GUIDELINES FOR HEALTHY BREASTFEEDING WOMEN

A BACKGROUND PAPER
FOOD AND NUTRITION GUIDELINES
for
Healthy Breastfeeding Women

A Background Paper

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PUBLIC HEALTH COMMISSION
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Foreword

This paper brings together the key areas of nutrition affecting the health of breastfeeding women at this point in time. It has provided the background material for the development of the health education booklet, *Eating for Healthy Breastfeeding Women*.

These guidelines support the National Nutrition Policy and are an important strategy within the *National Plan of Action for Nutrition* (PHC, 1995a).

It is envisaged that this background document will provide health professionals, educators and caregivers with technical information relating to food for breastfeeding women.

Dr Gillian Durham
Chief Executive
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Introduction

Maternal nutrition during breastfeeding must be adequate to maintain maternal nutritional status, while ensuring that the infant's health and growth is optimal. That is, the effects of diet on both milk composition and on maternal body nutrient stores must be considered, with the desirable outcome being the good health of both infants and mothers.

The importance of breastfeeding for infant health cannot be overstated in both developing and developed countries. It has been stressed by the New Zealand Paediatric Society, who recommend breastfeeding for at least the first six months of infant life (New Zealand Paediatric Society, 1992), and the Public Health Commission (PHC) states that breast milk is the ideal food for infants (PHC, 1994). The American Academy of Pediatrics recommends exclusive breastfeeding for the first four to six months of an infant’s life (Freed et al, 1991).

To promote breastfeeding to health professionals and mothers, the World Health Organization (WHO) and the United Nations Childrens Fund (UNICEF) have released a joint statement on the ten successful steps to breastfeeding (Appendix 1), and WHO has also released an International Code of Marketing Breast Milk Substitutes (WHO Code) (Appendix 2). These are designed to encourage breastfeeding and control the promotion of infant formulas and other aspects of bottle feeding to prevent the unnecessary use of breast milk substitutes.

Exclusive breastfeeding may be defined as the feeding of breast milk only, with no record of the infant receiving any other milks or solid/semi-solid foods.

There are many advantages, in addition to the nutritional advantages associated with breastfeeding, including:
- transfer of immune factors to the infant through the breast milk (Hennart et al, 1991)
- psychological advantages (Jason, 1991)
- breastfeeding is an economical, low-cost alternative to other forms of feeding
- breastfeeding may have child spacing benefits (Gross, 1991)
- there is the potential of a reduced risk of breast and ovarian cancers among women who have breastfed (Yoo et al, 1992).

In New Zealand, the incidence of breastfeeding has increased substantially since 1975, although rates have tended to level off since the late 1980s. The most recent data, collected by the New Zealand Plunket Society in 1993, indicate that 93.8 percent (with a range of 89-94 percent) of mothers initiate breastfeeding. By eight weeks postpartum, 15 percent of those who started breastfeeding have stopped. There is a particularly high rate of cessation within the first week postpartum. Major factors associated with breastfeeding failure are:
- low levels of maternal education
- geographic region of domicile
- maternal smoking
- being primiparous
- being European.

Pacific Islands mothers were least likely to stop breastfeeding early. Reasons cited for cessation include sore nipples, insufficient milk supply, feeding difficulties, inconvenience and feeling embarrassed or uncomfortable. Data on exclusive versus partial breastfeeding are limited, and further research is necessary in this area (Alison, 1993).

It is important that much support from partners, family and health professionals is provided to the breastfeeding woman in this initial period to help establish breastfeeding patterns. This may help prevent
cessation of breastfeeding once the mother leaves the hospital environment where support is readily
given.

Women who have not planned to breastfeed are most likely to fail. Health care workers are therefore
likely to be most effective in promoting breastfeeding to those women who want to breastfeed (Graffy,
1992), ensuring that they have sufficient information and support to maintain breastfeeding. However,
education and encouragement must be conveyed to all pregnant mothers, as it is believed that many
women fail to breastfeed through inadequate preparation and assistance.

One of the reasons cited for breastfeeding failure is insufficient milk supply, which is a term used to
describe a wide range of reasons. Support for the breastfeeding mother to achieve an adequate nutritional
intake may result in fewer feeding difficulties. Although reduction in milk supply is often due to problems
with breastfeeding technique and positioning, nutritional education may help to increase rates. The PHC
has identified two targets for breastfeeding in its policy advice to the Minister of Health in 1993-1994
(PHC, 1994). They are:

1. To increase exclusive breastfeeding at three months from 60 percent (1991) to 70 percent by 1997,
   and 75 percent by the year 2000.

2. To increase breastfeeding (exclusive or partial) at six months from 55 percent (1991) to 70 percent by
   1997, and 75 percent by the year 2000 (PHC, 1994).
Energy Balance
During Breastfeeding

Energy Expenditure and Requirements

The energy cost of breastfeeding is the energy content of the milk secreted plus the energy required to produce it. The energy content of breast milk is considered to be close to 2.93 MJ/L (700 kcal/L), and if the efficiency of conversion of food energy to milk energy is assumed to be 80 percent, the average energy cost of breastfeeding over the first six months is estimated to be 2.93 MJ/d based on a daily volume of 800 mL/d (van Raaij et al., 1991) The resultant dietary recommendation is an extra 2.09 MJ/d throughout breastfeeding assuming that extra fat deposited during pregnancy is mobilised during breastfeeding. However, recent studies have suggested that the metabolic efficiency of milk synthesis is higher than has been estimated, with values of 95 percent being suggested as being more accurate (Frigerio et al, 1991). This would imply that current recommendations may be higher than actual requirements, with values of 1.20-1.70MJ/d proposed to be more appropriate (van Raaij et al, 1991).

The energy needed for breastfeeding is generally considered to be provided by both the maternal diet and tissue reserves. However, recent studies have led to the suggestion that there are other possible sources, for example, energy sparing adaptations and lower physical activity levels.

A Dutch study suggested that an enhanced efficiency of metabolism during breastfeeding resulted in a lower basal metabolic rate (BMR) and possibly a lower dietary induced thermogenic response (van Raaij et al, 1991). However, it is likely that these mechanisms play a greater part in developing countries or in populations where food intake is restricted, and/or where women cannot afford to decrease physical activity (Goldberg et al, 1991).

Until energy and nutrient intakes have been studied further in New Zealand and updated recommendations for dietary intakes for New Zealanders are available, it has been recommended by the Nutrition Taskforce that the revised Australian Dietary Intakes (1990) be adopted for New Zealanders as an interim measure (Department of Health, 1991).

There is still much to be learnt about the exact dietary energy requirements of breastfeeding women, but it must be considered whether the current Australian recommended energy intake of an increase of 2.0-2.4 MJ/d (Truswell et al, 1990) may be too high for New Zealand women, who generally are well nourished and some of whom may reduce their physical activity levels while breastfeeding due to lack of time for exercise.

Energy intakes and milk volume

It is unknown whether there is an energy threshold for breastfeeding, but despite much lower reported energy intakes among women in developing countries, compared with women in industrialised countries, average milk volumes at three months are similar (Prentice, 1991).

Numerous observational studies have reported that undernourished women produce smaller amounts of milk than their well-nourished counterparts. However, this may be related to the size of the infant, as birth weights tend to be lower in infants born to undernourished women, which results in decreased milk volume as smaller babies have ‘smaller requirements’ (Gonzalez-Cassio and Delgado, 1991). Longitudinal studies of Bangladeshi mothers have shown that the overall quality and quantity of milk production is only moderately less than in better nourished women, but it does indicate that there is the potential for limited milk production with lowered nutritional status (Brown et al, 1986).
Maternal Weight Changes During Breastfeeding

An important issue for most breastfeeding women in developed countries is whether they will lose the extra weight gained during pregnancy. The assumption that breastfeeding will result in prompt weight loss seems to have little foundation. Successful breastfeeding is compatible with gradual weight reduction (Butte et al., 1984). It has been found that American breastfeeding women eating self-selected diets typically lose weight at the rate of 0.5-1.0 kg per month in the first six months of breastfeeding. However, not all women lose weight; 20 percent may actually gain weight postpartum (Institute of Medicine, 1991). It is suggested that women who gain weight during pregnancy in excess of recommendations are more likely to retain some of that weight postpartum (Abrams, 1993).

Recent findings suggest that breastfeeding leads to significantly faster loss of body weight and reduction in hip circumference than does formula feeding in the first month postpartum only; thereafter there are no significant differences (Kramer et al., 1993). Breastfeeding does tend to favour lipid mobilisation from the femoral adipose tissue rather than abdominal tissue (Institute of Medicine, 1991).

It is important that breastfeeding women are aware that rapid weight loss (>2 kg/month) is unlikely to occur, and is not recommended. Energy intakes below 6.25 MJ are also contraindicated during breastfeeding, as the exact effects of energy restriction are not known and intakes of most nutrients are unlikely to be adequate with these low energy intakes.

It must be recognised that lower energy intakes than recommendations and moderate weight loss in healthy breastfeeding women with a Body Mass Index (BMI) >25 is not associated with any problems or lack of success in breastfeeding (Dusdieker et al., 1994), so initial weight must be considered when formulating individual recommendations.

