

Key nutrients in the Early Years

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Children grow and develop constantly and therefore need plenty of energy and other nutrients to ensure they grow and develop normally and to support periods of rapid growth in muscles and bone tissues and in the development of the brain. Children also need plenty of energy to be active. Most of their energy is derived from fat and carbohydrate. Unfortunately, the main dietary related problems in the UK in the under-5 are obesity, dental caries, iron deficiency and anaemia. It is therefore important to expose the under-5 in childcare to the best nutrition whilst guiding them towards healthy eating in a fun way. It is well recognised that during early ages that lifelong eating habits are established.

For the purpose of this project the three main macronutrients (nutrients which we need a lot of): protein, carbohydrates and fat, will not be discussed in detail. All menus and recipes analysed will contain information about the carbohydrate, fat and protein content and will be measured against the standards. See comments about sugar on page 10.

The body requires micronutrients in much smaller quantities. The micronutrients are vitamins and minerals.

Key nutrients and their main functions	
<i>Macronutrients</i>	<i>Function</i>
Protein	Growth and repair
Fibre	digestion, aids regular bowel movements, regulates blood sugar
<i>Micronutrients</i>	<i>Function</i>
Vitamin A	Fighting infections, growth, vision
B Vitamins	Brain and use of energy
Vitamin C	Growth and repair and healing
Vitamin D	Healthy bone development
Calcium	Bones and muscles
Iron	Prevents anaemia
Zinc	Normal functioning, healing

For the purpose of this project, specific vitamins and minerals will be discussed which have been proven by recent National Surveys for the under-5's to have intakes below the Reference Nutrient Intakes – iron, zinc, vitamin D, vitamin C and vitamin A.

This does not mean that the other vitamins and minerals are less important, but are currently not associated with deficiencies in the UK.

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Iron

Iron is essential for the function of several body systems and particularly as part of the pigment in red blood cells called haemoglobin, which carries oxygen. A deficiency in iron can cause anaemia. Children with iron deficiency will be pale and tired and their general health, resistance to infection, appetite and vitality will be impaired. Sometimes there are not apparent symptoms and iron deficiency may be undetected. A recent survey shows that up to 1 in every 8 preschool children may have iron deficiency and 84% of children in Britain have intakes below the recommended requirements. The incidence of iron deficiency is known to be greater among children from ethnic minority groups.

For this reason iron is a very important mineral and stresses the point that intakes of iron in the diet of children in childcare should be enhanced to provide not less than 80% of the Reference Nutrient Intake. It is important that children receive the bulk of their iron from their meals. Drinks and snacks are generally low in iron.

How much iron do children need?

Reference Nutrient Intakes for iron	
Children aged 1-3 years	6.9mg per day
Children aged 4-6 years	6.1mg per day

Compared to their bodyweight, children have high iron requirements because of rapid growth and development.

Which children may be at risk?

- Over dependence on milk puts toddlers at risk of iron deficiency, especially where children do not have good intakes of foods that are rich in iron. Always offer milk drinks after meals, rather than during meals, as milk is a filling.
- Faddy and fussy eaters who have a selective diet and a poor intake may be at risk
- Vegetarians and vegans. Children who do not eat meat or fish require a diet of variety containing foods such as cereal foods, pulses, vegetables and fruit. See more vegetarian meal ideas on page 43.
- Infants under a year who are taking cow's milk as a main drink. Although very nutritious, cow's milk is a poor source of iron. All infant formulas are fortified with iron. Breast milk and infant formulas are the only suitable drinks for infants below a year. Infants have sufficient iron stores up to 6 months. From 6 months infants require additional iron, which breast milk or infant formula alone cannot provide, it is therefore important that all healthy infants are introduced to solid foods and are established on a variety of foods, including iron rich foods.

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Sources of iron

There are two forms of iron in foods:

- haem iron, which is found in foods of animal origin such as meat and meat products and oily fish
- non-haem iron, which is found in foods of plant origin such as cereals and vegetables.

Haem iron is found in foods of animal origin such as beef, lamb, chicken and turkey liver (liver is a rich source of vitamin A, which can be harmful in large amounts). It is recommended that these foods are given to children no more than once a week), and in some fish such as sardines and tuna. Haem iron is absorbed into the body more easily than non-haem iron.

Non-haem iron is found in foods of plant origin including cereal foods like bread, pulses such as peas, beans and lentils, dried fruits and green vegetables. It is also found in fortified breakfast cereals and can be identified on labels of cereal packets. The absorption of non-haem iron may be enhanced if foods or drinks rich in vitamin C are consumed at the same time e.g. vegetables and fruit.

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**Table 7: Haem and non-haem sources of iron
(portions sizes appropriate for children)**

Haem-sources of iron	Iron (mg)
125g can sardines in tomato sauce	5.8
40g liver pate	2.8
50g of raw extra-lean minced meat	0.7
1 boiled egg	1.1
1 slice of least roast beef	1.1
1grilled sausage	0.5
1 slice of roast lamb	0.7
½ salmon steak (50g)	0.4
50g roast turkey drumsticks	0.7
50g roast chicken, dark meat	0.5
50g roast chicken, white meat	0.2
Non-haem and fortified sources of iron	Iron (mg)
75g baked beans in tomato sauce	0.95
20g Cornflakes	1.6
20g Rice Krispies	1.6
20g uncooked Ready Brek	2.38
1 slice wholemeal bread	0.8
1 slice white bread	0.6
2 spears broccoli	0.9
75g tinned chickpeas	0.7
50g kidney beans	0.45
50g cabbage	0.3
50g steamed spinach	0.7
150ml glass Cow's milk	0.045

There are various other good sources of iron, such as nuts, seeds and liver. Various iron-fortified cereals are available with high iron contents such as All Bran and Bran Flakes, but these are unsuitable for the under-5s due to their high fibre, sugar and salt content.

