Diet and pregnancy

Fact sheet

In the period before and during pregnancy, a woman lays the foundation for her child's health. A good, safe diet helps to give a child a healthy start. During pregnancy, a child is completely dependent on its mother's diet and food reserves. For pregnant women, a healthy diet means eating in accordance with the Wheel of Five. The Netherlands Nutrition Centre has additional recommendations. These recommendations apply from the very moment that women decide to try to become pregnant. In the first weeks of pregnancy, women are often unaware that they are pregnant, yet that initial period is particularly important for their child's development.

This fact sheet restricts itself to pregnancy and diet. It does not cover other lifestyle factors that are important for pregnancy, such as working conditions, exercise and the harmful effects of smoking and drug use.

The recommendations for pregnant women can be classified into dietary recommendations and food safety recommendations.

The dietary recommendations focus on providing the best possible diet for the health of the expectant mother and her child. Most dietary recommendations are derived from the 2006 Guidelines for a healthy diet[1], supplemented by more recent recommendations from the Health Council of the Netherlands regarding vitamins A, D, folic acid, alcohol and preconception healthcare.[2-6] These recommendations include a special focus on being overweight before and during pregnancy.

Recommendations concerning food safety focus on foodborne infections and on the intake of harmful substances. The recommendations are designed to minimise risks. Many of the food safety recommendations are offered as precautionary measures.

For whom is it relevant?

This fact sheet is for those professionals who are supervising pregnant women. The recommendations are relevant for women who want to become pregnant, those who are already pregnant, and their immediate circle of family and friends.

What issues are involved?

The Netherlands Nutrition Centre recommends diets that are as beneficial as possible to the health of the expectant mother and her child. For the child, the primary consideration is enabling it to develop into a healthy baby. Maternal overnutrition and undernutrition can both impede the growth and health of a child in the womb. One indication of stunted growth is a lower birth weight than might be expected on the basis of gestational age. In addition, there is a growing awareness that certain maternal lifestyle factors increase the child's risk of disease in later life.[7] During pregnancy, it is also particularly important to pay special attention to hygiene and food safety. While the risks involved are often slight, they are nevertheless significant and avoidable.

Dietary and food safety recommendations for pregnant women

For pregnant women, a healthy diet means eating in accordance with the Wheel of Five. The daily recommended intakes of food for pregnant women are the same as those for women between the ages of 19 and 50. However, the recommended intake in the category of meat (and processed meats), fish, chicken, eggs and meat substitutes is slightly higher, as women need more iron during pregnancy.

The Netherlands Nutrition Centre offers the following recommendations to women who want to become pregnant and those who are already pregnant:

- From at least four weeks before conception to eight weeks thereafter, take 400 micrograms of folic acid daily. Thus, start taking folic acid supplements from the very moment the decision is taken to try to become pregnant, until ten weeks after the last menstruation.
- During pregnancy, take 10 micrograms of vitamin D per day.
- Do not take any supplements containing vitamin A (retinol, retinal, retinyl acetate or retinyl palmitate) or eat any liver (or liver products).
- Eat more products from the categories meat (and processed meats), fish, chicken, eggs and meat substitutes: 125-150 grams per day rather than 100-125 grams per day.
- Eat fish twice a week, including oily fish at least once a week.
- Drink no alcohol from the very moment that the decision is taken to try to become pregnant.
- Do not make a conscious effort to eat more than you did before the pregnancy.
- Overweight women should try to lose weight before becoming pregnant, so that they start the pregnancy at a healthy weight. During the pregnancy, do not diet in an attempt to lose weight.
- Follow the food safety recommendations as described under the heading 'Scientific state of the art: food safety recommendations'.