Few studies have been conducted examining the effects of longer periods of breastfeeding on weight loss, although it has been suggested that the rate of weight loss actually decreases between six and twelve months postpartum (Institute of Medicine, 1991). Further research is necessary on the potential nutritional effects on women who exclusively breastfeed for long periods, and on the energy requirements of these women.

Observed Energy Intakes

The only data on energy intake of breastfeeding women in New Zealand (from two 24 hour recalls from a group comprising 94 percent women of European descent) have indicated that mean energy intakes are 8.41 MJ/d (Todd and Parnell, 1994a). These are similar to those found overseas, although they do tend to be slightly lower than most, which may reflect the method of dietary assessment used.

This study did indicate however, that intakes are lower than the Australian Recommended Dietary Intakes (RDI) of 10.5 -11.0 MJ/d, yet breastfeeding was successful as all of the women involved were still exclusively breastfeeding at three months postpartum. However, there is some concern that intakes of some nutrients were not as high as recommended.

An American study also found that breastfeeding women did not meet the recommended allowances for energy intakes (with a mean intake of 9.15 MJ/d), but sufficient quantities of most nutrients were provided. This suggests the women were choosing nutrient dense foods. The authors concluded that successful breastfeeding can occur with energy intakes less than current recommendations due to mobilisation of tissue stores (Butte et al., 1984), although the importance of a balanced diet must be emphasised.
Recommended Energy Intakes for Breastfeeding Women

The American Institute of Medicine recently suggested that an energy intake of at least 7.5 MJ/d (1,800 kcal/d) should be recommended for breastfeeding women (Institute of Medicine, 1991). This value may be more realistic in terms of women achieving these intakes than the current Australian RDI of 10.5-11.0 MJ/d which is being used for New Zealand women who are breastfeeding.

Women should be encouraged to eat according to their appetite, and to choose nutrient dense foods, aiming for a balanced and varied diet. Rapid weight loss is unlikely to occur during breastfeeding, and is not recommended.

Each woman must be considered individually as exercise undertaken may alter energy requirements, and in some cases, useful weight loss can be tolerated if appropriate; that is, in obese women.

Studies which have been conducted examining the effects of maternal protein intake on breast milk production and composition have tended to have methodological problems such as small sample sizes, short duration, and often extreme protein intakes have been used. This makes it difficult to determine if there are any significant effects of protein intakes, within the range of normal intakes.
Macronutrient Intakes During Breastfeeding

Protein

It has been suggested that the total nitrogen content of breast milk may be affected by maternal protein intakes (Forsum and Lönnertal, 1980), and also by maternal body protein metabolism; a positive association between milk yield and maternal body protein metabolism has been found (Motil et al, 1989). Other research has suggested that the protein concentration in breast milk decreases over time independently of maternal dietary protein intakes, reflecting metabolic activities within the mammary gland (Thomas et al, 1980).

Studies in developing countries have not found any differences in milk protein levels between well-nourished and malnourished women (Prentice et al, 1983), nor any effects of protein supplementation on milk composition.

It is obvious that this is an area where further research is necessary as there is no convincing evidence that diet or body composition influence the total concentration of milk protein (Lönnertal, 1986).

New Zealand women who are breastfeeding have been found to have mean protein intakes of 78 g/d (Todd and Parnell, 1994a) which is well above the Australian RDI of 61 g/d for breastfeeding women (Truswell et al, 1990). The protein content of most New Zealanders diets is more than adequate (Horwath et al, 1991), so increases are unlikely to be necessary during breastfeeding.

Lipids

Human milk has 51 percent of energy present as fatty acids, the lipids thus being a very important source of energy for infant growth. Neither milk volume nor total milk fat level appears to be affected by dietary fat changes in well-nourished women (Insull et al, 1959). It has, however, been shown that the nature of the fat consumed by the mother will influence the fatty acid composition of the milk.

Breast milk from vegetarian mothers has been shown to contain a lower proportion of fatty acids derived from animal fat, and a higher proportion of polyunsaturated fatty acids derived from dietary vegetable fat (Finley et al, 1985a). Koletzko et al (1988) have found that levels of some essential fatty acids in breast milk can vary widely within a single community, illustrating the potential for a maternal dietary influence on breast milk composition. The milk cholesterol and phospholipids remain relatively constant and appear to be unaffected by maternal cholesterol intake and plasma levels (Harzer et al, 1984).

One advantage of breast milk over formula milk is the fact that breast milk contains erythrocyte docosahexanoic acid (DHA), which has been suggested to explain the improved neurodevelopment reported in breastfed infants as compared to formula fed infants (Makrides et al, 1994).

There has been some interest in the possibility of the transfer of trans fatty acids into breast milk, as they may have metabolic effects similar to those of saturated fatty acids and a possible causal role in coronary heart disease (Department of Health, 1991). There is little information available, but it has been shown that American women who mainly consumed margarine had higher levels of trans fatty acids in their milk than women who mainly consumed butter (Finley et al, 1985b). However, the proportion of trans fatty acids of the total amount of fatty acids in the milk was found to be small. Potential effects of these on the infant are unknown. The levels of trans fatty acids in New Zealand margarines are likely to be lower than those used in the above study, and it is unknown whether they may have any influence on the breast milk content of New Zealand women.
Further research is necessary to determine if there is a relationship between diet and the breast milk content, on levels of trans fatty acids in New Zealand foods, and whether the trans fatty acids may in fact be used as an energy source by the infant, and have few other potential metabolic effects.

Rapid mobilisation of fatty acids from maternal adipose tissue may release trans fatty acids and other fat-soluble environmental pollutants into the milk, which is another reason to warn mothers against the advisability of rapid weight loss during breastfeeding (Chappell et al, 1985).

New Zealand women who are breastfeeding have been found to have fat intakes comprising 37 percent of total energy intake (Todd and Parnell, 1994a). This is higher than the 30-35 percent recommended by the Nutrition Taskforce for Healthy New Zealanders (Department of Health, 1991). Although breastfeeding women do have high energy needs and in this study were unlikely to be consuming energy in excess of their requirements, they should be aware that it is not recommended that fat intakes as an energy source increase during breastfeeding. Fat intakes should ideally be along the guidelines set for non-pregnant, non-breastfeeding New Zealand women as described above.

**Carbohydrates**

The principal carbohydrate in human milk is lactose, which is second only to water as a major constituent (Institute of Medicine, 1991). It is also the nutrient which is least likely to be affected by maternal nutrition, with concentrations being very similar between women (Lönnerdal, 1986).

Other milk carbohydrates are relatively unaffected by maternal dietary intakes, and it is recommended to breastfeeding women that they follow the guidelines set by the Nutrition Taskforce and obtain 50-55 percent of energy from carbohydrate, with sucrose and other free sugars restricted to no more than 15 percent of total energy to ensure a balanced and varied diet is consumed (Department of Health, 1991).
Mineral and Trace Element Intakes During Breastfeeding

Maternal mineral intakes appear to have little effect on their concentration in breast milk but replenishment of maternal stores is an important issue. It is also important to consider any possible mineral interactions, particularly if using dietary supplements.

Calcium

The calcium content of breast milk appears to be tightly regulated under hormonal control, with calcium being released from the maternal bone store, if necessary, to meet the required breast milk levels. It is therefore important that maternal intakes are adequate to replenish the bone stores and prevent the development of osteoporosis, or 'bone thinning' in later life.

It has been estimated that a woman breastfeeding for six months loses approximately five percent of total body calcium (Institute of Medicine, 1991). However, it has been suggested that there are few long term effects on bone mineral content as effective bone remineralisation appears to occur once breastfeeding has ceased (Sowers et al, 1993). Calcium repletion may therefore have occurred more effectively among women who had breastfed, or other behavioural characteristics among these women promoted enhanced bone mass over the long term (Institute of Medicine, 1991).

Until further research has clearly defined the relationship, if any, between breastfeeding and osteoporosis, it is important to ensure that women do have adequate intakes of calcium at all times, especially when breastfeeding to prevent any loss of bone mineral content. A study involving breastfeeding American adolescents found that those with low dietary-calcium intake had a loss of bone mineral content, and that adequate calcium intake can promote bone mineral content maintenance (Chan et al, 1987).

Mean intake of calcium among New Zealand women who were breastfeeding was found to be 923 mg/d (Todd and Parnell, 1994a), which is below the Australian RDI of 1,200 mg/d. Although this intake was higher than those of non-pregnant, non-breastfeeding women found in the Life in New Zealand Survey (LINZ) (642 mg/d) (Horwath et al, 1991), 44 percent of the breastfeeding women had intakes below two-thirds of the RDI, which is of some concern.

Women who are breastfeeding should be made aware of the need for adequate intakes of calcium, which may be achieved by regular daily consumption of milk and milk products (preferably reduced or low fat milks). Women who are unable to consume dairy products because of their effects on either the mother's or infant's health, can maintain adequate intakes through the consumption of calcium enriched soy milks, green vegetables, whole grain cereals and breads, canned fish with bones, beans and nuts. It has been suggested that vegetarian women with a low-calcium diet may have an altered hormonal response leading to greater calcium absorption (Specker, 1994). This is an area for further research, but vegetarian women should be encouraged to include calcium-rich foods in their diets.

