in pregnancy**

	<b>Approximate weight gain (normal BMI)</b>
<b>Baby</b>	3.4 kg
Placenta	0.7 kg
Amniotic fluid	0.9 kg
<b>Mother</b>	
Breasts	0.9 kg
Uterus	0.9 kg
Body fluids	1.8 kg
Blood	1.8 kg
Stores of fat, protein and other nutrients	3.2 kg
<b>TOTAL</b>	<b>13.6 kg</b>

Table 1: Adapted from: *Planning Your Pregnancy and Birth*, 3<sup>rd</sup> ed. American College of Obstetricians and Gynecologists, 2000.

## 4.2 Nutrient Overview

Pregnant women should be advised to follow the recommendations of the food pyramid. Irish studies have shown that less than 50% of pregnant women meet the recommendations for each individual group of the food pyramid (O'Neill *et al*, 2011) and less than 1% of the national population meet requirements for all groups (SLAN, 2008). Within the Irish population, there is over consumption of foods at the top of the food pyramid where guidelines recommend 1 or less servings a day (SLAN, 2008). This is matched with under consumption of foods at the lower end of the food pyramid, with the average intake of fruit and vegetables being much lower than the recommendations (IUNA, 2011).

The recommendations for nutritional intake during pregnancy remain largely the same as outside of pregnancy with a few exceptions:

- Women should be advised to take a daily supplement of 400 micrograms (400µg/0.4mg) folic acid at least 4 weeks prior to conception and during the first 12 weeks of pregnancy.
- Iron, calcium, vitamin D and long chain omega-3 polyunsaturated fatty acids are particularly important nutrients throughout pregnancy.

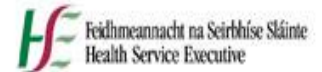
The Food Pyramid guidelines are summarised below:

- Starchy carbohydrates, such as whole grains and fibre rich foods including breads, cereals potatoes, pasta and rice, 6 or more servings a day from

this group; Where one serving is 1 bowl of cereal, 1 slice of bread or 1 medium potato

- Fruit and vegetables, at least 5 or more servings a day; 1 serving is 1 medium sized fruit e.g. 1 apple or 3 dessert spoons of vegetables.
- Dairy Foods which includes milk, cheese and yoghurt, 3 servings a day from this group; 1 serving is 125g yoghurt, 25g of cheese or 200ml milk.
- Protein Foods including Meat, poultry, fish, eggs or legumes, at least 2 servings a day: Where one portion is 50-75g (2 -3oz) cooked meat, 100g (4oz) fish, 2 eggs or 6 dessert spoons beans.
- Fats and oils are needed in small amounts , limit to 2 portions a day: one portion is 1 heaped teaspoon of spread. In addition 1 teaspoon per person of oil can be added in cooking (rapeseed oil or olive oil).
- Foods high in Fat and sugar should be avoided.

Use the **FOOD PYRAMID** to plan your daily healthy food choices



The healthy eating guidelines including the Food Pyramid, your guide to health eating using the Food Pyramid can be ordered through the Department of Health, health promotion website:

<http://www.healthpromotion.ie/>

## 4.3 Macronutrients

### 4.3.1 Energy

Adequate energy intake is essential to promote optimal growth of the fetus while providing adequate energy for the mother.

Inadequate maternal energy intake will result in reduced maternal weight gain during pregnancy, which in turn may result in restricted fetal growth and later infant development (Rasmussen and Habicht, 2010). Inadequate weight gain during pregnancy is associated with small for gestational age infants and preterm delivery (Scholl, 2008).

Conversely, excessive maternal weight during pregnancy is associated with large for gestational age infants, macrosomia, a higher caesarean section risk, in addition to a greater incidence of neonatal infection, hypoglycaemia and respiratory distress (Siega-Riz *et al*, 2009). Additionally, large for gestational age infants are at a greater risk of developing childhood obesity, and hence a spectrum of metabolic complications in childhood and later life (Koletzko *et al*, 2012). Furthermore, rates of miscarriage are higher in obese women, as is gestational diabetes, hypertension and deep vein thrombosis (Institute of Obstetricians and Gynecologists *et al*, 2011). Obese women are also at risk of small for gestational age babies in particular if they have other complications such as hypertension.

Energy requirements in pregnancy vary widely between individuals it has been estimated that women will require an additional 5% in the first trimester, 10% in the second trimester and 25% in the third trimester. Based on a well-nourished woman with a normal BMI this intake equates to an additional 70kcal per day in the 1<sup>st</sup> trimester, 260 kcal per day in the second and 500kcal a day in the third trimester (EFSA, 2013).

When choosing foods to increase energy intake, focus should be given to foods which are rich in essential vitamins and minerals such as milk and milk products, high fibre foods, lean red meat, omega-3-rich fish and fruits and vegetables (FSAI, 2011). The mother should be encouraged to consume a diet which will meet all her recommended nutritional intakes, rather than focusing on energy intake alone. Overweight or obese women should be encouraged to replace energy dense snacks with nutritious snacks.

### 4.3.2 Protein

Protein is essential in the development of a healthy baby as it forms the structural basis for all new cells and tissues in the mother and fetus. It is important to ensure the adequate balance of protein to energy as high protein alone can cause harm to the fetus (Ota *et al*, 2012) and protein deficiency can result in thin babies (Godfrey *et al*, 1997). Balanced intake of energy and protein seems to improve fetal growth (Ota *et al*, 2012). However, evidence is emerging on the relationship between the type of protein and fetal growth. Consumption of processed meats (such as sausage, burgers and chicken nuggets) increases the

risk of small for gestational age babies (Knudsen *et al*, 2008) while fish and eggs seem to reduce the risk (Ricci *et al*, 2010). Choosing foods high in fat, salt and sugar, seems to further increase risk of small for gestational age baby (Thompson *et al*, 2010).

Most women will meet their requirements for protein as the typical population intakes are adequate for pregnancy (O'Neill *et al*, 2011) with two servings of protein a day.

Particular attention should be paid to women who are at risk of inadequate protein intake or suboptimal protein choices. Women who have experienced nausea or vomiting of pregnancy are likely to have reduced their intake of protein rich foods due to aversions resulting from vomiting in early pregnancy. Vegetarian women should be encouraged to consume adequate protein sources during pregnancy by increasing their intake of foods rich in protein including beans, lentils, chick peas, tofu, dairy products and eggs. Vegetarian women should be advised on the importance of adequate protein sources to ensure optimal intake of essential amino acids, for example combining cereals and legumes in a meal. The adequacy of dietary iron intake should also be addressed within this group. Women following a vegan diet may need dietetic review to ensure nutritional adequacy.

Women from lower socioeconomic groups are at higher risk of inadequate protein intake due to the associated costs. They are also more likely to choose less expensive processed foods which would put them at risk of small for gestational age babies. If purchased in a multiple supermarket, a healthy diet costs 15-30% of the household budget for a family of 4 living on social welfare (Healthy Food for All, 2009). Food poverty in Ireland is on the increase with 10% of the population experiencing food poverty in 2010, this would indicate that people can't afford a meal with meat or vegetarian alternative every second day (Carney and Maitre, 2012). Health-care professionals should take this into consideration when advising women and discuss less expensive ways of incorporating protein into the diet such as the use of eggs, beans or lentils in cooking.

The 'meat, fish, eggs and alternatives' shelf of the food pyramid includes foods that are rich sources of protein in the diet. Pregnant women should be encouraged to consume two portions of protein rich foods a day and avoid processed versions such as sausages, luncheon meats etc.

### **4.3.3 Fats**

Dietary fat is an important energy source, and provides and aids in the absorption of fat soluble vitamins. However, high fat diets should be avoided during pregnancy due to the risk of excessive weight gain (FSAI, 2011).

#### **Long chain Omega 3 polyunsaturated fatty acids (PUFA)**

Docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are two important long chain omega-3 PUFA. DHA in particular is important for the developing fetus and there is evidence to support DHA consumption in pregnancy. DHA has



been linked to improved retinal development and forms an important part in the grey matter of the brain tissue (Koletzko *et al*, 2007). Ongoing research suggests that DHA could play a role in reducing risk of maternal depression, improving mood and reducing risk of allergy in infants. Maternal fish consumption during pregnancy has been positively associated with cognitive and visual abilities in the offspring but research into maternal supplementation is inconclusive as yet (Gould *et al*, 2013).

The European Food Safety Authority (EFSA) recommends that all pregnant women should consume an additional 700-1400mg/week of DHA (EFSA, 2010). This is in addition to the requirement of 1750mg/week combined EPA and DHA. This increased intake can be achieved by consuming 1-2 portions of oil-rich fish per week (FSAI, 2011). The best sources of DHA are trout, salmon, mackerel, artic char and sardines (FSAI, 2011).

Certain types of fish can be a source of environmental contaminants such as methylmercury. High levels of methylmercury may be harmful to the developing fetus. Therefore pregnant women should avoid the consumption of marlin, shark, ray and swordfish and limit consumption of tuna to one serving of fresh tuna (150g), or two 240g cans of tinned tuna per week.