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Calcium

Calcium is required for building and maintaining healthy bones and teeth, for the transmission of nerve impulses and muscle actions and for many other body functions.

How much calcium do children need?

Reference Nutrient Intakes for calcium	
Children aged 1-3 years	350mg per day
Children aged 4-6 years	450mg per day

About 50% of the calcium in diets of under-5's comes from milk and other dairy products. It is important to ensure that children who do not have milk or dairy products have sufficient calcium. Refer to the table below.

**Table 8: Sources of calcium
(portions sizes appropriate for pre-school children)**

Food	child's portion	Calcium (mg)
Milk (all milk)	150 ml	180
Cream - single	10-15 ml	13
Yoghurt - plain	50 ml	100
Yoghurt – fruit/flavoured	50 ml	80
Fromage frais	50 m- 60 ml	60
Ice cream	50 ml	70
Cheddar-type cheese	25g	210
Cheese spread	15g - teaspoon	50
White bread	1 slice	30-40
Pitta Bread	Per 100 g	90
Ready Brek	30 g	20
Plain white flour	Per 100g	140
Spinach	25 g	40
Baked Beans	50 g	25
Broccoli	25 g	10
Sardines in tomato sauce	50 g	230
Haddock	50 g	55
Dried apricots	25 g	25
Currants	25 g	22

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Zinc

Zinc plays a major role in the functioning of every organ in the body. It is needed for normal metabolism of protein, fat and carbohydrate and is associated with the hormone insulin which regulates the body's energy.

Zinc is also involved in the immune system, the utilisation of vitamin A, and in wound healing.

How much zinc do children need?

Reference Nutrient Intakes for zinc	
Children aged 1-3 years	5mg per day
Children aged 4-6 years	6.5mg per day

Lower intakes of zinc than the recommended amounts are frequently reported among children. In a recent national study of 1½ and 4½ year olds, more than 70% of children had intakes below the Reference Nutrient Intake.

A third of zinc in the diets of the under-5's is provided by milk and other milk products. Cereals and cereal products and another quarter from meat and meat products provide a quarter. As children grow older and their milk intakes decline, the intake of zinc goes down. It is therefore vital to ensure a good zinc intake by providing regular meat and meat dishes or, for those not eating meat, whole grain cereals and breakfast cereals, milk, milk products and eggs.

Dietary sources of zinc

- Meat
- Eggs
- Milk and cheese
- Whole grain cereals
- Nuts and pulses

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Vitamin D

Vitamin D is needed for healthy bones and teeth. Prolonged deficiency in children results in rickets (the main signs of which are skeletal malformation e.g. bowed legs) with bone pain or tenderness and muscle weakness, lethargy and irritability.

The main source of vitamin D is exposure of the skin to ultraviolet radiation in summer sunlight. Infants and children aged between 6 months and 3 years are particularly vulnerable to vitamin D depletion because of their rapid bone growth and the limited exposure some may have to UV radiation.

Vitamin D is present in a limited number of foods and it is thus difficult for young children to obtain satisfactory vitamin D intakes from diet alone.

The recommendation for infants and children aged between 7 months and 3 years is 7 micrograms of vitamin D per day.

Under-5's of Asian origin are more likely to have, lower vitamin D status and a resurgence of rickets has been reported in many cities in the UK.

Dietary sources of Vitamin D

Only a few foods are good sources of vitamin D:

- Oily fish such as tuna, salmon and pilchards
- Fortified foods such as margarine, many fat spreads and breakfast cereals

Infant formula also contains vitamin D. The main dietary sources of vitamin D among children aged 1½ -4½ are fat spreads and fortified breakfast cereals.

Vitamin and mineral drops

The department of Health recommends a supplement of vitamins A and D for:

- Breast fed infants from 6 months (or from 1 month if there is any doubt about the mother's nutritional status during pregnancy)
- Formula fed infants over 6 months when they are taking <500 ml/day formula
- Children under 5 years who may be at risk e.g. picky eaters and children from Asian, African and Middle Eastern origin.

The recommendation is particularly important for infants at risk of low vitamin D status and includes those living in northern areas or the UK, and children from Asian, African and Middle Eastern origin.

The drops contain vitamin A, C and D and are available free for infants and families on low income under the Healthy Start scheme. The drops can also be bought from local health centres.

The availability and the distribution areas of the drops in the local area should be promoted and advertised in the children's centre.

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Vitamin C

Vitamin C has an important role in preventing disease and maintaining good health. The body uses vitamin C to produce collagen, which is the foundation material for bones, teeth, skin and tendons. It is also vital in wound healing. Vitamin C also acts as an antioxidant that prevents damage to cells and tissues. Vitamin C also improves the absorption of iron in the diet, it is thus good to have both nutrients available in the same meal.

According to a recent national study of children between 1½ and 4½, 38% of children have lower intakes of vitamin C below the Reference Nutrient Intake. Children from a lower socio-economic status often have lower vitamin C intakes, mainly due to lower intakes of fruit and vegetables, the major sources of vitamin C.

How much vitamin C do children need?

Reference Nutrient Intakes for vitamin C	
Children aged >1year	30mg per day

Sources of vitamin C:

- Fruit and fruit juices (particularly citrus fruits, blackcurrants and strawberries)
- Potatoes (including chips)
- Vegetables (especially red and green peppers and spring greens)

A good variety of vegetables and fruit will safeguard sufficient intake of vitamin C.