All women should also be made aware of the adverse effects of sodium on their calcium status (Goulding, 1990), and encouraged to decrease their sodium intakes by avoiding salty snacks or processed foods.

Moderate exercise may be undertaken by some women, this is associated with increasing bone mineral content. If a woman has been relatively sedentary during pregnancy, low intensity exercise should be undertaken after medical consultation, to promote bone mineralisation. Alcohol consumption and smoking may adversely affect calcium metabolism, and should be avoided.
Because of the important role of vitamin D in calcium metabolism, an adequate vitamin D status is necessary as well as a sufficient calcium intake to prevent osteomalacia. This may be particularly relevant to women who tend to stay indoors, or cover their body and face for cultural or religious reasons. These women may require vitamin D supplementation (but only under medical supervision), to ensure dietary calcium is able to be utilised.

Breastfeeding adolescents will have even greater needs for calcium as this is a time when their own bone density should be increasing. Supplementation may be necessary for those adolescents or low-income women who find it difficult to consume adequate amounts of calcium.

**Zinc**

It appears that the zinc concentration in breast milk decreases over time during breastfeeding independent of intake, suggesting there is some hormonal regulation of the levels (Moser and Reynolds, 1983). However, some studies have shown that those women taking a zinc supplement appeared to have a slower rate of decline over time (Krebs et al, 1985). There is however, some controversy over the effects of maternal zinc intakes on breast milk content and further research is necessary.

If the mother has not had an adequate zinc intake during pregnancy, especially during the third trimester when the fetus accumulates most of its zinc stores, then her infant may not have adequate levels and her body stores may be depleted putting both mother and infant at risk of deficiency. Given the importance of zinc in growth and development, and immune function, the call for further research and concern with zinc intakes is justified.

The Australian RDI of 18 mg/d is higher than the estimated secretion of zinc in breast milk, to allow for poor maternal absorption of dietary zinc. It has however, been suggested that zinc absorption is increased in breastfeeding women who have low intakes (Jackson et al, 1988).

The zinc intakes of New Zealand breastfeeding women have been found to be 10.8 mg/d; considerably lower than the RDI (Todd and Parnell, 1994a). Given that zinc intakes generally reflect protein and iron intakes, which were satisfactory among this group of women, it suggests that it is difficult to reach these levels of intake without supplementation.

Until the exact effects of a low zinc intake on maternal and infant health are known, supplementation need not be recommended. However, breastfeeding women should be encouraged to include zinc rich foods in their diet, such as lamb, leafy and root vegetables, beef, whole grains, milk, eggs and nuts.

**Iron**

Iron is present in haemoglobin as a carrier of oxygen, in myoglobin in muscle cells, and also in many enzymes within cells. Iron deficiency may result in impairment in exercise performance, resistance to infections, work capacity and body temperature regulation (Department of Health, 1991).

Iron deficiency anaemia continues to be a problem in many parts of the world, and many pregnant and breastfeeding women take iron supplements as iron deficiency can be common at these times. Generally, iron levels are low in breast milk, and appear to be relatively unaffected by maternal intakes (Murray et al, 1978), although this possibility cannot be ruled out until further research is completed.

Although iron losses in milk during six months of exclusive breastfeeding are equivalent to approximately 14 percent of the average woman's iron stores, this is only about half of what is ordinarily lost through menstruation. Thus, unless there was excessive blood loss at delivery, the total demand for iron during breastfeeding is reduced while the woman is still amenorrheic. Once menses resume, breastfeeding women could then have increased needs for dietary iron (Institute of Medicine, 1991).
If iron stores have been depleted considerably after pregnancy/delivery, replenishment is recommended through diet or supplements, but supplementation should only be implemented under medical supervision.

It appears that New Zealand breastfeeding women of European descent do have an adequate iron intake (11.8 mg/d) (Todd and Parnell, 1994a), although there is room for improvement to ensure the RDI of 12-16 mg/d is met.

RDIs for iron for breastfeeding women are no higher than those for non-pregnant, non-breastfeeding women, so women should be advised to follow guidelines set by the Nutrition Taskforce and include iron-rich foods in their diets and to enhance absorption by consuming vitamin C containing foods with non-haem iron containing foods.

**Selenium**

Selenium in the seleno-enzyme glutathione peroxidase (GSHPx) is one of the antioxidant defence systems of the body. Selenium deficiency can result in Keshan disease (a selenium responsive cardiomyopathy), but this has not been reported in New Zealand (Department of Health, 1991).

It is well known that there are several areas in the world with low soil selenium, and that intakes of selenium are generally very low in these areas. The selenium status of these people is thus lower, and this is reflected by lower breast milk selenium levels. Low mean values of breast milk selenium have been found in New Zealand women (Williams, 1981), and are related to maternal whole blood selenium concentrations.

A study examining the selenium status of Christchurch infants found that breastfed infants do have higher selenium intakes than formula fed infants, although some breastfed infants were receiving inadequate intakes (Dolamore et al, 1992). Since this study has been completed, two of the principal local formulae have been fortified with selenium, so these results may no longer be valid. Further research is necessary on whether some pregnant and/or breastfeeding mothers may require selenium supplementation.

Intakes of New Zealand breastfeeding women have been found to be 35.8 μg/d (Todd and Parnell, 1994a), which is significantly lower than the Australian RDI of 85 μg/d. However, it is obvious that it is necessary for New Zealand to establish its own specific requirements and RDI for selenium, which will reflect our low selenium environment. Until this is accomplished, it is not possible to determine whether breastfeeding women are at risk of having inadequate selenium intakes.
Fat Soluble Vitamin Intakes During Breastfeeding

Vitamin A

Vitamin A refers to a group of compounds essential for vision, growth, cellular differentiation and the integrity of the immune system. Deficiency of the vitamin, although rare in New Zealand, may result in night blindness or skin disorders (Department of Health, 1991).

Current evidence suggests that breast milk vitamin A content is affected by maternal diet. However, because vitamin A is stored in the human body, long term assessment is necessary to determine any dietary effects. The breast milk concentration of vitamin A decreases over the course of breastfeeding from approximately 2,000 to 600 µg/L (Chappell et al, 1986). It has been reported that in mothers with poor vitamin A status, milk levels of vitamin A were not increased by supplementation. It was suggested that the stores must firstly be repleted to a certain level before the milk concentrations of the vitamin change (Bates, 1983).

The LINZ data indicate that intakes of vitamin A have been decreasing over recent years, and that intakes for women may be considered marginally adequate (Horwath et al, 1991). It is possible that New Zealand breastfeeding women do not have large stores or intakes of the vitamin, but data on their intakes are not adequate to determine whether intakes are sufficient.

Women who are breastfeeding can be encouraged to increase their intakes of the red/orange coloured fruits and vegetables which are good sources of provitamin A carotenoids. Selected dairy products (for example, cheeses) could not only improve their vitamin A intakes, but also their calcium status, but should only be consumed in moderation due to their fat content.

Vitamins D, E and K

Vitamin D requirements are not thought to be increased during breastfeeding, but the necessity of vitamin D in maintaining adequate calcium status is as important during breastfeeding as the demand for calcium. Vitamin D status does not always depend on dietary sources, as the action of ultraviolet light on vitamin D precursors in the skin results in its production. Dietary sources play a negligible role in contributing to the vitamin D status of New Zealanders as most healthy adults maintain an adequate vitamin D status through exposure to sunlight. It is therefore not necessary to recommend any incremental increase in vitamin D intake during breastfeeding. Research on the vitamin D levels of New Zealanders is necessary, particularly among groups who do not expose their bodies, hands or faces to the sunlight for cultural or religious reasons.

It has been suggested that an increase in vitamin E in the diet can lead to increased vitamin E levels in breast milk (Lönnerdal, 1986). Maternal stores may also have some influence. Vitamin E status is likely to be adequate in most healthy New Zealanders, although further research is necessary concerning this vitamin.

At present, most infants in New Zealand are given a prophylactic dose of vitamin K at birth to prevent haemorrhagic disease. If this is not given, then the infant does depend initially on a dietary source until gut bacterial synthesis takes over. There is little information on the breast milk concentrations of vitamin K, although it does appear there is no significant correlation between maternal intakes and breast milk concentration (Greer et al, 1991), and low dose maternal supplementation does not secure an adequate intake for the infant (Pietschnig et al, 1993). There is little justification in recommending an increased intake during breastfeeding, provided good sources of the vitamin (such as dark green vegetables and cauliflower) are regularly included in the diet, as the extent to which gut synthesis contributes to the vitamin's status in the body is not completely known.
Water Soluble Vitamin Intakes During Breastfeeding

The water soluble vitamins are involved in energy metabolism, cell growth, enzyme systems and antioxidant systems and are therefore important for growth and cell maintenance (Department of Health, 1991).

Generally, maternal intakes of the water soluble vitamins do affect breast milk levels of the vitamins. It is therefore important that adequate amounts of these are consumed to ensure the infant will receive the necessary amounts for growth and development. One must also be aware that the vitamins riboflavin, niacin, vitamin B_{6}, vitamin B_{12} and folate are often associated with protein metabolism. Therefore, as protein concentration in breast milk decreases with time, the levels of these vitamins may decrease in prolonged breastfeeding due to decreased protein entering the breast milk, and so increased maternal intakes of these vitamins may be necessary (Thomas et al, 1980). The increased needs should all be able to be met through appropriate food choices, including consumption of vegetables, fruit and cereals.

