IMPORTANCE OF MICRONUTRIENTS IN INFANTS AND TODDLERS

Welcome note

Infancy and toddlerhood is characterized by extremely rapid physical growth as well as physiological, immunological and mental development. The quality of nutrition in the first 1000 days can greatly impact a child’s ability to grow and learn. The health and well-being of children depend upon the interaction between their genetic potential and exogenous factors such as adequacy of food intake, safety of the environment, social interaction and stimulation\(^1\). Almost two-thirds of the deaths of children around the world are directly or indirectly associated with nutritional deficiencies\(^2\). Both proteins-energy malnutrition and micronutrient deficiencies increase the risk of death from common diseases such as acute gastroenteritis, pneumonia and measles\(^2\).

It is our hope that you will find this article, Written by Patience Chimah, insightful and relevant to your practice. Please write to us at nutrinews@danone.co.ke with your feedback.

Have a splendid month!
Nutrinews desk

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Introduction
Micronutrients can be defined as nutrients that are only needed by the body in small amounts, which play leading roles in the production of enzymes, hormones and other substances, helping to regulate growth activity, development and the functioning of the immune and reproductive systems. Micronutrients of known public health importance include the following: zinc, iodine, iron, selenium, copper, vitamins A, E, C, D, B2 B6 and folate.

Micronutrient deficiencies are often referred to as “Hidden Hunger” because they develop gradually over time, their devastating impact not seen until irreversible damage has been done. Millions of children suffer from stunted growth, cognitive delays, weakened immunity and opportunistic infections as a result of micronutrient deficiencies.

Vitamin A, iron, iodine, zinc, and folate among others profoundly affect child survival, women’s health, educational achievement, adult productivity, and overall resistance to illness. It affects over two billion people around the globe today. Maternal folate deficiency is responsible for about 150,000 birth defect annually, with neural tube defects being the second most prevalent class of birth defects in the world. Annually, 18 million babies are born mentally impaired due to maternal iodine deficiency and decreases IQ by as much as 15 points. 136,000 women and infants die per year while 1.6 million people suffer reduced productive capacity due to anemia. Iron deficiency impairs the mental development of about 40-60% of children in the developing world. Vitamin A deficiency causes 1 million premature deaths per year and is the leading cause of blindness among children. It also compromises the immune system of approximately 40-60% of developing world’s children under 5. Zinc deficiency causes the death of 450,000 children annually. Undernutrition is not just a problem of poverty. Children are undernourished in over one-fifth of even the richest households. This is not typically an issue of food access, but inadequate access to micronutrient rich food, high burden of infection and parasites, detrimental feeding and dietary practice.

In the first six months of life, infants’ nutritional requirements can be totally satisfied by breast milk. Afterwards, complementary foods need to be introduced to augment energy and nutrient intake. Complementary foods are, therefore, transitional foods consumed between the time when diet is composed exclusively of mothers’ milk and the time when it is mostly made up of family foods. Infants are particularly susceptible to nutrient deficiency for a number of reasons. Their food choices are limited and the amount of food they consume is relatively low while the demand for nutrients is high. By and large, the primary cause of under nutrition in this stage of infancy is a lack of suitable nutrient density and bioavailability of the nutrients in complementary foods.

Main micronutrients and their importance

Vitamin A: It is essential for optimal health, growth and development. Vitamin A is part of a family of fat-soluble compounds that play an important role in vision, bone growth, reproduction cell division and cell differentiation (in which a cell becomes part of the brain, muscle, lungs etc.). Its deficiency weakens immune system and increases a child’s risk of contracting and dying from infections like measles, diarrheal disease and blindness.
Vitamin A deficiency is common in developing countries. Approximately 250, 000 to 500,000 malnourished children in the developing world go blind each year from a deficiency of vitamin A. It’s also called preformed Vitamin A and is found in animal foods such as liver and whole milk and in some fortified food products i.e infant formula (Cow & Gate Nutristart and Bebelac infant formula, follow on formula & growing up milk), baby cereals i.e Cow & Gate Nutrigrow baby cereals. Pro-vitamin A carotenoids are darkly coloured pigments found in fruits and vegetables that can be converted to vitamin A.

**Iodine:** Helps prevent brain damage in children. Most children born to iodine-deficient mothers appear normal but have suffered brain damage and loss in IQ points, affecting their ability to develop to their full potential and will later have difficulty learning in school and staying in school. The deficiency of iodine can be prevented by salt iodization, consumption of foods fortified with iodine i.e infant formula (Nutristart and Bebelac infant formula, follow on formula & growing up milk). Its most devastating impacts occur during fetal development in the first few years of a child’s life. Severe iodine deficiency can lead to cretinism and birth defects as well as miscarriage and stillbirth.