Additional dietary recommendations are required, for example, in the event of gestational diabetes mellitus and of extreme nausea and vomiting (hyperemesis). Pregnant women affected by these conditions will be treated by a physician. The physician may refer them to a dietician. The Netherlands Nutrition Centre advises women who suffer from morning sickness to eat and drink something before getting up in the morning, and to eat regularly and drink plenty of fluids. There is no scientific evidence to support these recommendations, but they do appear to work in everyday practice.
In addition, women following a vegan or vegetarian dietary pattern require additional recommendations, with respect to their vitamin B12 intake, for example. Women who follow a vegan dietary pattern would be well advised to consult a dietician.

Scientific state of the art: dietary recommendations

Details of the evidence underpinning the dietary recommendations are set out (per recommendation) below.

Take 400 micrograms of folic acid per day

Taking extra folic acid just before becoming pregnant and during early pregnancy reduces the risk of birth defects, including defects of the spine and the palate. This supplementation recommendation is needed because women can not obtain the recommended intake of folic acid from their normal diet. The Health Council recommends to start taking 400 micrograms of folic acid daily at least four weeks before conception, to achieve adequate levels of this vitamin early in pregnancy. It recommends to continue taking this supplement until eight weeks after conception.[4]
The Netherlands Nutrition Centre's recommendation (which was derived from the Health Council's recommendation) is to start taking folic acid from the very moment that the decision is taken to try to become pregnant. In cases of unplanned pregnancy, of course, it is not possible to start taking folic acid before becoming pregnant. Here, the recommendation is to start taking it as soon as possible.

Take 10 micrograms of vitamin D per day

All pregnant women are advised to take 10 micrograms of vitamin D per day. This recommendation is especially important for women with a tinted or dark skin, women who dress in clothing that covers almost all of the body, or those who seldom go outside. In these groups, the vitamin D recommendation applies even if they are not pregnant.[3] The adequate intake for pregnant women is the same as for other women of their age (10 micrograms per day). Yet this special advice is certainly applicable, as deficiencies can occur.
In addition to adversely affecting mothers (muscle weakness and aching bones) severe vitamin D deficiencies can affect their children. The body synthesises some vitamin D when exposed to sunlight, and the rest comes from the diet. Dietary vitamin D is found mainly in oily fish, meat and eggs. Vitamin D is added to low-fat margarine, margarine, and products used in baking and frying. Fair-skinned people who are regularly exposed to the summer sun synthesise about two-thirds of their vitamin D requirement from sunlight. This is much less the case for those with dark skins, those who wear clothing that covers almost all of the body, or those who seldom go outside.[3]
Pregnant women in these groups are at particular risk of developing vitamin D deficiency. However, vitamin D deficiency also occurs in fair-skinned women. So, just to be on the safe side, the Health Council advises all pregnant women to take extra vitamin D (from a supplement).

Do not take any supplements containing vitamin A or eat any liver (or liver products)

In pregnant women, excessive doses of vitamin A pose a risk of having a child with congenital abnormalities. The tolerable upper level for adults is 3,000 micrograms per day.[8] For this reason, the Health Council recommends that pregnant women take no vitamin A supplements and avoid the use of liver (or liver products).[2] This is because liver (or liver products) contain a lot of vitamin A.
The Dutch National Food Consumption Survey[9] has shown that, in women of childbearing age, the intake of dietary vitamin A is well below the tolerable upper level: 95% of those aged from 19 to 30 have an intake of less than 1,200 micrograms. If a pregnant woman eats one slice of bread with a liver product, such as liver sausage or liver pâté (1,000 to 1,200 micrograms of vitamin A), this probably does not pose a health risk to her unborn child.

For the normal development of their unborn child, it is important that pregnant women ingest sufficient amounts of vitamin A (or pro-vitamin A) from products from the Wheel of Five, such as low-fat margarine, products used in baking and frying, egg, cheese and some types of fruit and vegetables.