Thiamin, Riboflavin, Niacin and Pantothenic Acid

There appears to be a limit to the amount of thiamin that appears in breast milk. Supplementation of poorly nourished women with thiamin may increase the breast milk content up to 200 μg/L. However, a study has found that supplementation in adequately nourished women did not increase milk thiamin levels, but that urinary excretion of thiamin increased (Thomas et al, 1980).

Levels of riboflavin, niacin and pantothenic acid in breast milk also reflect maternal intakes to a certain extent, and increased intakes will only have an influence in women who are not well nourished. There is therefore a greater likelihood that breastfeeding women will have low intakes of these nutrients if they have a low energy intake. It is important that these women are aware of the importance of adequate intakes and consume plenty of nutrient rich foods, for example, vegetables, whole grains, meats, and legumes.

Biotin

There is conflicting evidence concerning the effects of maternal dietary intakes of biotin on breast milk content of the vitamin. The milk levels appear to reflect the maternal plasma concentration, but are a lot higher, suggesting some form of active transport of biotin into breast milk. The milk biotin concentration increases with length of breastfeeding, however, a sufficient maternal intake is important to maintain an adequate status. This is likely to occur among most New Zealand women.

Vitamin B_{6}

Vitamin B_{6} levels in breast milk are strongly influenced by maternal intakes, although there may be a threshold above which milk levels cannot be increased (West and Kirksey, 1976). Generally for healthy women diet alone should be adequate to maintain adequate vitamin B_{6} status. There appears to be a consistent postpartum increase in maternal plasma and breast milk vitamin B_{6} levels, which may be suggestive of a physiological mechanism being present to regulate the infant's intakes in order to prevent the development of central nervous system disorders in infants due to vitamin B_{6} deficiency, although this is rare.

There is some concern that women who are not well nourished may not be receiving adequate intakes of the vitamin (Sneed et al, 1981) but routine supplementation is not often recommended. It has been suggested that high levels may suppress breastfeeding due to suppression of the normally elevated prolactin levels (Greentree, 1979), however, this needs to be further researched.
New Zealand women who are breastfeeding appear to have adequate intakes of the vitamin (1.6mg/d) (Todd and Parnell, 1994a), so no specific recommendation is necessary for healthy breastfeeding women.

**Folate**

Due to methodological problems occurring in many of the trials conducted involving folate, there is some uncertainty concerning maternal requirements. It does appear that the folate concentration in the milk increases with breastfeeding time, possibly due to some regulatory mechanism (Cooperman et al, 1982). Folate levels may be increased in breast milk by supplementation among poorly nourished women, but this effect is not seen among the well nourished.

One study has found that folate levels in the red blood cells of women breastfeeding for longer than six months decreased by up to 30 percent, although milk levels are not affected, and these women showed no sign of folate deficiency (Ek, 1983).

It thus appears that milk content is maintained at the expense of maternal stores, so it is important that women do have adequate folate intakes to protect their health. Stores are likely to be adequate among New Zealand women if they have been taking folate supplements during pregnancy, as recommended by the PHC (PHC, 1995b).

This could be achieved by regular consumption of leafy vegetables, and fruits, preferably raw, as these are a good source of the vitamin.

**Vitamin B₁₂**

Breast milk vitamin B₁₂ content has been reported to vary widely, mainly due to different types of assays being used in analysis. Because vitamin B₁₂ is only present in animal food sources and some fermented food products, it is suggested that vegetarian/vegan women may be at risk of a low vitamin B₁₂ status, and therefore of low milk concentrations, putting the infants at risk of deficiency. This can result in haematologic, neurologic and metabolic abnormalities in the infants, and some cases of this have been documented (McPhee et al, 1988). These cases are rare, but it must be recognised that exclusively breastfed infants of strict vegetarian mothers may be at risk as illustrated by increased urinary methylmalonic acid concentrations found in breastfed infants of vegetarian women consuming a macrobiotic diet (Specker et al, 1988).

Supplementation studies have shown that increased intakes of vitamin B₁₂ where status is low can increase milk concentrations (Sneed et al, 1981). However, supplementation will not have any effect where the women are well nourished.

Most New Zealand women who are breastfeeding are likely to have an adequate intake, but health professionals must be aware of the potential risks of vegetarian women who are breastfeeding, and ensure that vitamin B₁₂ status is adequate. Supplementation may be necessary in some cases, but only under medical supervision.

**Vitamin C**

The vitamin C concentration in human milk appears to be affected by maternal intakes, but only up to 100mg/d. Intakes higher than this only result in increased urinary excretion of the vitamin (Byerley and Kirksey, 1985).

Given that most adult New Zealand women do have adequate intakes of the vitamin (Horwath et al, 1991), and that it has been found that New Zealand breastfeeding women have mean intakes of 140mg/d (Todd and Parnell, 1994a), there is little need for concern over the intakes of this nutrient as the increased needs for breastfeeding should be easily met by most New Zealanders.
Fluid Intakes
During Breastfeeding

It is widely assumed that a high fluid intake is an important factor in the maintenance of milk production, however, the evidence suggests that breastfeeding women can tolerate a considerable amount of water restriction, and excessive fluids have little effect on milk volume (Institute of Medicine, 1991). A study of breastfeeding women who consumed no food or fluids from 5:00am to 7:30pm during Ramadan lost 7.6 percent of their body water, but appeared to adapt by super-hydration overnight, and no changes in milk volume or osmolality were observed (Prentice et al, 1984).

Studies of supplemental fluids have also failed to influence milk production. Using a randomised crossover study design, it has been found that a 25 percent additional fluid intake by breastfeeding women did not significantly increase the milk supply while energy intake remained constant (Dusdieker et al, 1985). Earlier studies have suggested that very high fluid intakes (4L/d) may suppress breastfeeding due to responses of prolactin secretion to osmotic stimuli (Horowitz et al, 1980).

There appears to be no physiological basis to recommend an increased fluid intake other than to satisfy thirst. Unnecessary recommendations to consume ‘lots of fluids’ may result in some women replacing nutritionally valuable solid foods with water or other nutrient-free beverages such as tea or coffee (Ershow et al, 1991).

Sufficient intake (at least two litres per day) of fluids - especially milk and fruit juices should be encouraged to satisfy natural thirst. Exceptions may be during summer or periods of high ambient temperatures, or after exercise, when fluid requirements to prevent dehydration will be greater than usual.
Alcohol Intakes During Breastfeeding

Alcohol intakes are of concern to breastfeeding mothers. Traditionally alcohol has been recommended as a breastfeeding aid, with the suggestion that it may increase milk yield, facilitate milk let down and relax both the mother and infant (Lawrence, 1989). Conversely, it has been shown that relatively high intakes of alcohol may inhibit oxytocin release and block the milk-ejection reflex (Wagner and Fuchs, 1968).

A New Zealand study in which eight breastfeeding mothers drank as much alcohol as they preferred in as short a time as possible, showed that alcohol appeared quickly in the milk at levels equal to, or greater than the blood, and was eliminated from the milk at a similar rate to elimination from the blood. The calculated amount of alcohol reaching the infant’s blood was found to be very small, and unlikely to affect the infant, providing the exposure was only occasional (Lawton, 1985).

An American study examined 400 mother-infant pairs for one year and found a strong positive linear relation between the level of exposure to ethanol in breast milk and the Psychomotor Development Index (PDI) on the Bayley Scales of Infant Development. However, no correlations were found with the Mental Development Index. Although the differences in the PDI were not large, it did appear that increased maternal alcohol intakes led to impaired infantile development at one year. There was more of an association when maternal intakes of alcohol were regular, rather than with maternal binges (Little et al, 1989).

Further research is necessary, as it is possible that there are different behaviour patterns between those mothers who do, and who do not consume alcohol while breastfeeding. For example, these may involve differences in amounts of time spent stimulating the infants.

Another American study found that maternal alcohol consumption led to less milk being consumed by their infants compared to days when alcohol had not been consumed. This may have been due to changes in flavour of the milk, or to a decrease in milk production, or changes in the milk-ejection reflex making it difficult for the infant to obtain the milk. There was no significant difference in the total amount of infant sleeping time, but they did tend to sleep for shorter periods more often during the day after consuming the alcohol-containing milk. This suggests a pharmacological effect of ethanol on the infants (Mennella, 1991).

Alcohol should be avoided as much as possible as the full potential effects are unknown. Occasional moderate alcohol intakes by breastfeeding mothers may be acceptable, but not directly before breastfeeding, as the alcohol may pass into the milk. Further research is necessary before more exact recommendations may be made.

Caffeine Intakes During Breastfeeding

Beverages (coffee, tea and cola drinks) are the main sources of caffeine, although it is present in other foods such as chocolate, and in some medications. There is currently little information available on the transfer of caffeine to breast milk.