## **4.4 Micronutrients**

### **4.4.1 Folate/ Folic acid**

Folate is a B vitamin which is referred to as folic acid in the synthetic form. A daily supplement of 400 micrograms (400µg/0.4mg) folic acid as recommended prior to conception and for the first 12 weeks of pregnancy, has been shown to help prevent neural tube defects (NTD's) (FSAI, 2006). Women who have a family history of NTDs or pre-existing diabetes should be provided with a prescription of a higher dose of folic acid prior to conception through 12 weeks gestation (HSE 2010). There is evidence to support the supplementation of obese women with a higher dose of folic acid (CMACE, 2010; Institute of Obstetricians and Gynaecologists *et al*, 2011) as the incidence of congenital malformations, including NTDs, are higher in obese women compared with normal women (Rasmussen *et al*, 2008). Currently the HSE recommends that these women are prescribed a higher dose folic acid to be given with prescription (4000micrograms / 4 milligrams) (HSE, 2010). Care should be taken when placing women on this higher dose of folic acid due to increased risk of colorectal adenomas with prolonged high dose intake (Cole BF *et al*, 2007; Fife J *et al*, 2009). For women taking anti-seizure medication the requirement for folic acid may be different and they should be advised to consult their doctor (FSAI, 2011).

Supplemental folic acid can stop at 12 weeks gestation as the neural tube will have closed and the window of opportunity for prevention of NTD will have passed but the role of folate in red blood cell manufacture and in cell replication continues to be of importance. Thus, women should continue to eat foods rich in folate and folic acid throughout their pregnancy. These include green leafy

vegetables, citrus fruit, whole grains, legumes and foods fortified with folic acid such as breads and cereals.

#### 4.4.2 Iron

The developing fetus requires a large red blood cell mass to provide sufficient oxygen for development and growth. There is a positive association with its intake and birth weight (Alwan *et al*, 2011). Iron requirements increase progressively after 25 weeks to combat the lower oxygen environment in the womb (Dewey and Chaparro, 2007). Late cord clamping at delivery can reduce the risk of infantile anaemia (Chaparro *et al*, 2006). However, it remains vital that the iron intakes of the mother are sufficient throughout pregnancy to meet the increased requirement for fetal growth (Health Canada, 2009), while maintaining adequate maternal stores. Appropriate use of supplementation and iron rich diet has the potential of reducing incidence of anaemia in pregnancy and subsequent adverse outcomes (Barroso *et al*, 2011) therefore the threshold for iron supplementation in pregnancy should be low.

The Survey of Lifestyle Attitudes and Nutrition reveals that a significant proportion of women of reproductive age do not meet the daily requirement for iron (SLAN, 2007). This corresponds to research in pregnant women which shows the majority are not reaching their requirements for iron during pregnancy (McGowan and McAuliffe, 2012). There are two types of iron in the diet, haem iron and non-haem iron. Haem iron is more readily absorbed. While non-haem iron is more difficult to absorb, absorption can be assisted with concomitant intake of vitamin C from fruit, fruit juice and certain vegetables. Foods that contain tannins such as tea should be avoided at meal times as these can inhibit the absorption of iron from the diet (FSAI, 2011). See appendix 2 for a list of haem iron and non-haem iron food sources. Many Iron rich foods can be expensive and therefore women from lower socioeconomic groups are at higher risk of inadequate intake.

Women suspected of iron deficiency should have a full blood count (FBC) and if possible serum ferritin checked. Symptoms of iron deficiency are similar to some common problems of pregnancy such as fatigue. If there is evidence of iron deficiency, the treatment is oral iron supplementation (NICE, 2008). Iron ferrous contained within some supplements, can cause unpleasant gastrointestinal (GI) side effects, impair mineral absorption, and increase risk of haemoconcentration (Zhou *et al*, 2009). Slow-release iron preparations or split doses may alleviate these symptoms. Other dietary tips can also help GI symptoms such as increased fibre and fluid intake. It is important to ensure compliance with the recommended treatment as women suffering from GI symptoms may avoid the supplement, therefore variations of iron preparations should be explored. Intermittent or lower dose iron preparations seem to be sufficient in preventing anaemia without unpleasant GI symptoms (Pena-Rosas, 2012), indeed a supplement containing 16-20mg of iron should be effective in the healthy population (Health Canada, 2009). Women with low haemoglobin FBC or serum ferritin will require higher dose supplements in keeping with doses recommended for Iron deficiency anaemia.

Note: Despite its high iron content, it is important to advise pregnant woman that liver is not recommended due to its high vitamin A content.



### 4.4.3 Calcium

Calcium has a key role to play in the development of healthy bones and teeth as well as extra-cellular fluid, muscle, and other tissues. It is also involved in vascular contractions and vasodilation, muscle contractions, neural transmission, and glandular secretion. Adequate dietary calcium intake before and during early pregnancy may reduce the risk or severity of pre-eclampsia (Hofmeyr, 2007) and therefore adequate dietary intake should be encouraged.

During pregnancy women should be advised to consume 3 portions of dairy or calcium-fortified alternatives daily (FSAI, 2011). Adolescent pregnant mothers may require additional calcium which is best achieved with 2 additional portions of dairy (5 total) per day (Chan *et al*, 2006).

A portion is one glass of milk (200 ml), one pot of yoghurt (~125 ml) or a matchbox-sized piece of cheddar cheese (28g). Whole milk, low-fat and skimmed milk all contain relatively similar levels of calcium and fortified milk is typically fortified with extra calcium and vitamin D. Advise women to choose milk and yoghurt more often than cheese.

### 4.4.4 Vitamin D

Vitamin D is a fat-soluble vitamin essential in the absorption of calcium and is linked to prevention of autoimmune diseases (Fronczak *et al*, 2003; Hypponen *et al* 2001). Adequate provision of vitamin D has been found, in ecological, cross-sectional and observational studies, to be associated with reduction in the risk of many types of cancer, cardiovascular diseases (CVDs), autoimmune diseases, diabetes mellitus types 1 and 2, neurological disorders and several bacterial and viral infections (FSAI, 2007). Vitamin D can also reduce risk of adverse pregnancy outcomes including pre-eclampsia in addition to the classical bone disorders of rickets and osteomalacia.

Vitamin D is found naturally in few foods; dietary sources of this fat soluble vitamin include flesh of fatty fish, some fish liver oils (however fish liver oil should be avoided in pregnancy), and eggs from hens fed vitamin D. Foods fortified with vitamin D such as margarine, milk and cereals are a good source of vitamin D in the diet. Although vitamin D can be synthesized in skin, above latitudes of approximately 40°N such as Ireland, vitamin D<sub>3</sub> cannot be made in the skin from October to March. The UV light that is able to promote Vitamin D synthesis cannot penetrate the atmosphere during this time. Furthermore, sun exposure may increase the risk of melanoma, and so advising sun exposure is not an effective public health strategy to combat low vitamin D levels.

Recent studies show that the average intake of vitamin D in the Irish population is well below the recommended intake (SLAN, 2007; IUNA, 2011). It is of particular concern that suboptimal intakes and low serum vitamin D levels have also been reported in cohorts of pregnant women in Dublin (McGowan *et al*, 2011) Cork (O’Riordan *et al*, 2008), and Belfast (Holmes *et al*, 2009). In order to meet nutritional requirements for vitamin D women should be encouraged to take oily fish once or twice a week (FSAI, 2011). However, the consumption of vitamin D rich foods, such as oily fish is not widespread and a vitamin D supplement is likely to be needed by most women during pregnancy to meet

their requirements. Pregnant women should be advised to take a pregnancy suitable supplement containing 5µg of vitamin D (5 micrograms/ 200IU) (FSAI 2011). This recommendation is due to be reviewed by an expert working group for the Irish population. The American College of Obstetrics and Gynaecologist recommend 15µg (15 micrograms/600IU) a day (ACOG, 2011) and the UK recommendation is 10µg (10 micrograms/ 400IU) a day during pregnancy and lactation (NICE 2008, B). Of note, the majority of over-the-counter antenatal multivitamins contain 10 µg (10 micrograms/ 400IU) of vitamin D, therefore if a woman chooses to take a pregnancy multivitamin she will not require additional vitamin D supplementation. If there is a history of rickets in a sibling or a known maternal vitamin D deficiency, a higher 'treatment dose' is warranted as the neonatal serum Vitamin D will be 60% of the maternal level, and both adequate maternal and neonatal serum levels are positively associated with bone health in childhood and later life . The number of trials and outcomes reported are too limited, and in general are of low quality, to draw conclusions on the usefulness and safety of high levels of vitamin D supplementation as a part of routine antenatal care. Further randomised trials are required to evaluate the role of vitamin D supplementation in pregnancy (De-Regil *et al*, 2012).

#### 4.4.5 Iodine

During pregnancy iodine requirements increase by 50% (Stagnaro-Green *et al* 2011), Iodine deficiency appears when the maternal thyroid gland cannot meet the demand for increasing production of thyroid hormones (Obican *et al* 2012). Research in Ireland has shown low serum levels of iodine are low in 23% of women in winter months and 55% of women in the summer months (Nawoor *et al*, 2006). It is suggested that maternal iodine deficiency can result in hypothyroidism and elevated TSH in infants, which is associated with cognitive and psychomotor deficits (Obican *et al* 2012). Supplementation of iodine may decrease the risk of cognitive and psychomotor developmental delay (Trumpff *et al* 2013). Dietary sources of iodine include seaweed, iodized salt, dairy products and fish. The American Thyroid Association recommend that all pregnant women should consume 220µg (220 micrograms) of iodine daily (Stagnaro-Green *et al* 2011) while the WHO recommends an upper limit of 500 µg (500 micrograms) and the EFSA (2009) an upper limit of 600µg/day (600 micrograms).

Currently there is no national guideline for the supplementation of iodine although prenatal vitamins contain various amounts and women should be recommended to increase foods containing iodine to meet requirements.

