

The Role of Vegetables in Good Nutrition

“Diversifying consumption to include nutritious fruits, vegetables, and nuts can greatly enhance the quality of predominantly grain-based diets that otherwise are unable to sustain a person in good health.” Dr. Fred Bliss, University of California

Vegetables provide substantial amounts of nutrients important for human health, and are particularly important sources of micronutrients including vitamins (A, B₃, and C, and folate), minerals, (calcium, potassium, phosphorus, iron and magnesium), and dietary fiber. More recently, the recognition of nutraceuticals, specific compounds in foods that may prevent disease, has added to the value of vegetables in human diet.

Vegetables are thought of primarily as a source of nutrients, but could also be important in supplying calories. Studies using world average yields have shown that carrots produce slightly more edible calories per hectare per day than maize, potatoes, and sweet potatoes, and that cabbage and onions are comparable to wheat and rice. High yields of rice and sugarcane can produce 35 kg of dry matter per hectare per day, while New York research demonstrated that table beets, harvested for both leaves and roots, could produce 42 kg per day. Grains are much less perishable and easier to ship than vegetables, but if locally produced, vegetables can be a good source of total nutrition.

Minerals supplied by vegetables are critical for growing children, especially those with a limited diet. Calcium is an essential component of strong bones, but is also important in moving nutrients through cell walls and for proper muscle and nerve function. When calcium in the bloodstream is low, the body removes calcium from the bones to maintain these other functions. Bones then become weak, and growth and development is impaired. Phosphorus often works in combination with calcium for formation of bones, teeth and nerves, and is plentiful in vegetables. Fortunately, phosphorus is commonly found in both plant and animal foods, so deficiency is seldom a problem. Magnesium is also essential for development of bone and muscles as well as insulin secretion and absorption of vitamins and minerals. All these minerals are required in relatively large amounts.

Much smaller amounts of other nonstructural minerals supplied by fresh produce are essential for growth and development. Iron is critical for early nerve development in infants, affecting learning and behavioral development. Deficiencies also significantly affect immune function. Females have a higher iron requirement than males, so adolescent girls and pregnant and lactating women are at high risk. Vitamin C, also supplied by many vegetables, aids iron absorption, while tannins found in some grains, edible bark, and other plant materials inhibit absorption. Electrolytes like sodium and potassium regulate fluid balance in the body and maintain efficient nerve function. Other minerals, including zinc, manganese and copper, are required in very small amounts. However, they are essential for proper enzyme functions, affecting cell regulation, nerve

and muscle function, and immune responses. Many vegetables supply significant amounts of some or all of these minerals.

Vitamins are essential for growth, energy, body functions and general health. Unfortunately, the human body cannot manufacture most vitamins, so they must be supplied by diet. Vegetables are rich sources of several important vitamins. Vitamin A aids cell reproduction, stimulates immunity, promotes growth of bones and teeth, aids vision and promotes general health. Alpha- and beta-carotene and retinol found in a number of vegetables are all forms of Vitamin A. Vitamin C is a very important antioxidant in the body, protecting tissues from free radicals produced by the body's metabolism. Vitamin C has also been found to be an effective antiviral agent. Vitamin B₉, folate or folic acid, is important in nerve and brain function and as a component of spinal fluid. Folic acid deficiency has been linked to neural tube defects resulting in birth defects in infants. Adequate folic acid in the body before and during pregnancy is important for embryonic development. Vitamin B₃, (niacin) and Vitamin B₅ (pantothenic acid), found in many vegetables, are both important in food metabolism and functioning of body systems. Other vitamins may be supplied by specific vegetables. For example, dark green leafy vegetables are a good source of Vitamin K, a major factor in blood clotting, calcium regulation and bone health.

Finally, vegetables are a vital source of nutraceuticals that promote health by playing a protective role in the body. Vitamin C, previously discussed, is part of the family of terpene compounds that protect cells from free radicals and ionizing radiation. Some terpenes are very protective of vaginal, uterine, and cervical tissues. Glucosinolates found in cruciferous vegetables and allyl sulfides from onions and garlic have important functions in building and regulating the immune system. These compounds, along with isoflavones, flavonoids, indoles, and other nutraceuticals improve and protect the circulatory system, enhance detoxification activity in the liver, and prevent or suppress various kinds of cancer. While much remains to be discovered about many of these compounds and their function in preventing disease, their value as a component of a healthy diet is clear.

Vegetables are a valuable component of any diet, contributing minerals, vitamins, and other nutrients which may otherwise be lacking. These compounds can enhance human growth and development, improve general health, and strengthen immune responses to combat disease. In situations where dietary choices are limited, or when immune systems are compromised, vegetable consumption may make the difference between normal health and life-threatening disease.