In an American study it was found that after maternal consumption of a caffeine-containing beverage, the caffeine was present at detectable levels after fifteen minutes in the saliva and milk, when more than 100mg (one cup of ‘instant’ coffee) had been ingested. The half life in the milk was 6.1 ± 4.4 hours. The amount of caffeine theoretically available to the infant ranged from 0.06 to 1.5 percent of the maternal dose. No caffeine was detected in the urine of any infants. The authors concluded that moderate maternal...
intakes will not present a hazard to breastfed infants, but multiple large doses are warned against (Berlin et al, 1984).

In the full-term newborn, caffeine has been shown to have a half life in the blood of three to three and a half days (infants aged 0 to three months), and to be longer in the premature infant when given directly to the infant. This suggests that repeated large dosages may accumulate in the infant (Sherriff et al, 1992).

It has been noted that irritability and poor sleeping habits in breastfed infants have been reported with maternal caffeine intakes greater than ‘usual’ amounts (> 300-600mg caffeine per day; >4-8 cups of ‘instant’ coffee) (American Academy of Pediatrics, 1989), however, this effect was not noted after maternal ingestion of 500mg of caffeine in divided doses (Ryu, 1985).

Maternal caffeine ingestion has been implicated as a cause of infantile colic, but this has yet to be proven by double blind study, and it may be only one of several factors contributing to colic. Low to moderate caffeine ingestion by women who have an infant with colic is recommended until further research is completed.

It has been suggested that caffeine may also affect the status of iron and calcium concentrations in breast milk (Munoz et al, 1988), although the effects may be small; this deserves further investigation.

While there is little knowledge at present about the possible effects of caffeine, one should be aware that the American Academy of Pediatrics Committee on Drugs has classified caffeine as a drug that has caused significant effects such as altered sleeping habits and temperament in some nursing infants, and that it should be used by nursing mothers with caution (American Academy of Pediatrics, 1989).

Breastfeeding women should be encouraged to be aware of their caffeine intakes, and to avoid the consumption of large quantities or large multiple doses, especially of percolated coffee. The equivalent of one to two cups of regular coffee daily is unlikely to have any negative effects; although for those women with low iron intakes, this may adversely affect their iron status.

Cigarette Smoking During Breastfeeding

Cigarette smoking has been shown in several studies to significantly reduce milk volume (Matheson and Rivrud, 1989; Vio et al, 1991), and is also associated with a slower weight gain of infants of mothers who smoke. It is thought that the effects on milk volume are due to altered prolactin and oxytocin production (Vio et al, 1991).

The New Zealand Cot Death Study has shown that the risk of an infant dying from sudden infant death syndrome (SIDS) is considerably increased by maternal smoking both during pregnancy and the first year of the infant's life. While breastfeeding the infant may offer some protection to the infant from SIDS, passive smoking by the infant is independently causally related to SIDS, and parental smoking should be strongly discouraged (Mitchell et al, 1993).

A prospective longitudinal study examined the development of infants of both smoking and non-smoking mothers. Smoking was associated with a lower birth weight and height in the infants, but after one year the mean body weights were identical. However, the study confirmed that children suffer from infections of the lower respiratory tract more often when they grow up in a smoker's household (Schulte-Hobein et al, 1992). The incidence of smoking may be associated with other factors not usually associated with a high success rate of breastfeeding such as low socioeconomic status and low education level, and it has been shown that smoking is associated with an early incidence of weaning (Matheson and Rivrud, 1989).

Parental smoking has also been shown to be associated with the development of allergy in genetically susceptible infants (Arshad et al, 1992).
Women who smoke may have higher requirements for certain nutrients, particularly vitamin C, vitamin B₁₂, folate, zinc and amino acids due to decreased availability of these nutrients (Institute of Medicine, 1990), and so may need to increase their intakes of vegetables and fruits accordingly.

The negative effects of smoking on breast milk volume and on infant and maternal health should be emphasised to all women, and parental smoking strongly discouraged during breastfeeding.
Effects of Maternal Nutrition on Allergies, Wind and Colic in Breastfed Infants

Maternal dietary habits may change during breastfeeding for several reasons. Many women believe that several components of foods may pass into their breast milk, and have some effect on their infants, such as allergies, excessive wind or colic. There is some scientific evidence to confirm certain effects of maternal foods on the development of allergies in breastfed infants, but less evidence concerning excessive wind and colic, and it does appear that each mother-infant pair will have unique experiences.

Development of Allergies in Breastfed Infants

The incidence of food-induced allergic disease has been estimated to be between four and six percent of infants (Sampson, 1988). Genetic factors are important in the development of allergy, but so are environmental factors. This suggests there is a possibility of preventing allergy or atopy (the inherited tendency to produce IgE antibodies to environmental antigens) by avoiding antigens in the early months of life (Soothill, 1980).

It has been suggested that exclusive breast milk ingestion can help in the prevention of the allergic response, but this is difficult to determine as there are many other environmental factors which need to be controlled such as timing of solid food introduction.

There is some concern that allergens may be transferred from the breast milk to the infant after maternal ingestion, thus sensitising the infant, and leading to allergic responses. Some infants (11 percent of those showing symptoms) may develop allergic symptoms in the first week of life, suggesting they may have been sensitised antenatally, or via the breast (Gerrard and Shenassa, 1983).

Cows' milk is the most common food which elicits an adverse reaction in the breastfed infant after maternal ingestion, but other foods such as eggs, fish, peanuts, oranges, wheat and chocolate may also lead to sensitisation in some infants (Gerrard and Shenassa, 1983).

Cows' milk allergy in infants

The incidence of cows' milk protein allergy in infants has been found to range from 0.3-7.5 percent of the world infant population, and it has gained considerable attention by many health professionals (Wilson and Hamburger, 1988). The resulting symptoms include rhinitis, eczema, diarrhoea and abdominal pain, and less frequently, asthma.

It appears that early exposure to cows' milk and a familial atopic history are important factors in the developments of cows' milk allergy. It has been shown that β-lactoglobulin, casein and bovine IgG are transferred into human milk, and may sensitise susceptible infants. However, the levels of IgA antibody in the breast milk also appears to be an important factor in the development of the allergy (Machtlinger and Moss, 1986).
Effects of maternal antigen avoidance on the development of infant allergic disorders

Care must be taken to ensure that there are no resulting adverse effects on the mother’s or infant’s nutritional status due to maternal restrictions, in either pregnancy or breastfeeding. Any dietary restrictions must be given under the guidance of a dietitian or general practitioner.

In a prospective study of breastfeeding women with a familial history of atopy, it was found that breastfeeding combined with maternal avoidance of cows’ milk and other dairy products, eggs, fish, beef and peanuts during pregnancy and breastfeeding led to a decreased occurrence of atopic eczema in their infants compared to breastfed infants of mothers with no dietary restrictions, and also with formula fed infants (Chandra et al, 1986).

A more recent study also found that maternal dietary restrictions led to a lower incidence of atopic dermatitis in the first six months of life compared with the control group (Hattevig et al, 1990). A follow up of these infants at four years of age found both the cumulative incidence and the current prevalence of atopic dermatitis were significantly lower in the children in the diet group than in the control group (Sigurs et al, 1992).

Until more studies with larger groups are completed, current recommendations are that mothers-to-be of infants at risk of allergic disorders due to family history should be advised to avoid cows’ milk and other possible allergens during pregnancy and breastfeeding, and to breastfeed exclusively for six months or longer (Chandra et al, 1986). However, this advice should not be given lightly; each case must be examined individually, with a complete history taken and an elimination-challenge study undertaken by the mother where possible, under medical or dietetic supervision only. Women at risk could be identified by general practitioners routinely questioning expectant mothers on their family history of allergies.

Colic in Breastfed Infants

Colic can be a problem in infants up to the age of three months, but it may persist until the age of four or five months in some cases. Several names and definitions for this problem exist, and there is still confusion over the exact causes of colic.

The classic picture is of a well, thriving baby, who in the early evening, for no apparent reason, develops paroxysms; beginning with flushing of the face, a frown, drawing up of the legs, followed in a few seconds by high pitched screaming, suddenly ending in a few minutes, and followed in a few minutes by another paroxysm. This can occur for up to two or three hours (Illicworth, 1985).

However, many other definitions are used, and this makes it difficult to determine the prevalence and aetiology of the problem. The Isle of Wight infant feeding survey found that colic affected 16 percent of 843 infants (Hide and Guyer, 1982). Other estimates of its prevalence have ranged from 10-40 percent - although no standard criteria of the condition have been used for these estimates.

There are many suggested ‘causes’ of infantile colic, but the infants suffering from colic are a very heterogeneous group, and no one factor can be applied to all of them. The following theories are thought to play a role in some infants:

1. Feeding management

   The infant may be underfed, overfed, may swallow excessive amounts of air, or may not be adequately burped. It has been suggested that switching the baby to the second breast too early during a feed may lead to low-fat feeds, and rapid gastric emptying with increased intestinal fermentation and colic.

   Irritant substances such as caffeine ingested via breast milk from the mother are implicated as a cause of colic, but this has yet to be proven by double-blind study (see Caffeine Intakes During Breastfeeding).
2. Allergy
There has only been one study supporting the theory that maternal cows’ milk ingestion can lead to infantile colic. This study suggested that in one third of infants with colic, a diet free of cows’ milk for the mother should be used as a treatment (Jakobsson and Lindberg, 1983). However, other trials have failed to find this relationship. It appears that only one to two percent of infants may have colic due to cows’ milk intolerance, and further research is necessary to determine the exact relationship.