#### 4.4.6 Supplementation

Folic acid supplementation is recommended prior to conception and during the first 12 weeks of pregnancy. A daily supplement of 400 micrograms (400 µg/ 0.4mg) is recommended for all women. However, a higher dose administered with prescription (containing 4000 micrograms/ 4 milligrams) should be given to those with pre-existing diabetes, obesity and where there is previous delivery of an infant with NTD or a family history of NTD.

The consumption of vitamin D rich foods, such as oily fish is not widespread and a vitamin D supplement is likely to be needed by most women during pregnancy

to meet their requirements. Women should be advised to take a daily pregnancy suitable supplement containing 5µg (5 micrograms/ 200IU) of vitamin D.

Iron supplementation is recommended for women with a low serum ferritin or those deemed at risk of developing iron deficiency anaemia. A low threshold for checking iron status should be maintained during pregnancy due to associated risks. Advice on avoidance of GI side effects should be given prior to commencing supplementation to improve compliance.

If a supplement is deemed necessary in pregnancy women should be encouraged to take a supplement which is specifically designed for pregnancy. Women should avoid any over the counter supplements which are not pregnancy specific.

## **4.5 Foods to Avoid**

### **4.5.1 Toxicological substances**

#### **Caffeine**

Excessive caffeine in pregnancy has been hypothesised to have teratogenic effects and although not all human epidemiological studies and animal studies support these claims (Brent *et al*, 2011) women should be advised to limit their intake during pregnancy. Caffeine can be absorbed freely across the placenta, but cannot be broken down by either the placenta or the fetus. Therefore, maternal caffeine consumption is closely linked with placental and fetal caffeine concentrations, and the fetus can be exposed to the effects of caffeine. Caffeine is a mildly addictive stimulant which is found naturally occurring in foods and drinks such as coffee, tea and cocoa (FSAI, 2011) Caffeine is also used as an additive in soft drinks, energy drinks, some chewing gums and medications. It is therefore possible that pregnant and lactating women may consume excessive caffeine from multiple sources. Women are advised to limit caffeine to less than 200mg per day, which equates to 2-4 mugs of tea or 2 cups of coffee or 1000ml cola or 500ml energy drink or 4 bars of chocolate. Caution should also be taken when prescribing medications that contain caffeine.

#### **Vitamin A**

During pregnancy dietary intakes of vitamin A (retinol equivalent) greater than 7,000 micrograms may be teratogenic leading to an increased risk of congenital malformations. Therefore, supplements containing pre-formed vitamin A, should be avoided. Due to the high levels of vitamin A contained in liver and liver products, e.g. cod liver oil, these foods should also be avoided (NICE, 2008). Beta carotene is a precursor of Vitamin A (retinol) and is not harmful in pregnancy. Many food supplements will contain beta carotene as their source of Vitamin A (Azais-Braesco and Pascal, 2007).

### 4.5.2 Food borne infections

Safe food preparation and hygiene practices are important at all stages of life in order to prevent potentially harmful food-borne illnesses. This is particularly important during pregnancy as some bacteria and parasites can reach the developing infant causing severe illness in the neonate, miscarriage or stillbirth. These include *Listeria*, *Salmonella* and *Toxoplasmosis*. To prevent food-borne illness, women should be advised to:

- Ensure eggs are cooked thoroughly, avoid soft eggs or raw eggs e.g. in mousse.
- Avoid un-pasteurised milk and any cheese or yoghurt made with un-pasteurised milks.
- Avoid mould ripened cheese e.g. Camembert, Danish Blue, Brie, Stilton.
- Ensure all meat, fish and poultry is cooked throughout. Avoid smoked fish such as smoked salmon, cured and smoked meats e.g. salami.
- Wash all raw ingredients such as fruits, vegetables and pre-packed salads very well before eating.
- Keep raw and cooked meats separate, and use different knives, chopping boards and other kitchen utensils when preparing these foods to avoid cross-contamination.
- Ensure refrigerator temperature is below 5°C and put food in the refrigerator as quickly as possible. Freezer temperature should be below -18°C.
- Always wear gloves when gardening or changing cat litter, and always wash hands very well after these activities or handling animals or pets.

For more information see the safefood website (<http://www.safefood.eu/Home.aspx>) and FSAI 2011.

## 5. Specific diets

Patients on therapeutic diets should be given the opportunity to review their intake with a dietitian these include patients with coeliac disease, diabetes, phenylketonuria and anaemia of pregnancy. Women with chronic disease will ideally have had dietetic input as part of their preconception preparation and continue to have input from their multidisciplinary team as part of their obstetric management.

### 5.2 Allergies

There is currently insufficient evidence to recommend that mothers of infants who are at risk of developing an allergy should avoid potentially allergenic foods during pregnancy unless she herself is allergic to a certain food.

## 6. Hospital Equipment and Facilities

All women should have a weight and height measurement taken at their booking antenatal visit. The centre should ensure equipment is available in a discrete area and calibrated as required to accurately record measurements.

## **7. Provision of information on best practice for infant feeding**

It is the responsibility of all healthcare professionals to promote best practice for infant feeding:

- Information and support around breastfeeding should be given ante-natally or even before, as it has been shown that many women make the decision on whether or not they will breastfeed before the birth of their infant (FSAI, 2011). Pregnant women should be educated during this time on the many benefits breastfeeding offers the mother and her infant including the health benefits in both short-term and throughout later life.
- Pregnant women should be advised on the correct time to wean an infant onto solid food, which provides a guide thus reducing the risk of early and inappropriate introduction of solid foods (Dunlevy, 2010)

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## 9. Implementation Strategy

- Distribution of guideline to all members of the Institute and to all maternity units.
- Implementation through HSE Obstetrics and Gynaecology programme local implementation boards.
- Distribution to other interested parties and professional bodies.

## 10. Key Performance Indicators

- Proportion of women with an accurate weight and height assessment in early pregnancy
- Proportion of pregnant women receiving advice on appropriate food pyramid choices to meet nutritional requirements.
- Proportion of women advised appropriately on folic acid supplementation.
- Adherence to vitamin D supplements recommendation.
- Appropriate advice on avoidance of toxicological and potential food borne diseases in pregnancy.

## 11. Qualifying Statement

These guidelines have been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. Clinical material offered in this guideline does not replace or remove clinical judgment or the professional care and duty necessary for each pregnant woman. Clinical care carried out in accordance with this guideline should be provided within the context of locally available resources and expertise.

This Guideline does not address all elements of standard practice and assumes that individual clinicians are responsible for:

- Discussing care with women in an environment that is appropriate and which enables respectful confidential discussion.
- Advising women of their choices and ensure informed consent is obtained.
- Meeting all legislative requirements and maintaining standards of professional conduct.
- Applying standard precautions and additional precautions, as necessary, when delivering care.
- Documenting all care in accordance with local and mandatory requirements.

## Appendix 1 - Useful websites

Food Safety Authority of Ireland website:

<http://www.fsai.ie/>

Food Safety Authority of Ireland, Best Practice for Infant Feeding in Ireland, 2011:

[www.fsai.ie/bestpracticeforinfantfeedinginireland.html](http://www.fsai.ie/bestpracticeforinfantfeedinginireland.html)

Food Safety Authority of Ireland, Scientific Recommendations for a National Infant Feeding Policy, 2nd Edition, 2011:

[www.fsai.ie/scientificrecommendationsforanationalinfantfeedingpolicy.html](http://www.fsai.ie/scientificrecommendationsforanationalinfantfeedingpolicy.html)

What's Up Mum website:

[www.whatsupmum.ie](http://www.whatsupmum.ie)

HSE Health Promotion website:

<http://www.healthpromotion.ie/>

Safe food website:

<http://www.safefood.eu/>

The Irish Nutrition and Dietetic Institute (INDI) website:

[www.indi.ie](http://www.indi.ie)

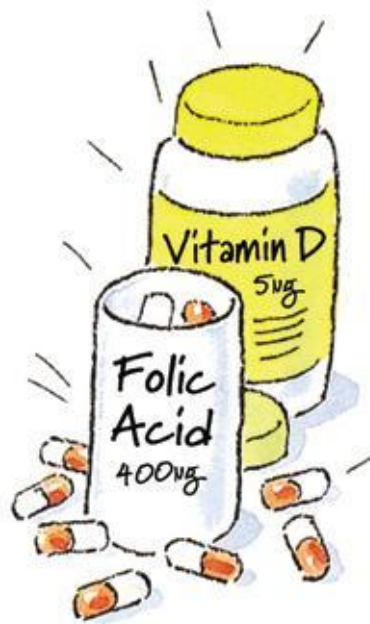
## **Appendix 2**

Food Safety Authority Ireland (FSAI) 2011 Best Practice for infant feeding in Ireland. Chapter 1 Nutrition and Lifestyle before and during pregnancy



# chapter 1

## Nutrition and Lifestyle before and during Pregnancy



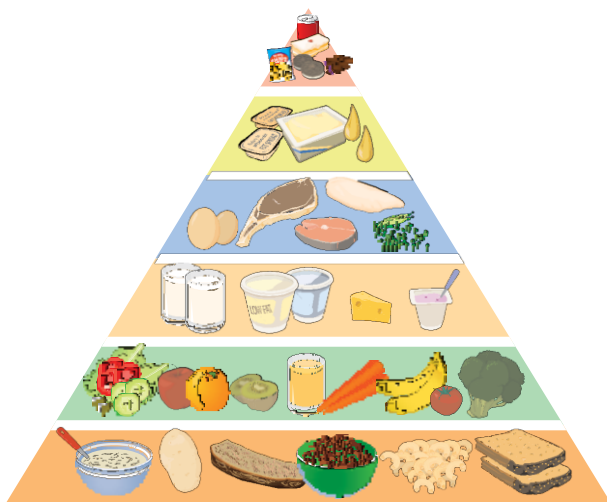
## 1.1 Nutrition and Lifestyle before Pregnancy

A healthy and balanced diet is important for good health throughout all stages of life. A healthy and balanced diet helps ensure that in the event of pregnancy, a woman of childbearing age will be in good health throughout the pregnancy and will be able to provide the unborn infant with the nutrition needed to develop properly.