Other vitamins and minerals
The daily recommendation for most vitamins and minerals is slightly higher for pregnant women than for other women (see fact sheet 'Recommendations for vitamins, minerals and trace elements' at www.voedingscentrum.nl/factsheets). Nevertheless, there are only supplementation recommendations for folic acid and vitamin D. According to the Health Council[10], pregnant women will ingest sufficient quantities of other vitamins and minerals if they eat in accordance with the Guidelines for a healthy diet. The use of all other supplements (such as multivitamins) is not recommended. If pregnant women nevertheless opt to take a dietary supplement, they must ensure that they do not exceed 100% of the recommended daily allowances (RDA) and that this supplement contains no vitamin A in the form of retinol, retinal, retinyl acetate or retinyl palmitate.

Eat more products from the category meat (and processed meats), fish, chicken, eggs and meat substitutes

Ten percent of women at the beginning of pregnancy[11] and 50% at the end of pregnancy[10] have a low iron status (plasma ferritin concentration <12 micrograms/l). The symptoms of a low iron status are headaches and fatigue. A low haemoglobin level and other indicators of iron deficiency in the mother are associated with preterm birth and low birth weight.[12] There is insufficient evidence that iron supplementation during pregnancy can prevent this.[13]Accordingly, there is no supplementation recommendation for iron.

Nevertheless, an adequate dietary iron intake is important. For this reason, the Netherlands Nutrition Centre recommends that, during pregnancy, women should eat 25 grams more from the categories meat (and processed meats), fish, chicken, eggs and meat substitutes. Eating fruit or vegetables at each meal promotes iron absorption. Over time, an inadequate iron intake can lead to an iron deficiency. This needs to be confirmed by blood tests. In such cases, physicians may prescribe an iron supplement.

By eating more products from the category meat (and processed meats), fish, chicken, eggs and meat substitutes, pregnant women will increase their protein intake as well . The Health Council[14] and the European Food Safety Authority (EFSA)15 indicate that the protein requirement increases during pregnancy. Protein intake in the Netherlands is generally more than adequate.[9] Accordingly, there are no extra recommendations with regard to protein intake.

Eat fish twice a week, including oily fish at least once a week

The consumption of fish and docosahexaenoic acid (an omega-3 fatty acid found in fish) during pregnancy is important for the development of the child's brain and retina.[16] The health effects relate to eating fish and not to taking fish oil capsules.[16] Accordingly, the Health Council[1] recommends that consumers should eat fish twice a week, including at least one portion of oily fish. This recommendation applies not only to pregnant women, but to the entire Dutch population.

Do not drink alcohol

Alcohol reduces fertility. Alcohol consumption during pregnancy increases the risk of spontaneous abortion, foetal death and preterm birth. A high alcohol intake (6 or more drinks per day) also increases the risk of congenital abnormalities and foetal alcohol syndrome. Foetal alcohol syndrome is a serious disorder. Affected children can suffer permanent physical and psychological damage. The more a pregnant woman drinks, the greater the risk. It is not possible to set a safe lower limit for alcohol consumption. Accordingly, the Health Council recommends that women drink no alcoholic beverages from the moment they start trying to become pregnant until the moment they stop breast-feeding their baby. In women who drink more than three glasses a day, providing general information about the risks of alcohol use does not lead to the desired behavioural change. Such women need specialist help.[5]

The Health Council[5] also indicates that alcohol use may lead to reduced fertility in men. In the event of fertility problems, future fathers might be well advised to stop drinking alcohol from the moment the woman in question starts trying to become pregnant.

Do not make a conscious effort to eat more than you did before the pregnancy.

Averaged over the entire pregnancy, women require an additional 1.5 megajoules per day[14] which amounts to about 360 kilocalories per day. However, the actual amount required can differ considerably from one woman to another. It also depends on a woman's body weight before pregnancy and on whether she takes less exercise during pregnancy. Accordingly, the Netherlands Nutrition Centre advises pregnant women to eat about the same amount of food as before.

Women who are overweight should try to lose weight before becoming pregnant.