3. Psychological factors
These factors may relate to either the infant’s temperament, or parental (especially maternal) anxieties. The infant may have a temperament which leaves them predisposed to being difficult. Parental anxiety is a controversial issue, as maternal anxiety may cause the colic, but then the colic may also induce anxiety in the mother, which then potentiates the colic. Methodological problems make it difficult to make conclusions about anxiety and colic, but it does appear that anxiety may affect infant behaviour, but there is no strong evidence that it is a cause of colic.

4. Other factors
These include intestinal problems, increased sensitivity or immaturity, passive smoking by the infant and inadequacies of care.

It appears that the aetiology of colic may be multifactorial and interactional, and much more research is needed in this area. It has been found that maternal ingestion of garlic and onions may cause colic in some infants. Cabbage, turnips, broccoli or beans may also make others colicky for 24 hours after maternal ingestion, however, the occurrence of this is believed to be rare (Lawrence, 1989). Maternal dietary factors do not appear to play a large role, and maternal dietary restrictions should not be recommended unless found to be necessary through elimination-challenge studies completed under medical or dietetic supervision.

Excessive Wind in Breastfed Infants

Although many women believe that foods they ingest may cause excessive wind in their breastfed infants, there is little scientific evidence to support this theory. It has been documented that New Zealand women are avoiding foods such as cabbage, onions, other vegetables, and spicy foods to prevent excessive wind in their infants (Todd and Parnell, 1994b). However, this phenomenon has not been proven to occur. The normal maternal intestinal flora produce gas from the action on fibre in the gastrointestinal tract; neither the fibre nor the gas is absorbed from the tract, nor do they enter the milk (Lawrence, 1989).

There are some essential oils in some foods such as garlic that can pass into the breast milk and affect the flavour, but this has not been found to affect infant health (Mennella and Beauchamp, 1991).

So while there is no evidence to support general maternal restrictions of certain foods, the occurrence of this is widespread, and based on experience and hearsay.

It is difficult to conclude whether maternal food avoidances can help in the prevention of excessive wind, as many women avoid foods without trying them first, after suggestions from Plunket nurses, family and friends (Todd and Parnell, 1994b).

The avoidance of some vegetables is unlikely to adversely affect maternal nutritional status, or affect milk composition. However, women should be advised to try the foods before avoiding them to prevent unnecessary restrictions, and to seek professional advice before avoiding foods such as dairy products or meats, as this may be detrimental to their nutritional status.

Further research is necessary on the potential effects of maternal diet on excessive infant wind.
Further Areas of Concern During Breastfeeding

Breastfeeding Adolescents

There is little information available on the dietary intakes and milk production of adolescents who are breastfeeding, with no studies being conducted in New Zealand on this topic. However, American data indicate that age has little effect on milk volume, so adolescents should be able to adequately breastfeed their infants (Lipsman et al, 1985). This study also found that mean dietary intakes met or exceeded the American RDAs.

It has been shown among New Zealand women who are breastfeeding that women aged thirty and over have higher energy and nutrient intakes than those aged under thirty, significantly so for fibre, iron, zinc, vitamin A and thiamin. This suggests that the younger women may be at a greater risk of having some inadequate intakes (Todd and Parnell, 1994a).

It is important for adolescents who are breastfeeding to have adequate energy intakes to maintain their own growth and the growth of their infants. It is especially important that they consume adequate calcium, as studies have shown that bone mineral content is decreased in breastfeeding adolescents with inadequate calcium intakes (Chan et al, 1987).

Additional requirements could be met by an increased intake of nutrient dense foods.

Vegetarian/Vegan Women who are Breastfeeding

Few studies have been conducted examining vegetarian women who are breastfeeding. American data suggest that dietary intakes are adequate to meet the American Recommended Dietary Allowances (RDA) (Appendix 5); although protein intakes do tend to be lower than in omnivorous breastfeeding women, they still exceed the RDA (Finley et al, 1985b).

Vegan diets may be of concern in New Zealand as vitamin B_{12} intakes may not be sufficient to maintain the required levels of the vitamin in breast milk. Some women may therefore require vitamin B_{12} supplementation. They may also need to be advised on non-milk product food sources of calcium, to ensure adequate intakes.

Vegan or vegetarian women who have little exposure to sunlight may require vitamin D supplementation, but this should only be implemented under medical supervision.

Providing vegetarian women are consuming well balanced diets, they are likely to have adequate intakes to maintain infant and maternal health. Further research is necessary on the diets of New Zealand vegetarian women who are breastfeeding, until this is completed health professionals should be aware of the potential risks of the avoidance of animal and milk products.
Ethnic Groups of Women who are Breastfeeding

There are no data available on the intakes of non-European women who are breastfeeding in New Zealand. The LINZ survey indicated that there are differences in food consumption patterns between the New Zealand Maori population of non-pregnant non-breastfeeding women and other New Zealanders (Horwath et al, 1991). It remains to be determined whether these patterns may continue during breastfeeding, and if so, whether they may have any significant effects on nutrient intakes. Pacific Islands people may also have different food patterns, as may other ethnic groups in New Zealand.

Health professionals should be aware that dietary habits may differ among these sub-groups of the population, and attempt to ascertain whether these patterns may lead to the risk of inadequate intakes of some nutrients.

Toxic Metal Contamination of Foods and Breast Milk

Although cadmium may have some serious health effects such as kidney failure, there are few foods in New Zealand containing significant levels of cadmium. It is recommended that breastfeeding women limit their consumption of oysters to prevent any adverse effects on the mother or infant.

Mercury levels in foods are variable, and infants are much more sensitive than adults and are therefore at a particular risk of toxic intakes. It is therefore recommended that women who are breastfeeding avoid excessive quantities of old large fish such as tuna and shark, and also fish taken from waters downstream from geothermal or volcanic activity. Trout and other fresh water species (like eels) from geothermal lakes and rivers also need to be included in this limitation (ESR Health and Ministry of Health, 1994).
References


Appendix 1

WHO and UNICEF Statement on the Ten Steps to Successful Breastfeeding

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within half an hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming-in – allow mothers and infants to remain together – 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Appendix 2

Summary of the World Health Organization

The Aim of the Code (Article 1) is to contribute to the provision of safe and adequate nutrition for infants, by the protection and promotion of breastfeeding, and by ensuring the proper use of breastmilk substitutes, when these are necessary, on the basis of adequate information and through appropriate marketing and distribution.

A summary of the Code is as follows:

1. No advertising of these products to the public.
2. No free samples of these products are to be supplied to the public.
3. No promotion of these products in health care facilities, including no free or subsidised supplies to these facilities.
4. No infant formula or equipment manufacturing companies to directly advise mothers.
5. No gifts or personal samples are to be provided to health care workers.
6. No words or pictures idealising artificial feeding, including pictures of infants, on the labels of the products.
7. Information to health care workers from manufacturers should be scientific and factual.
8. All information on artificial feeding, including labels, should explain the benefits of breastfeeding and the costs.
9. Unsuitable products, (such as sweetened condensed milk or ordinary milk powder), should not be promoted for babies.
10. All products should be of a high quality and take account of the climatic and storage conditions of the countries where they are used.

Appendix 3

Recommended Nutrient Intakes for Breastfeeding Women (Australian RDI)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Recommended Nutrient Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (MJ/d*)</td>
<td>10.5-11.0</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>61</td>
</tr>
<tr>
<td>Dietary fibre (g)</td>
<td>25-30</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>920-2,300</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>340</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>1,950-5,460</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>1,200</td>
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<tr>
<td>Iron (mg)</td>
<td>12-16</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>18</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>85</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>0.7</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>1.7</td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>17-19</td>
</tr>
<tr>
<td>Vitamin B₆ (mg)</td>
<td>1.6-2.2</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>350</td>
</tr>
<tr>
<td>Vitamin B₁₂ (µg)</td>
<td>2.5</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>60</td>
</tr>
<tr>
<td>Total Vitamin A (µg)</td>
<td>1,200</td>
</tr>
<tr>
<td>Alpha-tocopherol (mg)</td>
<td>9.5</td>
</tr>
</tbody>
</table>

*Based on mean RDI for non-pregnant, non-breastfeeding women, plus 2.4 MJ/d required for breastfeeding.

### Appendix 4

**Dietary Reference Values for Breastfeeding Women (British DRV)**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Reference Nutrient Intake</th>
<th>0-4 Months Postpartum</th>
<th>4 Months Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (MJ/d*)</td>
<td></td>
<td>10.3</td>
<td>10.1</td>
</tr>
<tr>
<td>Protein (g)</td>
<td></td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td></td>
<td>1,600</td>
<td>1,600</td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td></td>
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<td>320</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td></td>
<td>3,500</td>
<td>3,500</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td></td>
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<td>1,250</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td></td>
<td>14.8</td>
<td>14.8</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td></td>
<td>13</td>
<td>9.5</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td></td>
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<td>75</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td></td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td></td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td></td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Vitamin B₆ (mg)</td>
<td></td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td></td>
<td>260</td>
<td>260</td>
</tr>
<tr>
<td>Vitamin B₁₂ (µg)</td>
<td></td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td></td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Total Vitamin A (µg)</td>
<td></td>
<td>950</td>
<td>950</td>
</tr>
</tbody>
</table>

* Mean additional requirement for breastfeeding plus requirement for non-pregnant, non-breastfeeding females aged 19-50 years.