Women of childbearing age should aim to consume a nutritionally adequate diet. Such a diet should contain foods from the five main food groups every day. A supplement of 400µg folic acid should be taken daily to help prevent neural tube defects (NTDs) in infants. Healthcare professionals should provide information on:

- Maintaining a healthy body weight
- Not smoking/smoking cessation
- The weekly alcohol limits for women

Women should be advised **not to consume more than 11 units** (approximately 110g alcohol) spread over a week. A unit is a rough measure of the amount of drink that will provide about 10g alcohol, e.g. ½ pint beer (284ml), pub measure of spirits (35.5ml), or a small glass of wine (100ml).



*The new Food Pyramid from “Healthy Eating and Active Living for Adults, Teenagers and Children over 5 years – A Food Guide for Health Professionals and Catering Services”.*

### Healthy eating guidelines for women of childbearing age

- Enjoy a wide variety of foods from the five food groups (See Food Pyramid below)
- Pay attention to serving sizes - choose smaller portions and add plenty of vegetables, salad and fruit.
- Include wholemeal breads, cereals, potatoes, pasta and rice to provide energy for a healthy weight.
- Eat at least five servings of different coloured fruit and vegetables every day.
- Use low-fat varieties of milk, yoghurt and cheese - choose milk and yoghurt more often than cheese.
- Include lean meat, poultry and fish (oily is best) daily, and remember that peas, beans and lentils are good alternatives.
- Use polyunsaturated and monounsaturated spreads and oils sparingly – reduced-fat spreads are best.
- Healthy eating can be enjoyed without foods like confectionery, savoury snacks, and biscuits – these foods are rich in calories, fat, sugar and salt and need to be limited.
- Drink plenty of water.

## Healthy cooking practices

- Grill, bake, steam or boil food instead of frying or deep frying.
- Prepare and store food safely.
- Limit salt intake - Use fruit to make tasty sauces for meat and poultry, e.g. apple or cranberry sauce and flavour food with pepper, herbs and spices, lemon juice, vinegar.

## Vitamin D

Vitamin D is needed for strong healthy bones and may protect against heart disease and cancer. Most people do not get enough vitamin D. Choosing oily fish one to two times a week is the best way to get vitamin D. Taking a daily vitamin D supplement is another way of getting vitamin D. The best choice is to take a vitamin D supplement of 5µg (200 IU) every day.

## Active Living

Being active for adults means taking part in at least 30 minutes of moderate to vigorous activities such as walking, running, cycling, swimming, Gaelic games, rugby, football, basketball, or dancing, on at least 5 days a week.

## The importance of folic acid supplementation before pregnancy

Folate is a B-vitamin found naturally in some foods such as green leafy vegetables. Folic acid is the synthetic form of folate which is used to fortify some foods such as breakfast cereals and milk, and is found in some food supplements. It is difficult to get the recommended amount of folate from the diet alone. This is why a folic acid supplement is recommended.

The neural tube becomes the brain and spinal cord in humans, and is therefore essential to the correct development of the nervous system. A sufficient level of folic acid is required to ensure the neural tube closes correctly. Incorrect closure of the neural tube causes NTDs in the infant.

NTDs, such as *Spina Bifida*, are severe abnormalities of the brain and spine which can develop in a foetus between days 21 and 28 after conception. A woman may only begin to suspect a pregnancy around this time. Therefore, sexually active women of childbearing age should be advised to take a daily supplement of 400µg folic acid in preparation for a possible unplanned pregnancy. This supplementation should continue for the first 12 weeks of pregnancy.

**Recent research in Ireland has shown that although most pregnant women take folic acid supplements, many do not take folic acid supplements in time to prevent NTDs.** Therefore, it is imperative that healthcare professionals encourage all women of childbearing age to develop the habit of taking a folic acid supplement daily.



### Over half of all pregnancies in Ireland are unplanned.

As such, it is important that healthcare professionals recognise this vulnerability in women of childbearing age, and tailor their health-related advice accordingly.

**Up to 70% of all neural tube defects can be prevented** by taking a 400µg folic acid supplement for at least 4 weeks prior to conception and during the first 12 weeks of pregnancy.

## What is the bottom line in terms of nutrition and lifestyle before pregnancy?

1. *Advice on healthy eating and lifestyle and how to maintain a healthy weight should be provided to all women of childbearing age.*

This will help ensure that the mother provides the best possible environment for her infant if she becomes pregnant.

2. *Women of childbearing age should be advised to take a daily supplement of 400µg folic acid to prevent NTDs.*

This is especially important for at least 4 weeks prior to conception and during the first 12 weeks of pregnancy.

3. *Women who have given birth to an infant with a neural tube defect should be prescribed a high-dose daily supplement containing 4,000µg (4mg) folic acid.*

Women who have had an infant with a NTD should be prescribed a daily **4,000µg (4mg)** folic acid supplement at least 4 weeks prior to conception and for the first 16 weeks of pregnancy to help prevent recurrence.

4. *Dietary sources of folate are important.*

In addition to taking a folic acid supplement, women should also be advised to eat foods fortified with folic acid (such as fortified breakfast cereals and fortified milk) and high folate foods (such as green leafy vegetables).

## Further Information

- FSAI 2011, *Scientific Recommendations for Healthy Eating Guidelines in Ireland*  
[www.fsai.ie](http://www.fsai.ie)
- FSAI 2012, *Healthy Eating and Active Living for Adults, Teenagers and Children over 5 years – A Food Guide for Health Professionals and Catering Services*  
[www.fsai.ie](http://www.fsai.ie)
- INDI 2005, *Planning a Pregnancy: Good Nutrition for Preconception*  
[www.indi.ie](http://www.indi.ie)

## 1.2 Good Nutrition for a Healthy Pregnancy

### Healthy eating is important for pregnant women

A healthy and balanced diet during pregnancy helps to ensure that:

- Women have the nutrients needed for good health during and after pregnancy, and;
- Infants have the best possible environment in which to grow and develop

The time an infant spends developing in the womb is critically important and can influence health throughout adult life.

Evidence suggests that many diseases common in later life such as heart disease and diabetes, may have their root in this period of early development.

### What is a healthy diet during pregnancy?

During pregnancy, a healthy and balanced diet can be achieved by following the healthy eating guidelines for women in Ireland (FSAI 2012, *Healthy Eating and Active Living for Adults, Teenagers and Children over 5 years - A Food Guide for Health Professionals and Catering Services*). The 5 main food groups which provide the nutrients needed for a healthy pregnancy are:

- **Breads, cereals and potatoes** – choose wholegrain and wholemeal more often
- **Fruit and vegetables** – choose at least 5 a day and vary the types chosen
- **Milk and milk products** – choose low-fat milk and yoghurt more often than cheese
- **Meat, fish, chicken and alternatives** – choose lean cuts of meat
- **Fats and oils** – use sparingly

Certain nutrients are particularly important to help protect a mother's health and to promote the healthy development of an infant. To include these nutrients in the diet, pregnant women should prioritise consumption of foods rich in **iron, calcium, D, and long chain omega-3 polyunsaturated acids**. Each of these nutrients is discussed on the following pages.

### The importance of folic acid supplementation during the first 12 weeks of pregnancy

Pregnant women should take a folic acid supplement of 400µg per day during the first 12 weeks of pregnancy to help prevent NTDs in the infant. If a mother has previously had an infant with an NTD, a supplement containing 4,000µg of folic acid is required per day to help prevent recurrence. See page 5 for further information on folic acid.

### Foods rich in iron are important during pregnancy

#### *Why is iron important during pregnancy?*

Iron is involved in the transport of oxygen to the developing foetus and helps to protect the health of a pregnant woman. A pregnant woman's body adapts to absorb more iron from the diet; however, it is still essential that there is sufficient iron in the diet to support both the mother and the developing foetus.

#### *How can a pregnant woman get enough iron from her diet?*

Pregnant women need to consume a total of 15mg of iron from their meals every day. Pregnant women should aim to eat iron-rich foods twice daily. Examples of suitable food sources of iron are found in Table 1.

Dietary iron exists in *haem* and **non-haem** forms.

### Haem iron

Haem iron is more easily absorbed by the body and the best source is red meat such as beef, lamb, mutton and pork.

Despite its high iron content, it is important to note that liver is not recommended for pregnant women due to its high vitamin A content. High maternal vitamin A intake during pregnancy can be harmful to the developing foetus.



## Non-haem iron

Non-haem iron is less well absorbed by the body. It is found in eggs, green leafy vegetables, pulses and foods fortified with iron.

*What foods and fluids increase the amount of iron absorbed by the body?*

Consuming a source of vitamin C with a meal containing non-haem iron will improve the amount of iron absorbed by the body. Sources of vitamin C include fresh fruits (such as

oranges, lemons, kiwis, strawberries and limes), fruit juices made from these and fresh vegetables (such as broccoli, peppers, cauliflower and kale).