Being overweight (BMI > 25 kg/m2) is associated with reduced fertility.[17, 18] Women who are overweight have a greater risk of spontaneous abortion, preterm birth[19, 20] and a heavier baby. Being overweight can have an effect on how well the placenta functions. If the placenta does not function effectively, there is a greater risk of having a child with low birth weight.[21] Pregnancy complications, such as gestational diabetes mellitus and high blood pressure,[22-24] are more common in overweight and obese women.[25, 26] Such babies are more likely to be born by caesarean section, which is particularly stressful for the mother. The more overweight the mother is, the stronger the above associations. There appears to be an association between mothers who are obese (BMI > 30) at the beginning of pregnancy and children who suffer poorer health in later life. For instance, such children will be more likely to be overweight, or to suffer from high blood pressure, cardiovascular disease and type 2 diabetes mellitus later on.[27-29]

Despite these risks, losing weight during pregnancy is discouraged. In this situation, the unborn child may not receive adequate amounts of some nutrients. Moreover, toxins may be released from adipose tissue. Thus, in this connection, overweight or obese women who want to lose weight (due to the risks involved) must do so before becoming pregnant. Nevertheless, women are advised to limit their weight gain during pregnancy.

Scientific state of the art: food safety recommendations

Pregnant women are more susceptible to foodborne infections and the consequences can be more severe. Foodborne infections are usually only unpleasant to the expectant mother, but in some cases pathogens can cross the placenta and reach the child. In cases like these, foodborne infections also pose a risk to the child. To prevent foodborne infections, it is especially important to follow hygienic practices. It is also important for pregnant women to cut down on some products, or to avoid them completely, as they contain substances that can be harmful to the child.

Such risks are often slight and avoidable. The Netherlands Nutrition Centre's recommendations are designed to minimise all such risks. The various avoidable risks are discussed below, together with measures that pregnant women can take to reduce such risks.

Hygiene

By following hygienic practices, expectant mothers can minimise the risk of health impairment to themselves and their unborn child as a result of foodborne infections. Tips for hygienic practices are given in the "5 steps for safe food handling for pregnant women" chart, as shown in Figure 1.

Figure 1

Listeria monocytogenes

An infection by the bacterium *Listeria monocytogenes* during pregnancy can lead to spontaneous abortion or preterm birth. While there is only a very slight risk of becoming infected with this bacterium, the results can be severe. *Listeria* can be present in refrigerated products that are eaten without being heated, such as deli meats or soft blue-veined cheeses. Women can greatly reduce their risk of infection by:

- Ensuring that refrigerated products in the refrigerator are at a low enough temperature (4°C).
- Not storing refrigerated products too long. Eating refrigerated products before the expiry date has passed, and within four days of opening, prevents *Listeria* from reaching dangerous numbers.

Smoked ready-to-eat fish and raw animal products, such as soft cheese made from unpasteurised milk and raw processed meats are more often associated with *Listeria*. The Netherlands Nutrition Centre recommends that pregnant women avoid such products, as a precautionary measure, or that they only eat them after they have been thoroughly heated.[30-32]

Toxoplasma gondii

An infection by the parasite *Toxoplasma gondii* during pregnancy can lead to spontaneous abortion or it can inflict severe damage to the unborn child. Some infected children who are born without symptoms may go on to develop eye disorders. *Toxoplasma gondii* reproduces in felines, such as domestic cats. The eggs are released with the cat's faeces, which is how they are spread.

The Netherlands Nutrition Centre recommends that pregnant women with cats get someone else to change the cat litter every day. If this is not possible, they should wear gloves when performing this task. They are also advised to wear gloves while gardening, and to wash fruit and vegetables thoroughly under running water. The parasite may also occur in raw meat. The parasite can survive for some time in raw, dried and fermented processed meats as well.

Accordingly, the Netherlands Nutrition Centre recommends that people avoid the following products:

- Raw meat, such as uncooked steak, roast beef and steak tartare.
- Raw processed meats, such as beef sausage and steak tartare.
- Dried and fermented deli meats such as salami and raw ham.