## Recommended Dietary Allowances for Breastfeeding Women (US RDA)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Recommended Dietary Allowance</th>
<th>0-6 Months Postpartum</th>
<th>6-12 Months Postpartum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (MJ/d*)</td>
<td>+2.095</td>
<td>+2.095</td>
<td></td>
</tr>
<tr>
<td>Protein (g)</td>
<td>65</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Magnesium (mg)</td>
<td>355</td>
<td>310</td>
<td></td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>1,200</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>19</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>75</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>1.6</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>1.8</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Vitamin B₆ (mg)</td>
<td>2.1</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>280</td>
<td>260</td>
<td></td>
</tr>
<tr>
<td>Vitamin B₁₂ (µg)</td>
<td>2.6</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>95</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Vitamin A (µg) RE</td>
<td>1,300</td>
<td>1,200</td>
<td></td>
</tr>
<tr>
<td>Alpha-tocopherol (mg)</td>
<td>12</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Vitamin D (µg)</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

* Additional energy requirement for breastfeeding.

Appendix 6

Breastfeeding: Sample Diet

This three day meal plan has been analysed for major nutrients and meets the needs of a healthy breastfeeding female doing light to moderate exercise.

The purpose of the meal plan is to determine serving recommendations for the guideline and is not intended to be used as a dietary regime for individuals.

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakfast</strong></td>
<td><strong>Breakfast</strong></td>
<td><strong>Breakfast</strong></td>
</tr>
<tr>
<td>Muesli, non toasted</td>
<td>Wholemeal toast</td>
<td>Sultanas (1 tablespoon)</td>
</tr>
<tr>
<td>Trim milk (125ml)</td>
<td>(2 slices)</td>
<td>Weetbix (2)</td>
</tr>
<tr>
<td>Stewed apple</td>
<td>Margarine (2 teaspoons)</td>
<td>Fruit yoghurt (1 pottle)</td>
</tr>
<tr>
<td>Wholemeal toast (2 slices)</td>
<td>Poached egg (1)</td>
<td>Trim milk (125ml)</td>
</tr>
<tr>
<td>Margarine (2 teaspoons)</td>
<td>Marmite (1 teaspoon)</td>
<td>Wholemeal toast (1 slice)</td>
</tr>
<tr>
<td>Marmite (1 teaspoon)</td>
<td>Trim milk (250ml)</td>
<td>Marmalade (1 teaspoon)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Apple and orange juice (250ml)</td>
</tr>
<tr>
<td>Mid morning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digestive biscuits (2)</td>
<td>Fruitcake (1 slice) (40g)</td>
<td>Small coffee</td>
</tr>
<tr>
<td>Hot trim milk (250ml)</td>
<td>Glass of water</td>
<td>Trim milk (20ml)</td>
</tr>
<tr>
<td>Milo (1 teaspoon)</td>
<td>Small coffee</td>
<td>Currant bun (1)</td>
</tr>
<tr>
<td></td>
<td>Trim milk (20ml)</td>
<td></td>
</tr>
<tr>
<td><strong>Lunch</strong></td>
<td><strong>Lunch</strong></td>
<td><strong>Lunch</strong></td>
</tr>
<tr>
<td>Mushroom soup (1 cup)</td>
<td>Wholemeal bread (4 slices)</td>
<td>Macaroni cheese (200g)</td>
</tr>
<tr>
<td>Cheese toasties</td>
<td>Margarine (2 teaspoons)</td>
<td>Lettuce (2 leaves)</td>
</tr>
<tr>
<td>Cheese (2 slices) (40g)</td>
<td>Roast beef (2 slices) (90g)</td>
<td>Tomato (1)</td>
</tr>
<tr>
<td>Wholemeal toast (2 slices)</td>
<td>Coleslaw (1/2 cup)</td>
<td>Spring onion (1)</td>
</tr>
<tr>
<td>Apple and orange juice (200 ml)</td>
<td>Fruit yoghurt</td>
<td>Celery</td>
</tr>
<tr>
<td></td>
<td>Glass of water</td>
<td>Beetroot (1/2 cup)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vinaigrette</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Glass of water</td>
</tr>
<tr>
<td><strong>Mid-afternoon</strong></td>
<td><strong>Mid-afternoon</strong></td>
<td><strong>Mid-afternoon</strong></td>
</tr>
<tr>
<td>Water crackers (4)</td>
<td>Water crackers (3)</td>
<td>Tea</td>
</tr>
<tr>
<td>Pate (1 slice) (28g)</td>
<td>Cheese (1 slice) (20g)</td>
<td>Trim milk (20ml)</td>
</tr>
<tr>
<td>Tomato (4 slices)</td>
<td>Apple (1)</td>
<td>Orange (1)</td>
</tr>
<tr>
<td>Small coffee</td>
<td>Tea</td>
<td>Plain biscuits (2)</td>
</tr>
<tr>
<td>Trim milk (20ml)</td>
<td>Trim milk (20ml)</td>
<td>Glass of water</td>
</tr>
</tbody>
</table>

Food and Nutrition Guidelines for Healthy Breastfeeding Women - A Background Paper
<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dinner</td>
<td>Beef stew (3/4 cup)</td>
<td>Fish pie (220g)</td>
<td>Chicken, no skin (160g)</td>
</tr>
<tr>
<td></td>
<td>White rice (1 cup)</td>
<td>Peas (1/2 cup)</td>
<td>Kumara, baked (1 piece)</td>
</tr>
<tr>
<td></td>
<td>Broccoli (1/2 cup)</td>
<td>Pumpkin (1/2 cup)</td>
<td>Green beans (1/2 cup)</td>
</tr>
<tr>
<td></td>
<td>Carrots (1/2 cup)</td>
<td>Wholegrain breadroll</td>
<td>Carrots (1/2 cup)</td>
</tr>
<tr>
<td></td>
<td>Fresh fruit salad (1 bowl)</td>
<td>Small coffee</td>
<td>Apple crumble (1/2 cup)</td>
</tr>
<tr>
<td></td>
<td>Ice cream (1 scoop) (70g)</td>
<td>Trim milk (20 ml)</td>
<td>Custard (100ml)</td>
</tr>
<tr>
<td></td>
<td>Small coffee</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trim milk (20 ml)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supper</td>
<td>Wholemeal bread (1 slice)</td>
<td>Trim milk (250 ml)</td>
<td>Hot trim milk (250 ml)</td>
</tr>
<tr>
<td></td>
<td>Cottage cheese (1 tablespoon)</td>
<td>Shortbread (1)</td>
<td>Milo (1 teaspoon)</td>
</tr>
<tr>
<td></td>
<td>Bean sprouts</td>
<td></td>
<td>Wholemeal bread (1 slice)</td>
</tr>
<tr>
<td></td>
<td>Trim milk (200ml)</td>
<td></td>
<td>Tomato (1)</td>
</tr>
</tbody>
</table>

**Nutritional Analysis of Sample Diet**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Average Daily Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>- KiloJoules</td>
<td>9,580</td>
</tr>
<tr>
<td>- KiloCalories</td>
<td>2,290</td>
</tr>
<tr>
<td>Total fat</td>
<td></td>
</tr>
<tr>
<td>- grams</td>
<td>75 (29%)</td>
</tr>
<tr>
<td>Saturated fat</td>
<td></td>
</tr>
<tr>
<td>- grams</td>
<td>29</td>
</tr>
<tr>
<td>Dietary fibre</td>
<td></td>
</tr>
<tr>
<td>- grams</td>
<td>29</td>
</tr>
<tr>
<td>Calcium</td>
<td></td>
</tr>
<tr>
<td>- milligrams</td>
<td>1,640</td>
</tr>
<tr>
<td>Iron</td>
<td></td>
</tr>
<tr>
<td>- milligrams</td>
<td>16.5</td>
</tr>
</tbody>
</table>
Look after yourself by eating well and resting often.

By choosing to breastfeed, you are providing your baby with the ideal food - it is warm, clean, safe, nutritious and cheap.

Breastfeeding gets easier with practice.

• Breastfeed soon after birth
• Learn how to breastfeed
• Breastfeed to your baby’s demand
• Be patient while you both learn
• Ask for help if you have a question or need some support.

It is recommended that your baby is only fed on breast milk for the first four to six months of his or her life.

While breastfeeding, continue to follow these guidelines.

Some women will have special nutritional needs. Ask your doctor or midwife to arrange for you to see a dietitian.

It is best to seek advice if you:
• find that certain foods you eat are affecting your baby
• have a medical condition affecting your eating, such as diabetes
• are a vegetarian or vegan
• are an adolescent mother (18 years or younger).

Eat a variety of foods
Choose a variety of food from the four food groups each day.

Vegetables and Fruits
• Eat plenty of vegetables and fruits.
• Vegetables and fruits provide carbohydrates (sugar and starch), fibre, vitamins and minerals, and are low in fat.
• Enjoy fresh, canned, or frozen vegetables, and fruits which are raw or lightly cooked.