*What foods and fluids decrease the amount of iron absorbed by the body?*

Consuming a source of tannins or phytates with a meal containing iron will decrease the amount of iron absorbed by the body. Sources of tannins include tea and coffee, and sources of phytates include very high-fibre foods such as bran and high-fibre cereals.

Table 1. Amount of Iron in Commonly Eaten Foods

Foods rich in more easily absorbed HAEM IRON	Serving size (g)	Iron content (mg)
<b>RECOMMENDED RED MEAT</b>		
Average portion* of lean beef	120	3.2
Average portion* of lean beef mince (stewed)	120	2.8
Average portion* of lean lamb cutlets	120	2.5
Average portion* of pork chops	120	1.6
<b>POULTRY</b>		
Average* chicken breast	120	1.3
<b>FISH</b>		
1 small tin of sardines (canned in brine)	70	1.6
1 small tin of salmon	70	0.4
Average portion* of cod	120	0.5
<b>OTHER</b>		
2 small slices of black pudding	60	12

Foods rich in less easily absorbed NON-HAEM IRON	Serving size (g)	Iron content (mg)
1 cup** of fortified breakfast cereal	30	2.4 – 4.2
1 small can of baked beans	140	1.9
1 cup** of boiled spinach	90	1.4
1 boiled egg	50	1
1 slice of wholemeal bread	36	0.9
1 cup** of boiled broccoli	85	0.9
¼ cup of dried fruit	25	0.6

See below: Portion Size Reference Guide - Palm of hand \* and 200ml disposable cup\*\*

### PORTION SIZE REFERENCE GUIDE



#### Palm of the hand\*

The width and depth of your palm (without fingers and thumb) shows how much meat, poultry or fish you need in a day. Most of this can be used for your main meal, with the remainder for your light meal.



#### 200ml Disposable Cup\*\*

Use a disposable plastic cup to guide portion sizes of milk, milk puddings, cereals, cooked pasta and rice, and even vegetables, salad and fruit.

This is a reminder call from your body... IRON, VITAMIN D and FOLIC ACID are important for a healthy pregnancy!





### What about iron supplementation during pregnancy?

Pregnant women can find it difficult to meet their iron requirements from diet alone, and in such cases, an iron supplement may be needed. However, women can experience uncomfortable gastrointestinal side effects such as constipation when they are taking iron supplements. The healthcare professional leading the care of the pregnancy should advise accordingly.



#### Haemochromatosis

Celtic populations such as the Irish population are more prone to the iron overload disorder known as haemochromatosis compared with other populations. Individuals with haemochromatosis should not consume large amounts of dietary iron and should avoid iron supplements. Therefore, the family history of haemochromatosis should be determined before advising a woman about taking iron supplements.

### Foods rich in calcium are important during pregnancy

#### Why is calcium important during pregnancy?

Calcium is necessary to protect the bone health of the mother and to provide the developing foetus with the calcium needed for the healthy development of their skeleton. Although the requirement for calcium does not increase during pregnancy (because of pregnancy induced adaptations to maternal calcium homeostasis), many women do not reach the recommended daily intake.



Pregnant adult women require **1,000mg calcium** every day. Pregnant teenage girls require **1,300mg calcium** every day.

#### How can a pregnant woman get enough calcium from her diet?

Milk and milk-based products are excellent sources of calcium. To achieve the recommended daily intake of 1,000mg calcium, pregnant adult women should consume at least three portions of milk or milk-based products (Table 2) every day. Consuming products fortified with calcium will contribute to this recommended daily intake.

For lactose intolerant pregnant women or those who avoid dairy foods, soy-based products fortified with calcium should be included in the diet.

Foods which contain calcium in a form that is less easily absorbed by the body can be included as part of a varied diet, but should not be relied upon to provide all the calcium a pregnant woman needs. These include foods such as spinach, sweet potatoes, rhubarb, beans, unleavened bread, seeds and nuts.



Foods such as milk, milk-based products, and soy-based products contain calcium in a form that is easily absorbed by the body.

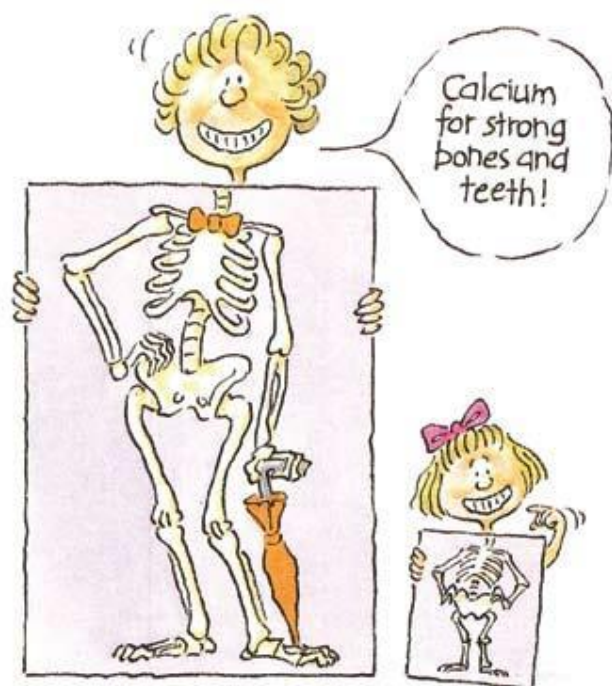
These foods should be prioritised for their calcium content and included in the daily diet.

Table 2. Amount of Calcium in Commonly Eaten Foods

Calcium-containing foods	Serving size (g)	Calcium content (mg)
1 tin of sardines (canned in oil, drained)	70	350
1 pot of yoghurt	125	260
Average portion* of calcium fortified set tofu	120	300
1 cup** of milk pudding with skimmed milk	200	260
1 pot of fortified soy yoghurt	125	208
1 matchbox size piece of cheddar cheese	30	220
1 cup** of rice pudding with skimmed milk	200	170
1 pot of unfortified soy yoghurt	125	Trace

Calcium-containing fluids	Serving size (ml)	Calcium content (mg)
1 cup** of fortified low-fat milk	200	332
1 cup** of whole milk	200	240
1 cup** of semi-skimmed milk	200	240
1 cup** of skimmed milk	200	240
1 cup** of fortified soy milk	200	178

See page 7: Portion Size Reference Guide - Palm of hand\* and 200ml disposable cup\*\*



Fish such as canned sardines have small edible bones which are a rich source of calcium.

#### *What about calcium supplementation during pregnancy?*

Pregnant women should be encouraged to meet recommended intakes of calcium through the diet. However, for women who don't like milk or milk-based products, who are vegan, lactose intolerant, those who do not include calcium enriched soy or non dairy foods, or who find it difficult to consume enough calcium rich foods in their daily diet, a calcium supplement may be needed.

High intakes of calcium can reduce the absorption of other essential minerals such as iron. Therefore, it is important to encourage women to meet, but not exceed, their calcium requirements. Calcium supplements should only **be advised where there is a clear need**.

The body can absorb calcium best from a calcium supplement when:

- It is broken down
- Taken with a meal
- The dose is 500mg calcium or less and
- It is not taken with an iron supplement

#### **Foods rich in vitamin D are important during pregnancy**

##### *Why is vitamin D important during pregnancy?*

Vitamin D is important during pregnancy since the vitamin D intake and stores of a mother determine her developing foetus's stores of vitamin D at birth. Vitamin D is needed to help absorb calcium in the body and therefore is essential for good bone health. Low levels of vitamin D have also been linked with increased risk of heart disease, diabetes and the metabolic syndrome.

Vitamin D is manufactured when the skin is exposed to ultraviolet (UV) light from the sun's rays. However, in countries above a latitude of 40°N such as Ireland, vitamin D<sub>3</sub> cannot be made in the skin from October to March because the UV light (of the wavelength) that is able to promote vitamin D synthesis cannot penetrate the atmosphere during this time.

Pregnant adult women require 10µg (400 IU) vitamin D every day.

##### *How can a pregnant woman get enough vitamin D from her diet?*

Vitamin D is found naturally in only a few foods, including oily fish, some fish liver oils, some fortified cereals and fortified milks.

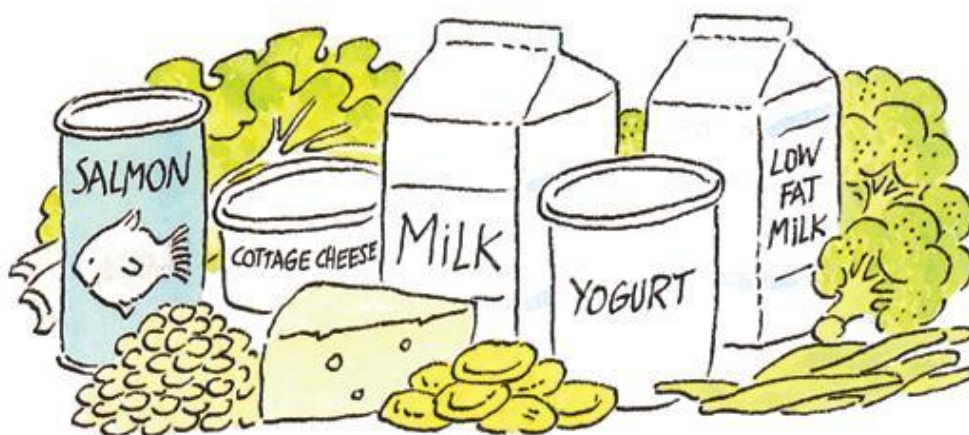


Table 3. Amount of Vitamin D in Commonly Eaten Foods

Vitamin D-containing foods	Serving size (g)	Vitamin D content (µg)
Average portion* herring, grilled	120	13.1
Average portion* mackerel, grilled	120	10.5
1 small tin of salmon	70	9.1
1 small tin of sardines (canned in oil or tomato sauce)	70	5.6
Average portion* of salmon steak, grilled	120	8.4
1 small tin of tuna† (canned in oil or brine)	70	2.3
1 egg, boiled	50	1
1 single portion pack of fortified margarine***	10	0.8

Vitamin D-containing fluids	Serving size (ml)	Vitamin D content (µg)
1 cup** of fortified milk	200	2.0
1 cup** of Supermilk® (whole and low-fat)	200	4.0

† Limit tuna intake to one fresh tuna steak (≤150g) or two 240g cans of tinned tuna per week during pregnancy due to mercury content

See page 7: Portion Size Reference Guide - Palm of hand\* and 200ml disposable cup\*\*

See page 11: Portion Size Reference Guide - Portion pack\*\*\*



**While liver contains vitamin D, it should not be consumed by pregnant women because it contains high levels of vitamin A.**

See page 11, 'Vitamin A during pregnancy', for further information.