**Iron:** Iron is one of the trace minerals that play a vital role in the body. The whole body contains about 4g of iron, ¾ of this is found in association with the protein, hemoglobin. In foods, iron occurs in two forms non-heme iron and heme iron. Heme iron, which makes up 40 percent of the iron in meat, poultry, and fish, is well absorbed.

Non-heme iron, 60 percent of the iron in animal tissue and all the iron in plants (fruits, vegetables, grains, nuts) is less well absorbed. Iron is essential for good health, mental and physical wellbeing. Its deficiency may cause low birth weight, infections, learning disabilities and delayed development. Infants and young children are the most adversely affected by iron deficiency because they are growing and developing at such a fast rate. If iron deficiency is not corrected, it leads to anaemia, which is the most common nutritional disorder in the world. Mothers should be encouraged to feed their infants and young children meats and foods rich in vitamin C, such as fruits, and to avoid foods and drinks that inhibit iron absorption, such as tea, during and 2 hours before and after mealtime. Traditional food practices such as germination and/or fermentation can also improve the availability of iron in the diet.

**Zinc:** Zinc is widely recognized as an essential micronutrient with a catalytic role in over 100 specific metabolic enzymes in human metabolism. It is one of the most ubiquitous of all trace elements involved in human metabolism and plays multiple roles in the perpetuation of genetic materials including transcription of DNA, translation of RNA, and ultimately in cellular division. Zinc is found in a wide range of foods; the richest sources are animal protein (meat, eggs and dairy products) shellfish, pulses, nuts and whole meal grains. Zinc is an essential element that promotes healthy immune system functioning and protects against infectious diseases. It’s observed that lesser degrees of zinc deficiency are more common now than was appreciated and the sub clinical deficiency of zinc contributes to an increased incidence and severity of common but important infections such as diarrhea and pneumonia. It fuels the production of infection fighting white blood cells and ensures the body’s cell grow and repair themselves properly.

**Vitamin D:** Vitamin D is a fat-soluble vitamin that is naturally present in very few foods, added to others, and available as a dietary supplement. It is also produced endogenously when ultraviolet rays from sunlight strike the skin and trigger vitamin D synthesis. Vitamin D promotes calcium absorption in the gut and maintains
adequate serum calcium and phosphate concentrations to enable normal mineralization of bone. Without sufficient vitamin D, bones can become thin, brittle, or misshapen. Vitamin D sufficiency prevents rickets in children\textsuperscript{14}.

**Calcium:** Very essential for bone growth as it is required for the mineralization (impregnation of the bone matrix with minerals) and Vitamin D helps in calcium utilization by the body. An adequate intake of calcium is one of a number of factors which are important for acquiring bone mass and attaining peak bone mass (PBM).

**Folate:** Folate is the B vitamin form found naturally in foods while folic acid is the synthetic B vitamin form that is used in vitamin supplement and foods can be fortified with it. The body can absorb and use the folic acid found in vitamin supplements more efficiently than it can convert the food folate into a usable form. Folate is essential in the production and maintenance of new cells. It is particularly important during periods of rapid cell division and growth such as the fetal period and infancy. Deficiency of folate increases the risk of certain serious and common birth defects, which affects the brain and spinal cord. The technical names of the two major neural tube birth defects are spinal bifida and anencephaly. Spinal bifida is the most common form of neural tube defect resulting in continued life after birth. Currently (pending the release of the Kenyan DHS 2014 results), only 2.5\% of pregnant women are supplemented for 90+ days\textsuperscript{15}. In Ethiopia (a neighbouring country to Kenya) this figure stands at 0.4\%\textsuperscript{16}. These are very low coverage figures given that almost half of the women of reproductive age in Kenya for instance, are anaemic\textsuperscript{17}.

**Vitamin E:** It promotes healthy brain and nerve development as well as proper functioning and development of eyes, skin and immune functions.

**Conclusion**

In light of the above, micronutrient malnutrition among infants and preschoolers remains a concern in many parts of the world. This because millions of children suffer from stunted growth, cognitive delays, weakened immunity and disease as a result of micronutrient deficiencies. The causes are multi factorial; nevertheless the problems can be managed by

1. Supporting women and their families to practice optimal breastfeeding and ensure timely and adequate complementary feeding.
2. Ensure that complementary foods are nutritionally well balanced and properly modified in taste, texture and consistence for easy ingestion by the infant e.g. mashing, pureeieg, blending etc
4. Involve multiple sectors including agriculture, education, transport, gender, the food industry, health and other sectors, to ensure that diverse, nutritious diets are available and accessible to all household members.

Danone Early Life Nutrition offers options to support adequate intake of micronutrients through fortification of key micronutrients in the Cow & Gate Nutri range of milks and baby cereals available in Kenya and Nigeria, Bebelac range available in Ethiopia and Sudan.

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