

What are micronutrients?

Micronutrients, as opposed to macronutrients (protein, carbohydrates and fat), are comprised of vitamins and minerals which are required in small quantities to ensure normal metabolism, growth and physical well-being.

- **Vitamins** – these are essential organic nutrients, most of which are not made in the body, or only in insufficient amounts, and are mainly obtained through food. When their intake is inadequate, vitamin deficiency disorders are the consequence. Although vitamins are only present and required in minute quantities, compared to the macronutrients, they are as vital to health and need to be considered when determining nutrition security.

Each of the 13 vitamins known today have specific functions in the body: vitamin A, provitamin A (Beta-carotene), vitamin B₁, vitamin B₂, vitamin B₆, vitamin B₁₂, biotin, vitamin C, vitamin D, vitamin E, folic acid, vitamin K, niacin and pantothenic acid.

- **Minerals** – these are inorganic nutrients that also play a key role in ensuring health and well-being. They include the trace elements copper, iodine, iron, manganese, selenium and zinc together with the macro elements calcium, magnesium, potassium and sodium. As with vitamins, minerals they are found in small quantities within the body and they are obtained from a wide variety of foods.

No single food contains all of the vitamins and minerals we need and, therefore, a balanced and varied diet is necessary for an adequate intake.

Of course, we already know a huge amount about how these work, and the importance they have in normal human growth and development. Based on this, an Expert Panel of nutritionist, NGOs and development agencies indentified five micronutrients such as those below in their priority group:

- **Vitamin A** – this vital micronutrient is found in a range of different foods including carrots, spinach, broccoli, milk, egg, liver and fish. It plays an essential role in vision (lack of Vitamin A is a common cause of blindness), reproduction and growth, and the functioning of a healthy immune system (it plays a key role in the development of white blood cells).

Worldwide about 5 million children under the age of five are affected by xerophthalmia, a serious eye disorder caused by vitamin A deficiency. These children are at risk of becoming blind and are more likely to die of common childhood diseases.

- **Folate (folic acid)** – this is a generic term for a group of B vitamins including folic acid and naturally occurring folates. Folic acid is a synthetic folate compound used in vitamin supplements and fortified food because of its increased stability. Folates are found in egg, dairy products, asparagus, orange juice, dark green leafy vegetables, beans and brown bread, and they play a key role in the metabolism of amino acids and the production of proteins, the synthesis of nucleic acid (the molecules that carry genetic information in the cells), and the formation of blood cells.

Women who suffer from folate deficiency prior to and during pregnancy, have an increased risk of giving birth prematurely to children, with a lower birth weight and malformations of the brain and spinal cord, together with other birth defects such cleft lip and palate, certain heart defects and limb malformations.

- **Iodine** – Some 2 billion people worldwide (both in developing and developed countries) have an insufficient iodine intake. Iodine is an element found in soil and water and as its concentration is variable, so in turn is the iodine concentration of foods - both plant and animal. Seaweed and fish are rich sources but in many countries the addition of iodine (known as iodization) to salt is an important source. In fact the greatest progress in food fortification has been salt iodization and between 1993 and 2007, the number of countries where iodine deficiency was a public health concern was reduced by more than half. In 1990 less than 20% of households in the developing world were consuming iodized salt, today that figure has increased to 70% and 34 developing countries have achieved universal salt iodization and 38 countries are 'on track'. The iodine success story illustrates how when there is government commitment, market opportunity and social responsibility, there can be improved health.

Iodine is one of the most important elements required by the developing foetus due to its effect on brain development. Iodine also serves a number of other important functions especially in the production of hormones. Although goitre is a visible sign of severe iodine deficiency and has been known since the early 20th Century, the negative impact of deficiency on cognitive development has only recently been made and iodine deficiency is now recognised as the primary cause of mental retardation in the world. Sadly some 38 million children are born every year unprotected against the risk of iodine deficiency. In communities where iodine intake is sufficient, average IQ is shown to be on average 13 points higher than in iodine deficient communities.

- **Iron** – Iron has a number of key functions within the body. It acts as a carrier for oxygen from the lungs to the body's tissues – it does so in the form of hemoglobin – and it is also integral to the working of various tissues through the role that it plays in enzymatic reactions. Iron deficiency ultimately leads to iron deficiency anemia, the most common cause of anemia, a condition in which the blood lacks healthy red blood cells required to carry oxygen, and which results in morbidity and death.

Iron deficiency is the most widespread health problem in the world, impairing normal mental development in 40-60% of infants in the developing world, debilitating the health and energies of 500 million women, and leading to more than 115,000 deaths during childbirth a year. In the worst affected countries it can account for lost productivity of up to 2% of GDP.

Iron-rich foods include lentils, red meat, poultry, fish, lentils, leaf vegetables and chick-peas.

- **Zinc** – is found in a range of foodstuffs including liver, eggs, nuts, cereals and seafood. The absence of zinc is associated with a number of conditions including, short stature, anemia, impaired healing of wounds, poor gonadal function, and impaired cognitive and motor function. It can also lead to appetite disorders, as well as contributing to the increased severity and incidence of diarrhea and pneumonia.

The most important effect of zinc deficiency is its impact on children's resistance to infectious diseases including the risk of infection, the recurrence of infections and the severity of infection. This is well documented in the case of diarrhoea. Zinc nutrition is therefore an important determinant of mortality in children.