**One of the richest sources of omega-3 fatty acids in the diet is oily fish, examples of which include salmon, mackerel, herring, sardines, pilchard**



*What about vitamin D supplementation during pregnancy?*

Women should be encouraged to include vitamin D rich foods such as oily fish in their diet to meet requirements. However, if a woman does not include these sources in her diet and is considering taking a supplement, a low dose supplement containing 5µg of vitamin D<sub>3</sub> per day should be advised.



### WARNING!

**If a woman is taking a pregnancy multivitamin supplement she is already getting enough vitamin D. Women should be advised not to “double up” by taking additional supplements.**

**Foods rich in long chain omega-3 polyunsaturated fatty acids are important during pregnancy**

*Why are long chain omega-3 polyunsaturated fatty acids important during pregnancy?*

Two important long chain omega-3 polyunsaturated fatty acids are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). These fatty acids play an important role in slowing down blood clot formation and are protective against heart disease in the mother. DHA in particular is thought to be important for a developing foetus, since it is an essential component of the brain, nervous system and retinas of the eyes.

*How can a pregnant woman get enough long chain omega-3 polyunsaturated fatty acids from her diet?*

The human body has a very limited ability to make these long chain omega-3 fatty acids. Therefore, it is critical that these fatty acids are included in the diet. The European Food Safety Authority (EFSA) recommends that all pregnant women consume an additional 700-1,400mg DHA per week. This is recommended in addition to the requirement of 1,750mg combined EPA and DHA per week.

Pregnant women can achieve this recommendation for increased DHA intake by consuming 1-2 portions of oily fish per week (Table 4).

For vegetarians, or those who do not eat fish, sources of alpha-linolenic acid (ALA) can be included in the diet, e.g. some vegetable foods such as linseeds, rapeseed oil and walnuts. A small proportion of ALA can be converted by the body to EPA and, to a lesser extent, DHA. Because only a small amount of ALA is converted to EPA and DHA, oily fish is very valuable in the diet. Apart from oily fish, the only natural sources of EPA and DHA are human breast milk and cultivated marine algae.



Table 4. DHA content of an average portion of oily fish (150g) commonly consumed in Ireland

Omega-3-containing fish	Serving size (g)	DHA content (mg)
Average portion* of tuna steak <sup>†</sup>	120	2,749
Average portion* of salmon	120	2,485
Average portion* of mackerel	120	1,507
Average portion* herring kippered	120	902
Average portion* of Rainbow trout	120	641
1 small tin of tuna <sup>†</sup>	70	47.2

<sup>†</sup> Limit tuna intake to one fresh tuna steak (≤150 g) or two 240 g cans of tinned tuna per week during pregnancy due to mercury content

See page 7: Portion Size Reference Guide - Palm of hand\* and 200ml disposable cup\*\*

See below: Portion Size Reference Guide - Portion pack\*\*\*

#### How much fish can be eaten during pregnancy?

Fish is a very important part of a healthy balanced diet and pregnant women should be encouraged to include fish as part of their weekly diet. However, certain types of fish can contain contaminants, e.g. mercury, which may be harmful to the brain of the developing foetus.

### ! WARNING!

**Larger fish contain more contaminants than other fish.**

**Therefore, pregnant women should avoid eating marlin, shark, ray and swordfish, and should limit their consumption of tuna to one serving of fresh tuna (150g) per week, or two 240g cans of tinned tuna per week.**

#### What about long chain polyunsaturated omega-3 fatty acid supplementation during pregnancy?

Pregnant women should be encouraged to meet their intake requirements for these fatty acids through their diet. However, a supplement may be needed for women who do not like oily fish, who are vegan, or who find it difficult to consume enough omega-3 rich foods in their daily diet.

Women should be advised to take an omega-3 and omega-6 supplement or a pregnancy-specific supplement in order to avoid excessive intakes of other vitamins, such as vitamin A.

## Vitamin A during pregnancy

### Why is vitamin A important during pregnancy?

Vitamin A, also called retinol, is a fat-soluble vitamin which helps to strengthen immunity against infections. Vitamin A is involved in the maintenance of healthy skin and mucus linings, e.g. in the nose, and improves vision in dim light. It is also important for the development of the foetus.

During pregnancy, the recommended daily intake of vitamin A is 700µg. A healthy and balanced diet provides sufficient vitamin A for pregnant women.



### How can a pregnant woman get enough vitamin A from her diet?

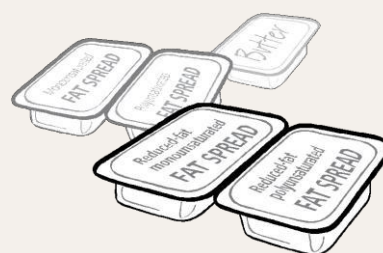
A woman eating a varied diet will easily achieve this. Good sources include whole milk (vitamin A is a fat soluble vitamin), cheese, eggs and some fortified milks and cereals (Table 5).

Table 5. The Vitamin A Content of Commonly Eaten Foods in Ireland

Type of food	Serving size (g)	Vitamin A content (µg)
1 matchbox size piece of cheddar cheese	30	109
1 single portion pack*** of butter	10	96
1 boiled egg	50	90
1 pot of full-fat plain yoghurt	125	45

See below: Portion Size Reference Guide-Portion pack\*\*\*

### PORTION SIZE REFERENCE GUIDE



#### Portion Pack\*\*\*

Portions of butter or spread found in cafés can guide the amount to use. For example, one pat of fat spread is more than enough for one slice of bread – try and make it do for two. Reduced fat polyunsaturated and monounsaturated spreads are best.



### WARNING!

Very high amounts of vitamin A (greater than 7,000µg/day, which is more than 10 times greater than the requirement for pregnant women) may harm the developing foetus. Some foods such as liver and liver products naturally contain very high amounts of vitamin A and pregnant women need to avoid these foods.



#### A note on carotene

Carotene is a dietary precursor of vitamin A. Dietary sources of carotene include brightly coloured vegetables like carrots, peas, broccoli, red peppers and spinach. Unlike foods naturally very high in vitamin A, such as liver and liver products, it is impossible to get too much vitamin A by consuming these dietary sources of carotene.



### What about vitamin A supplementation during pregnancy?

If a pregnant woman wishes to take a multivitamin, they should choose one designed especially for pregnancy. Certain 'standard' supplements and fish liver products such as cod liver oil are high in vitamin A, and these should be avoided during pregnancy.

Supplements designed especially for pregnancy tend to be lower in vitamin A than other supplements on the market and are safer for pregnant women. Supplements taken should not contain more than 100% of the recommended dietary allowance (RDA) for vitamin A in women.

### Allergy during Pregnancy

If a woman is not allergic to a particular food or ingredient, there is no good evidence to suggest that avoiding certain foods during pregnancy protects an infant from developing food allergies later in life. However, if there is a strong history of nut allergy in the family, it may be advisable to avoid peanuts.

Care should be taken that the woman does not consume a food to which she herself is allergic.

**Therefore, pregnant women do not need to avoid potentially allergenic foods during pregnancy, e.g. eggs, fish, milk or milk products, unless they themselves are allergic to these foods.**

### What is the bottom line in terms of good nutrition for a healthy pregnancy?

1. **Folic acid** is important during the first 12 weeks of pregnancy.

Pregnant women should take a folic acid supplement of 400µg per day during the first 12 weeks of pregnancy. If a mother has previously had an infant with a NTD, a supplement containing 4,000µg of folic acid is required per day to help prevent recurrence.

2. **Iron** is important all throughout pregnancy.

Pregnant women should aim to eat iron-rich foods such as those listed on page 7 twice daily.

3. **Calcium** is important all throughout pregnancy.

Three servings of milk or milk products daily should be eaten, such as those listed on page 8.

4. **Vitamin D** is important all throughout pregnancy.

Pregnant women should be encouraged to eat vitamin D rich foods, such as those listed on page 10. However, if a woman does not include these sources in her diet and is considering taking a supplement, a low dose supplement containing 5µg of vitamin D<sub>3</sub> per day should be advised.

5. *Consumption of oily fish should be encouraged throughout pregnancy.*

Consumption of oily fish, such as those listed on page 11, is recommended all throughout pregnancy to provide essential long chain polyunsaturated omega-3 fatty acids in the diet. However, large fish can contain substances which may harm the developing foetus. As such, pregnant women should avoid eating marlin, shark, ray and swordfish, and should limit tuna to one serving of fresh tuna (150g) per week, or two 240g servings of canned tuna per week.

