

Nutrition and Growth

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From a child's embryonic development in the womb to adulthood, nutrition plays a key role in physical, mental, and social growth and development. Throughout the lifespan, proper nutrition and growth are essential to living a long, healthy life. Nutrition is particularly important in the developmental period.

Because development begins at conception, maternal nutrition plays a critical role in the development and growth of the embryo. Maternal nutrition determines the intra-uterine environment in which the fetus develops. Specifically, the mother's health determines the supply of nutrients and oxygen for the fetus while in the womb. In order for the mother to provide sufficient nutrition, the mother needs to have healthy nutrition, healthy metabolism, as well as healthy body weight and composition – all of which are dependent upon the mother's development throughout her own life. With adequate nutrition available, the fetus is able to reach its full fetal development and growth potential, resulting in the birth of a healthy child.

Additionally, a well-nourished woman over the age of 18 has a higher likelihood of surviving pregnancy and childbirth, as well as a higher likelihood of her child developing healthily. However, mothers who are chronically malnourished are likely to give birth to underweight children, whose growth may be stunted. On the other hand, the over-nourishment of the fetus can also be harmful to the fetus, resulting in fetal overgrowth, or macrosomia. Any insult to fetal development can result in a fetal response that can lead to permanent changes in the structural and functional programming of the fetus. These insults to fetal development can result in lifelong disorders including Type 2 diabetes and coronary heart disease.

Once a child is born, a period of rapid growth begins, with the brain nearly doubling in size and the body nearly quadrupling in weight between birth and the age of three. This period of rapid growth is a chance to provide a child with a solid nutritional and immunological foundation. In order to maximize intellectual and physical growth throughout the first through years it is essential to provide children with a proper nutritional regimen; malnourishment during this period can result in permanent damage to intellectual and physical functioning.

The main risks for malnourishment in children are inappropriate feeding practices, poor hygiene, frequent illness, or diarrhea. Another equally dangerous but opposite threat to child development and growth is over nutrition. Over nutrition often leads to children being overweight or obese. It is not uncommon for children to have access to large quantities of food with little nutritional value. Such foods are high in energy (i.e., sugar and carbohydrates), but provides little nutritional value to a child's diet. In order to achieve a well-nourished diet, it is imperative that children are supplied with the recommended amount of various nutrient-filled foods (e.g., fruits, vegetables, grains, proteins). Although providing children with nutrient filled foods is especially important during pregnancy and the first three years of life, these practices are also important for older children and adults alike.

Proper nutrition throughout childhood, adolescence and adulthood is the key to proper growth and longevity. Child, adolescent, and adult diets commonly lack key nutrients, whose absence can cause deficiencies that may lead to serious health complications. Specific vitamins whose absence commonly cause deficiencies include vitamin D, vitamin B-12, and Iron. Vitamin D plays a critical role in the growth and strengthening of bones and teeth. The most common dietary sources of vitamin D include mushrooms, fish, eggs, cheese, and milk. In addition to these foods, sunlight has also been identified as a good source of vitamin D. Vitamin B-12 plays

an important role in the maintenance of healthy nerve and blood cells. A deficiency in vitamin B-12 has been related to nerve problems (e.g., numbness or tingling in the hands and/or feet), loss of appetite, weight loss, weakness, tiredness, and megaloblastic anemia. Nutritional sources of dietary sources of vitamin B-12 include dairy products, eggs, and fish. Iron's role in nutrition pertains to the oxygenation of red blood cells, as well as the functions of the nervous and muscular systems. For children, adolescents, and adults who are on a vegetarian diet or who are picky eaters, iron will be difficult to find in foods. Although iron is found in plants, the body is better able to absorb iron coming from meat. The best dietary sources of iron are spinach, red meat, soy beans, and cashew nuts. Iron-deficiency anemia is a common nutrition deficiency in children and adults, and should be carefully considered when planning a diet.

Further Reading

Gidding, S., Dennison, B., Birch, L., Daniels, S., Gillman, M., Lichtenstein, A., et al. (2006).

Dietary recommendations for children and adolescents: A guide for practitioners. *Pediatrics*, *117*(2), 544–559.

Martin-Gronert, M., & Ozanne, S. (2006). Maternal nutrition during pregnancy and health of the offspring. *Biochemical Society Transactions*, *34*(5), 779-782.

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