Pregnant women can eat these meat products if they heat them to more than 70°C or freeze them for at least 2 days at -12°C. Heating and freezing kills the parasite.[33]

Contaminants

Contaminants are toxins that can enter the food chain and can accumulate in the fatty tissue of animals. Some examples of contaminants are heavy metals and dioxins. A prolonged, high intake of contaminants can harm the child. Pregnant women who have a normal, varied dietary pattern do not have to worry about such contaminants.

Fish can contain elevated levels of dioxins or mercury (a heavy metal). These mainly include the following species of fish:

- Predatory fish such as sharks, king mackerel, swordfish, tilefish and tuna (except canned tuna, due to legal limits concerning the maximum measured quantities in canned fish).
- Wild eels and mitten crabs from Dutch waters.

As a precautionary measure to keep the intake of mercury and dioxins as low as possible, the Netherlands Nutrition Centre advises women not to eat these species of fish during pregnancy. However, fish also contain important nutrients and fatty acids. Thus, the Netherlands Nutrition Centre strongly recommends that pregnant women eat two portions of fish per week, including at least one portion of oily fish.[16]

Calabash chalk (pimba) is sometimes used to treat morning sickness. This chalk often contains excessive amounts of lead (a heavy metal), which is harmful to the unborn child. Thus, the Netherlands Nutrition Centre advises against the use of calabash chalk.

Herbal preparations

People take herbal remedies because they think this is good for their health, but by no means all such preparations have been assessed to determine the truth of the matter. Moreover, concerns are often expressed about the safety and origin of such preparations. Accordingly, the Netherlands Nutrition Centre advises against the consumption of all herbal preparations (tablets) and essential herbal oils.

Kitchen herbs and herbal tea

Estragole, methyl eugenol, safrole and myristicin are allylalkoxybenzene derivatives. Little is known about the effects of these substances in humans, but harmful effects have been found in animals. These substances are present in the following herbs: anise, tarragon, fennel, basil, allspice, nutmeg, cinnamon, sassafras, dong quai, mace and pepper. [34] Thus, the Netherlands Nutrition Centre recommends that these herbs, and herbal teas made using such herbs, be used in moderation.

Caffeine

Caffeine intake during pregnancy has been associated with an increased risk of delayed foetal growth.[35] Various upper intake levels are cited in the literature. The Food Standards Agency (FSA) in Britain[36] advises pregnant women to limit their consumption of caffeine-rich products to less than 200 milligrams of caffeine per day.[35, 36] The Netherlands Nutrition Centre follows this recommendation.

The precautionary advice is: take no more than one caffeine-rich product daily. Coffee and energy drinks are caffeine-rich products. This recommendation allows for an average consumption of other sources of caffeine such as tea, coke and chocolate. For example, a cup of coffee (125 ml) contains approximately 85 milligrams of caffeine, a cup of tea (125 ml) 30 milligrams, and a glass of coke (180 ml) 18 milligrams. Full details of the evidence underpinning the caffeine recommendation can be found in the fact sheet on caffeine at: www.voedingscentrum.nl/factsheets.

Liquorice and liquorice tea

Liquorice and liquorice tea contain glycyrrhizin. This substance can increase blood pressure. As a precautionary measure, pregnant women are advised to eat no more than a couple of pieces of liquorice per day and to avoid drinking too much liquorice tea.

Looking to the future

In its 2015 work programme, the Health Council has included healthy nutrition around the time of pregnancy. Following the publication of the Health Council's advisory report, this fact sheet will be modified where necessary. Also in 2015, EFSA will publish an opinion on the safety of caffeine. If this should lead to different insights, then this fact sheet will also be adjusted accordingly. New data on food consumption and nutritional status in pregnant women may lead to modified or additional dietary recommendations.

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