6. *Excess vitamin A is harmful during pregnancy.*

Pregnant women should avoid liver and liver products as these are too high in vitamin A. Frequently eating these products may lead to the woman taking too much vitamin A in her diet which may be harmful to the developing foetus. Pregnant women should be encouraged to eat other sources of vitamin A such as those listed on page 11.

7. *Any multivitamin recommended should be specific to the needs of pregnant women.*

If a supplement is deemed necessary, pregnant women should be advised to only take supplements which are specifically designed for pregnancy.

8. *Potentially allergenic foods should not be avoided unless the mother herself has an allergy.*

Pregnant women do not need to avoid potentially allergenic foods during pregnancy, e.g. eggs, fish, milk or milk products, unless they themselves are allergic to these foods.

### Further information

- HSE 2006, *Healthy Eating for Pregnancy* – [www.healthpromotion.ie](http://www.healthpromotion.ie)
- *Healthy Pregnancy*, Pack of 4 booklets on a range of topics related to healthy pregnancy is available to order online at [www.healthpromotion.ie](http://www.healthpromotion.ie). This pack includes a pregnancy calendar and three booklets: *Give your baby a breather*, *Healthy Eating for Pregnancy* and *Feeding your baby*.
- HSE supported multimedia information resource for expectant and new mothers – [www.whatsupmum.ie](http://www.whatsupmum.ie)

## 1.3 Lifestyle Factors which are Important for a Healthy Pregnancy

### A healthy weight is important during pregnancy

An underweight pregnant woman has an increased risk of a pre-term delivery and of delivering an infant of low birth-weight or very low birth-weight. An overweight or obese pregnant woman has an increased risk of delivering an infant with complications such as macrosomia (excessive birth weight), neonatal infection, hypoglycaemia and respiratory distress, in addition to a greater risk of obesity in later childhood. An overweight or obese mother also has a higher risk of gestational diabetes and hypertension during pregnancy, and of miscarriage or caesarean section.

It is easier for a woman to maintain a healthy weight during pregnancy if she is a healthy weight before pregnancy. Obesity affects over a fifth of adult women in Ireland today. Therefore, all healthcare professionals should play a role in encouraging all women of childbearing age to attain and maintain a healthy weight.

### How much weight should a woman gain during pregnancy?

**Deliberate attempts to decrease body weight are not recommended during pregnancy.** Instead, women who are overweight or obese before pregnancy should aim to gain less weight than is normally expected during pregnancy and women who are underweight before pregnancy should aim to gain a little more weight than is normally expected during pregnancy. Pregnancy weight gain goals are to be used as a guide to the weight gain pattern observed during pregnancy (Table 6). The healthcare professional leading the care of the pregnant mother may be best placed to give specific advice on weight gain during pregnancy.



### Calculating Body Mass Index (BMI)

Divide weight (kilograms) by height (in metres) squared:

$$\text{BMI (kg/m}^2\text{)} = \frac{\text{Weight (kg)}}{\text{Height (metres)} \times \text{Height (metres)}}$$

Table 6. Pregnancy Weight Gain Goals Based on Pre-Pregnancy Body Mass Index (BMI)

Pre-pregnancy BMI	Total weight gain		Rate of weight gain* 2nd and 3rd trimester	
	Range (kg)	Range (lbs)	Mean (range) kg/week	Mean (range) lbs/week
<b>Underweight</b> <18.5kg/m <sup>2</sup>	12.5 – 18.0	28-40	0.51 (0.44 – 0.58)	1.0 (1.0 - 1.3)
<b>Normal weight</b> 18.5-24.9kg/m <sup>2</sup>	11.5 – 16.0	25-35	0.42 (0.35 – 0.50)	1.0 (0.8 - 1.0)
<b>Overweight</b> 25.0-29.9kg/m <sup>2</sup>	7.0 – 11.5	15-25	0.28 (0.23 – 0.33)	0.5 (0.4 - 0.6)
<b>Obese</b> ≥30kg/m <sup>2</sup>	5.0 – 9.0	11-20	0.22 (0.17 – 0.27)	0.5 (0.4 - 0.6)

\* Calculations assume a 0.5 – 2.0kg (1.1 – 4.4lbs) weight gain in the first trimester. Adapted from *Weight Gain during Pregnancy*, National Academy of Science, 2009

Women build up some fat stores during pregnancy to ensure they have sufficient energy stores for breastfeeding. This is accounted for in the guidelines provided above (Table 6).

### 1.3.1 What to eat for healthy weight gain during pregnancy

**There is a modest increase in a woman's energy requirements**, i.e. the amount of calories required daily throughout pregnancy.

Table 7. The Number of Additional Calories\* needed by Pregnant Women during each Trimester of Pregnancy

Trimester of pregnancy	Additional calories to be consumed daily (kcal/d)
1st Trimester	0
2nd Trimester	350
3rd Trimester	500

\* An average adult female requires about 2,000kcal/day



When choosing foods to meet the modest increase in energy requirements, preference should be given to foods rich in essential vitamins and minerals, such as fruits and vegetables, milk and milk products, and oily fish. See Table 8 for suitable foods which can be consumed (1-2 extra healthy snacks per day) to achieve the increased intake in energy during the second and third trimesters of pregnancy.

Table 8. The Number of Calories in Suitable Snacks for Pregnancy

Suitable snack food	Serving size (g)	Calories (kcal)
Soda bread: 1 slice (with honey)	43 (10)	100 (29)
1 cup** of bran cereal	30	134
2 slices of wholemeal toast (cheddar cheese and tomato)	70 (30 of cheese and 50 of tomato)	160 (208 cheese and 0 tomato)
1 small can of baked beans	140	111
Scrambled eggs (2 eggs, no milk)	120	192
1 pot low-fat plain yoghurt	125	71
1 cup** of fortified low-fat milk	200	84
1 cup** of fortified full-fat milk	200	120
1 small tin of tuna (canned in brine)	70	80.5
1 small tin of salmon (canned in brine, drained)	70	105
1 fruit, e.g. banana, apple, or 2 mandarin oranges	100	95

See page 7: Portion Size Reference Guide - Palm of hand\* and 200ml disposable cup\*\*



### Caffeine and pregnancy

Caffeine can be absorbed freely across the placenta, but is not broken down by either the placenta or foetus. Caffeine consumption in excess of 200mg per day has been shown to have negative effects on an infant's birth weight, even in non-smokers. Therefore, pregnant women should keep their caffeine intake below 200mg caffeine per day. See Table 9 for the caffeine content of frequently consumed foods and drinks.

**Table 9. Caffeine Content of Frequently Consumed Drinks and Foods**

Caffeine-containing Drinks	Serving size (ml)	Caffeine content* (mg)
1 cup of brewed coffee	200	40 – 180
1 cup of instant coffee	200	30 – 120
1 bottle of cola	500	50 – 107
1 shot of espresso	30	29 – 92
1 bottle of diet cola	500	39 – 64
1 cup of tea	200	19 – 21
1 cup of decaffeinated coffee	200	4 – 12
1 can of stimulant energy drink	230	0.15 – 88.0

Caffeine-containing Foods	Serving size (g)	Caffeine content* (mg)
1 bar of dark chocolate	45	31 – 41

\*The exact amount of caffeine varies according to cup size, brewing methods and brands of tea or coffee.

### Smoking and pregnancy

Smoking is harmful to the developing foetus and is well-known to adversely affect foetal growth. Pregnant women who smoke have an increased risk of giving birth to infants with a low birth weight and with an increased risk of asthma. Pregnant women should be strongly advised not to smoke during pregnancy due to the harm caused to the developing foetus. Pregnant women should also be advised to avoid exposure to second-hand smoke.

### Alcohol and pregnancy

No amount of alcohol is safe during pregnancy. Alcohol harms the developing foetus and increases the risk of miscarriage and pre-term delivery. Pregnant women should avoid all alcoholic drinks.

### Food safety and hygiene

Good food preparation and hygiene practices are important at all stages of life in order to prevent potentially harmful foodborne illnesses. However, during pregnancy, this is particularly important, as certain bacteria in food (such as *Listeria* and *Salmonella*), or parasites (such as *Toxoplasma gondii*) can be extremely harmful to the developing foetus.





### **Listeria Monocytogenes**

*Listeria monocytogenes* is a pathogenic bacterium which causes listeriosis. This bacterium is ubiquitous in the environment. The consumption of contaminated food is the main route by which listeriosis is transmitted (80-90% of cases).

**Invasive listeriosis** affects high-risk individuals such as pregnant women and the developing foetus. Listeriosis is characterised by diarrhoea, headache, fever, muscle pain, meningitis and septicaemia, as well as spontaneous abortion.

*Listeria monocytogenes* is particularly dangerous to high-risk individuals because it can grow at fridge temperatures. Fortunately, this bacterium is killed by pasteurisation and by cooking food. Unpasteurised milk and dairy products made from unpasteurised milk may be contaminated. Certain chilled foods which are consumed without further treatment, i.e. cooking, also have a higher risk of contamination. Such foods include soft cheese (even those made with pasteurised milk), pâté, smoked salmon, deli meats, soft-serve ice-cream, luncheon meats and pre-prepared salads, e.g. coleslaw.

### **Toxoplasmosis**

Toxoplasmosis is caused by the parasite *Toxoplasma gondii*. Humans can become infected by ingesting *Toxoplasma* oocysts found in cat faeces or by eating raw/undercooked meat containing visible cysts seen on infected food.