Choose at least three servings of vegetables and two servings of fruit each day.

Serving size samples
• 1 medium potato, kumara or similar sized root vegetable such as taro or yam (135g)
• 1/2 cup cooked vegetables, eg, puha, watercress, parengo (go easy on butter or margarine) or corn (50-80g)
• 1/2 cup salad (60g)
• 1 tomato (80g).
• 1 apple, pear, banana, or orange (130g)
• 2 small apricots or plums (100g)
• 1/2 cup fresh fruit salad (120g)
• 1/2 cup stewed fruit (135g)
• 1 cup fruit juice (250ml).
**Breads and Cereals**

- Eat plenty of breads and cereals - including rice, pasta, breakfast cereals and other grain products.
- These provide carbohydrates, fibre and other nutrients.
- Choose wholemeal and wholegrain varieties which provide extra fibre (to help prevent constipation), B vitamins and minerals.

Choose at least seven servings of breads and cereals each day.

*Serving size samples*
- 1 roll (50g)
- 1 muffin (80g)
- 1 medium slice of rewa bread
- 1 medium slice of bread (26g)
- 2 cups cornflakes (30g)
- 1/2 cup muesli (55g)
- 1/2 cup cooked cereal (130g)
- 1 cup cooked pasta (150g)
- 1 cup cassava or tapioca (150g)
- 2 plain sweet biscuits (14g).

**Milk and Milk Products**

- Breastfeeding women need protein and calcium.
- Choose reduced (light-blue top) or low fat (green top) milk, yoghurt and cheese.
- If you are drinking soy milk, choose one which is fortified (check the label).
- Other foods such as tofu, cooked soy beans, canned salmon, tuna, green vegetables and bread contain calcium, but in lower amounts.

Choose at least three servings of milk or milk products, preferably reduced or low fat, each day.

Milk and milk products provide New Zealanders with most of their calcium. If you do not eat these foods or eat very little of them, it is best to see your doctor, midwife or Plunket nurse about taking a calcium supplement.

*Serving Size Samples*
- 1 glass milk (250ml)
- 1 bottle yoghurt (150g)
- 2 slices cheese (40g)
- 2 scoops ice cream (140g).

**Lean Meats, Chicken, Seafood, Eggs, Cooked Dried Beans, Peas and Lentils**

These give you protein, iron, zinc and other nutrients.
- Choose lean meats, chicken and seafood.
- Iron in lean meats, chicken and seafood is well absorbed. Cooked dried beans, peas and lentils also contain iron but this is not so well used.
- Include foods rich in Vitamin C with your meals to help absorb iron. Fresh fruits and vegetables, especially oranges, kiwifruit, tomatoes and broccoli are rich sources of Vitamin C.

Choose at least two servings from this group each day.
Serving Size Samples

• 2 slices cooked meat (approx 100g)
• 3/4 cup mince or casserole (195g)
• 1 egg (50g)
• 1 medium fillet of fish - cooked (100g)
• 1 medium steak (120g)
• 3/4 cup dried, cooked beans (135g)
• 2 drumsticks or 1 chicken leg (110g)
• 1 medium paua (120g)
• 3 medium mussels (30g).

Aim for a healthy weight

Breastfeeding can help you return to your pre-pregnancy weight.

Dieting is not recommended.

A slow weight loss over the time of breastfeeding is best.

Your body needs more energy (kilojoules or calories) when you are breastfeeding so your appetite will increase.

• Choose foods from the four food groups for your extra energy needs.
• Eat according to your appetite.
• Eat regularly, starting the day with breakfast.
• Include snacks from the four food groups.

Snack ideas:

• Sandwiches - peanut butter, banana, vegemite, cheese, cottage cheese, baked beans or jam.
  Spread margarine or butter thinly or only on one side of the bread.
  Use bread rolls, rewena bread, crackers, rice cakes, crumpets, pita bread, muffins and baked bread fingers as well as bread.
• Vegetable sticks - keep these in the fridge. Serve with cottage cheese or peanut butter.
• Fresh fruit - bananas, oranges, canned, unsweetened pineapple or peaches.
• Frozen fruit - bananas, oranges, canned, unsweetened pineapple or peaches.
• Dried fruit - raisins, dates, sultanas.
• Cereals - choose cereals low in fat and sugar, for example, porridge, untoasted muesli, cornflakes, branflakes and weetbix.
• Popcorn - pop using a little oil, margarine or butter or use a microwave. Go easy on salt.
• Yoghurt, cubes of cheese or milk.

Take time out for yourself

It is important to get the rest you need and to eat well. Being tired or stressed can delay your milk letdown.

If breastfeeding is not going well, easily or pleasurably, seek skilled assistance sooner rather than later. Ask your midwife, Plunket nurse, general practitioner, La Leche League or a lactation consultant.

Most new mothers feel tired for the first few months and benefit from the support of others.

• Try resting while your baby sleeps during the day.
• Rest when your body tells you it is tired.
• Ask friends, family, your local community or church group for support.
• Your doctor, Plunket nurse or community health worker from marae-based clinics are there to help.
Talking about how you feel and sharing jobs with other people can make all the difference. Whanau/family and friends can help by bringing meals, helping with cleaning and washing and by watching your baby and other children so you can have a break.

If you need to leave your baby, you can express milk so others can feed the baby.

Regular, moderate exercise is recommended. Going for a walk provides exercise, fresh air and a time to relax.

Choose activities that match your level of energy and fitness. A physiotherapist can show you exercises that will help to restrengthen your stomach, back and pelvic floor muscles.

**Choose and prepare foods low in fat, sugar and salt**
The best way to meet your extra needs is to choose foods from the four food groups.

When shopping, read labels and look for foods that are lower in fat, sugar and salt.

You can prepare foods low in fat; sugar and salt:
- Spread margarine and butter thinly.
- Choose lean meats, trim off the fat, skim fat off stews, remove skin from chicken and eat more grilled, boiled or steamed fish. Change water regularly when cooking mutton birds.
- Grill, steam, microwave, boil or bake foods without adding fat, as often as possible.
- Eat meals without adding extra salt.

Many fast foods, takeaways and snacks are high in fat, salt and/or sugar, for example, chocolate bars, muesli bars, potato chips, french fries, doughnuts, pies, sweets, fruit leathers, cordials and soft drinks. Save these foods for treats and eat only occasionally.

**Drink plenty of fluids every day**
- Use your thirst as a guide. You will need at least 6-8 glasses each day.
- Extra fluid may be needed during hot weather or after activity.
- Water, reduced (light-blue top) or low fat (green top) milk, diluted fruit juice, or fresh coconut juice are the best choices.
- Coffee, tea and cola drinks contain caffeine. Herbal teas may contain caffeine or other substances which cause side effects. Have no more than three cups of any of these drinks each day.
- Tea should not be drunk with meals. The tannins in tea mean you will not absorb the iron in the meal as well as you could.
- Go easy on soft drinks, cordials and diet drinks as these provide limited nutrients.

**Alcohol is not recommended**
- Alcohol passes quickly into the breast milk and can affect your baby. An occasional glass of alcohol is probably OK but the full effects are unknown.
- Having too much alcohol can affect your ability to care for your baby.

**Smokefree is recommended**
- Some people think smoking is an easy way to lose weight. This is not true.
- Smoking can reduce the amount of milk you make.

If you choose to smoke, don’t do it while breastfeeding and never smoke in the same room as your baby.
Allergies
Some substances from food may pass into breast milk but it is not clearly established that these cause allergies in the baby.

Allergies may be caused by food or other factors. Sometimes reducing the quantity of a particular food is helpful.

If you suspect that some food you are eating is affecting your baby, seek professional advice.

Colic
True colic can be described as inconsolable crying in an otherwise healthy baby. Colic seems to have more than one cause.

A crying baby may have an illness. Visit your doctor or Plunket nurse for a check-up.

Cutting out some foods may not eliminate the colic and you may be cutting out foods that you and your baby need.

Colic may be related to a feeding problem - it may help to have breastfeeding assessed so seek assistance from a lactation consultant, midwife, general practitioner or Plunket nurse.

Supplements
Using vitamin and mineral supplements will not give you extra energy. By choosing a variety of foods from the four food groups, supplements will not be necessary.

If you are taking supplements always make sure your doctor or midwife knows. It is best to only take supplements when recommended by your doctor, midwife or a dietitian.

If your doctor, midwife or Plunket nurse recommends you make changes to your food choices they may suggest assistance from a dietitian to make sure your needs and baby's needs are still being met.

For more information
Contact:
- doctor
- midwife
- dietitian: hospital, community or private practice dietitian (ask your doctor or midwife) or look in the Yellow Pages
- Plunket nurse - Plunket-Karitane Family Centres
- Plunket Help-Line, 0800-10 10 67, 4pm-1am
- Pacific Islands health workers
- La Leche League for breastfeeding support and information
- lactation consultant
- doctor's nurse (practice nurse)
- marae-based health services, Tipu Ora, Ngā Ūkaipō
- Maori health workers
- community health centre
- Parents Centres New Zealand
- local maternity hospital.
Recommended reading


Food and nutrition guidelines for healthy breast...