When primary infection with *Toxoplasma gondii* occurs in pregnancy, the organisms may be transmitted to the foetus and may lead to spontaneous abortion or serious handicap in the newborn.

Raw and undercooked meat, poorly cured and fermented meat products, and poorly washed salads and vegetables are possible sources of *Toxoplasma gondii*. To prevent infection, good hygiene practices are important, especially after handling raw meat or unwashed vegetables. Meat should be well cooked and served piping hot with no visible pink meat. Pregnant women should wear gloves when gardening or changing cat litter, and wash their hands afterwards.

### **Practical food safety and hygiene advice for pregnant women**

1. Eat only freshly cooked food and well-washed freshly prepared fruit and vegetables. If eating out, it is safer to order hot dishes
2. **Avoid** the following foods:
  - Unpasteurised milk and dairy products made with unpasteurised milk. Foods include all soft cheese and mould-ripened cheese (even those made with pasteurised milk), e.g. Brie, Camembert, goats' cheese, and blue cheese, e.g. Danish Blue, Stilton, Roquefort
  - Pâté made from meat, vegetables or fish
  - Smoked salmon and gravad lax fish
3. When preparing food:
  - Wash hands before handling food
  - Wash fruits and vegetables very well before eating
  - Keep raw and cooked meats separate and wash hands and chopping boards properly after handling uncooked food
  - Use different knives, chopping boards and other kitchen utensils when preparing raw and cooked meats to avoid cross contamination
  - Cook all food thoroughly, especially meat, and serve hot

- The fridge temperature must be below 5°C to store all food
  - Follow storage instructions carefully
  - Don't eat foods past their 'use-by' dates
4. Always wear gloves when gardening or changing cat litter, and always wash hands very well after these activities

### **What is the bottom line in terms of lifestyle factors which are important for a healthy pregnancy?**

1. **Encourage women of childbearing age to attain and/or maintain a healthy weight before becoming pregnant.**  
To reduce the risk of complications during pregnancy, pregnant women should ideally be a healthy weight before becoming pregnant. Specific advice related to the amount of weight a woman should gain during pregnancy should be provided.
2. **The additional amount of energy needed during pregnancy is modest.**  
In the second and third trimesters, 1-2 extra healthy snacks per day are all that are needed to cover a pregnant woman's additional energy requirements. See page 14 for a list of suitable snacks.

3. **Caffeine** should be limited to no more than 200mg per day.  
Limit the number of caffeine-containing beverages consumed during pregnancy. See page 15 for the caffeine content of commonly consumed beverages and foods.
4. **Smoking** is harmful to the developing foetus.  
Smoking during pregnancy should be strongly discouraged. Pregnant women who smoke should be advised on smoking cessation and adequately supported should they choose to cease smoking. Further information: Give your baby a breather is available to order online at [www.healthpromotion.ie](http://www.healthpromotion.ie).
5. **Alcohol** is harmful to the developing foetus.  
No amount of alcohol is safe during pregnancy. Women should be advised not to consume any alcohol during pregnancy.
6. **Food safety and hygiene** is important to protect mother and infant during pregnancy.  
Pregnant women should be particularly careful to follow general advice on food safety during pregnancy. Further information on food safety during pregnancy is available at [www.safefood.eu](http://www.safefood.eu).

## 1.4 Questions Commonly Asked by Pregnant Women

*What should I do if I am pregnant and have not started taking folic acid?*

If a woman is less than 12 weeks pregnant, she should **immediately** start taking 400µg of folic acid daily. She should continue to do so until she is at least 12 weeks pregnant.

If a woman is more than 12 weeks pregnant, the time in which neural tube defects could be prevented with folic acid supplementation has passed. The pregnancy should be routinely monitored with reassurance given as necessary if the pregnancy is progressing normally.

*How can I reduce morning sickness?*

To help alleviate morning sickness, advise the following:

1. Have **dry, starchy foods** such as dry crackers, toast, and cereal, regularly, to relieve nausea.
2. Have **small frequent meals and snacks** throughout the day.

Have a healthy snack (page 14) as soon as is tolerated after vomiting.

Despite nausea, it is important to encourage the pregnant woman to keep taking a daily supplement of 400µg of folic acid.



*What should I do if my blood pressure is too high?*

To help alleviate high blood pressure, advise the following:

1. **Be as active as possible.** The health care professional leading the care of the pregnancy should provide advice on a suitable exercise regimen.
2. **Reduce intake of salt.** Avoid high-salt foods, e.g. salty and cured meats, stock cubes, instant gravies, packet soups and ready-meals, and avoid adding salt to cooking or at the table.
3. Eat at least **5 servings of fruit and vegetables every day.**
4. Eat **3 servings of milk or milk based products every day** (page 8).

*What should I do if I become constipated?*

To help prevent constipation or to alleviate symptoms, advise the following:

1. Drink about **8-12 glasses (2-3 litres) of water every day**
2. With increasing fluid consumption, **increase the amount of fibre** in the diet:
  - a. Include wholegrain varieties of bread, cereal, pasta and rice, as well as fresh fruit and raw or cooked vegetables, peas and beans
  - b. Soak linseeds overnight and add 1-2 dessertspoons to cereal, meals, etc
3. Eat at least 5 servings of fruit and vegetables each day. Include at least 1 serving with meals and snack on fruit between meals

**Take gentle exercise every day.** The healthcare professional leading the care of the pregnancy should offer advice on an appropriate exercise regimen during pregnancy.



*What should I do if I am not gaining enough weight during my pregnancy?*

It is important to assess the woman's diet ensuring it is balanced and varied with all foods from the 5 main food groups included every day.

Advise the following:

1. Do not fast or skip meals
2. Choose foods from the 5 main food groups in line with healthy eating guidelines for adults
3. Do not exercise excessively. Speak with the healthcare professional leading the care of their pregnancy about an appropriate exercise regimen
4. Arrange a consultation with a dietitian if gaining weight remains a difficulty

*What should I do if I am gaining too much weight during my pregnancy?*

It is important that the diet is balanced and the woman is taking what is needed from the main food groups without too many foods which are high in fat, salt, sugar, e.g. confectionary, cakes, biscuits, crisps, and chocolate.

However, deliberate weight loss during pregnancy is not recommended.

Advise the following:

1. Have one or two fruit or low-fat dairy based snacks per day
2. Exercise according to the advice from the healthcare professional leading the care of the pregnancy
3. Avoid high-fat and high-sugar confectionery and snacks
5. Avoid fried foods

*What foods should I avoid when I am pregnant?*

- It is possible to get too much vitamin A from natural foods. Excessive intakes of greater than 7,000µg per day of vitamin A, well above the requirement of 700µg for pregnant women, may harm the developing foetus. As such, **food sources very high in vitamin A should be avoided during pregnancy, i.e. liver and liver products.**
- Some foods carry a greater risk of serious foodborne illnesses in high-risk groups such as pregnant women. To help prevent foodborne illness, pregnant women should follow the advice on pages 15 and 16.
- Limit tuna intake to one fresh tuna steak (150g) or two 240g cans of tuna per week to avoid excessive mercury intake.
- There is not enough evidence to say avoiding allergenic foods during pregnancy can protect an infant from developing allergies. However, if there is a strong history of nut allergy in the family, it may be advisable to avoid peanuts.

*What can I do to relieve heartburn?*

To help alleviate heartburn, advise the following:

1. Have **smaller and more frequent meals** in place of fewer larger meals to help avoid reflux of stomach contents
2. Avoid eating **foods which classically trigger heart burn**, e.g. fatty fried foods (slow down digestion), chocolate and caffeine (both relax the lower oesophageal sphincter)
3. **Avoid eating late at night** if heartburn occurs at bedtime
4. **Elevate the upper body** in bed (using pillows as necessary). This can help prevent regurgitation of stomach contents as can happen when lying completely flat

*Are herbal teas safe during pregnancy?*

Most common herbal teas, e.g. camomile, peppermint, and ginger, are safe in moderation during pregnancy. Some herbal teas may contain caffeine. The caffeine content should be checked to ensure the woman keeps her caffeine intake below 200mg per day.

**Women should be advised to avoid medicinal herbs and supplements**, e.g. Kava, Ginseng, Valerian Root, and Echinacea, as they are not tested for safety in pregnancy.

*I'm a vegan – how can I ensure my baby gets the right nutrients to develop properly?*

A vegan diet is restrictive. It may be difficult to get enough protein, iron, calcium, and vitamin B<sub>12</sub> from this diet – nutrients essential for the health of both the mother and developing foetus.

To ensure the mother's diet is meeting the necessary dietary requirements, a consultation with a dietitian should be arranged.

*I am concerned about my gestational diabetes and the size of my infant*

Most women with gestational diabetes are able to control their blood glucose levels and avoid harm to themselves or their infant. Following diagnosis, dietary education should be provided to the pregnant women with the aim of stabilising blood glucose levels. The healthcare professional leading the care of the pregnancy should measure blood glucose levels regularly to assess the need for insulin and the size of the growing foetus should be monitored.

**This chapter is from *Best Practice for Infant Feeding in Ireland: From Pre-conception Through the First Year of an Infant's Life - A practical guide for healthcare professionals based on the Scientific Recommendations for a National Infant Feeding Policy, 2<sup>nd</sup> Edition* (FSAI, 2012). The booklet is available to download from [www.fsai.ie](http://www.fsai.ie) or a hardcopy can be requested from the FSAI advice line (1890 33 66 77).**