



Malnutrition occurs in people who are either undernourished or over-nourished.

Under-nutrition:

Under-nutrition is a consequence of consuming too few essential nutrients or using or excreting them more rapidly than they can be replaced.

Infants, young children, and teenagers need additional nutrients.

So do women who are pregnant or nursing.

Nutrient loss can be accelerated by diarrhoea, excessive sweating, haemorrhage, or kidney failure.

Nutrient intake can be restricted by age-related illnesses and conditions, excessive dieting, food allergies, severe injury, serious illness, a lengthy hospitalization, or substance abuse.

The leading cause of death in children in developing countries is protein-energy malnutrition. This type of malnutrition is the result of inadequate intake of calories from proteins, vitamins, and minerals. Children who are already undernourished can suffer from protein-energy malnutrition (PEM) when rapid growth, infection, or disease increases the need for protein and essential minerals.

These essential minerals are known as micronutrients or trace elements. Two types of protein-energy malnutrition have been described—*kwashiorkor* and *marasmus*.

Kwashiorkor occurs with fair or adequate calorie intake but inadequate protein intake, while *marasmus* occurs when the diet is inadequate in both calories and protein.

About 1% of children in the United States suffer from chronic malnutrition, in comparison to 50% of children in Southeast Asia. About two-thirds of all the malnourished children in the world are in Asia, with another one-fourth in Africa.


Over-nutrition

In the United States, nutritional deficiencies have generally been replaced by dietary imbalances or excesses associated with many of the leading causes of death and disability. Over-nutrition results from eating too much, eating too many of the wrong things, not exercising enough, or taking too many vitamins or other dietary replacements.

Risk of over-nutrition is also increased by being more than 20% overweight, consuming a diet high in fat and salt, and taking high doses of:

- Nicotinic acid (niacin) to lower elevated cholesterol levels
- Vitamin B6 to relieve premenstrual syndrome
- Vitamin A to clear up skin problems
- Iron or other trace minerals not prescribed by a doctor.

Nutritional disorders can affect any system in the body and the senses of sight, taste, and smell.



They may also produce anxiety, changes in mood, and other psychiatric symptoms. Malnutrition begins with changes in nutrient levels in blood and tissues. Alterations in enzyme levels, tissue abnormalities, and organ malfunction may be followed by illness and death.

Causes and symptoms

Poverty and lack of food are the primary reasons why malnutrition occurs in the world. Ten per cent of all members of low income households do not always have enough healthful food to eat. Protein-energy malnutrition occurs in 50% of surgical patients and in 48% of all other hospital patients.

Loss of appetite associated with the aging process. Malnutrition affects one in four elderly Americans, in part because they may lose interest in eating. In addition, such dementing illnesses as Alzheimer's disease may cause elderly persons to forget to eat.

There is an increased risk of malnutrition associated with chronic diseases, especially disease of the intestinal tract, kidneys, and liver. Patients with chronic diseases like cancer, AIDS, intestinal parasites, and other gastric disorders may lose weight rapidly and become susceptible to undernourishment because they cannot absorb valuable vitamins, calories, and iron.

People with drug or alcohol dependencies are also at increased risk of malnutrition. These people tend to maintain inadequate diets for long periods of time and their ability to absorb nutrients is impaired by the alcohol or drug's effect on body tissues, particularly the liver, pancreas, and brain.

Eating disorders:

People with anorexia or bulimia may restrict their food intake to such extremes that they become malnourished.

Food allergies: Some people with food allergies may find it difficult to obtain food that they can digest. In addition, people with food allergies often need additional calorie intake to maintain their weight.


Failure to absorb nutrients in food following bariatric (weight loss) surgery. Bariatric surgery includes such techniques as stomach stapling (gastroplasty) and various intestinal bypass procedures to help people eat less and lose weight. Malnutrition is, however, a possible side effect of bariatric surgery.

Symptoms:

Unintentionally losing 10 pounds or more may be a sign of malnutrition. People who are malnourished may be skinny or bloated. Their skin is pale, thick, dry, and bruises easily. Rashes and changes in pigmentation are common.

Hair is thin, tightly curled, and pulls out easily. Joints ache and bones are soft and tender. The gums bleed easily. The tongue may be swollen or shrivelled and cracked. Visual disturbances include night blindness and increased sensitivity to light and glare.

Other symptoms of malnutrition include:

- Anaemia
 - Diarrhoea
 - Disorientation
 - Night blindness
 - Irritability, anxiety, and attention deficits
 - Goitre (enlarged thyroid gland)
 - Loss of reflexes and lack of muscular coordination
 - Muscle twitches
 - Amenorrhea (cessation of menstrual periods)
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- scaling and cracking of the lips and mouth.

Malnourished children may be short for their age, thin, listless, and have weakened immune system.

Diagnosis

Overall appearance, behaviour, body-fat distribution, and organ function can alert a family physician, internist, or nutrition specialist to the presence of malnutrition. Patients may be asked to record what they eat during a specific period. X rays can determine bone density and reveal gastrointestinal disturbances, and heart and lung damage.

Blood and urine tests are used to measure the patient's levels of vitamins, minerals, and waste products. Nutritional status can also be determined by:

- Comparing a patient's weight to standardized charts
- Calculating body mass index (BMI) according to a formula that divides height into weight
- Measuring skinfold thickness or the circumference of the upper arm.

Treatment:

Normalizing nutritional status starts with a nutritional assessment. This process enables a clinical nutritionist or registered dietician to confirm the presence of malnutrition, assess the effects of the disorder, and formulate diets that will restore adequate nutrition.

Patients who cannot or will not eat, or who are unable to absorb nutrients taken by mouth, maybe fed intravenously (parenteral nutrition) or through a tube inserted into the gastrointestinal (GI) tract (enteral nutrition).

Tube feeding is often used to provide nutrients to patients who have suffered burns or who have inflammatory bowel disease. This procedure involves inserting a thin tube through the nose and carefully guiding it along the throat until it reaches the stomach or small intestine. If long-term tube feeding is necessary, the tube may be placed directly into the stomach or small intestine through an incision in the abdomen.

Tube feeding cannot always deliver adequate nutrients to patients who:

- Are severely malnourished
- Require surgery
- Are undergoing chemotherapy or radiation treatments
- Have been seriously burned
- Have persistent diarrhoea or vomiting
- Whose gastrointestinal tract is paralyzed.

Intravenous feeding can supply some or all of the nutrients these patients need.

Prognosis:

Up to 10% of a person's body weight can be lost without side effects, but if more than 40% is lost, the situation is almost always fatal. Death usually results from heart failure, electrolyte imbalance, or low body temperature. Patients with semi-consciousness, persistent diarrhoea, jaundice, or low blood sodium levels have a poorer prognosis. Some children with protein-energy malnutrition recover completely. Others have many health problems throughout life, including mental retardation and the inability to absorb nutrients through the intestinal tract. Prognosis for all patients with malnutrition seems to be dependent on the age of the patient, and the length and severity of the malnutrition, with young children and the elderly having the highest rate of long-term complications and death.



Prevention:

Breastfeeding a baby for at least six months is considered the best way to prevent early-childhood malnutrition. The United States Department of Agriculture and Health and Human Service recommend that all Americans over the age of two:

- Consume plenty of fruits, grains, and vegetables
- Eat a variety of foods that are low in fats and cholesterols and contain only moderate amounts of salt, sugars, and sodium
- Engage in moderate physical activity for at least 30 minutes, at least several times a week
- Achieve or maintain their ideal weight
- Use alcohol sparingly or avoid it altogether.

Every patient admitted to a hospital should be screened for the presence of illnesses and conditions that could lead to protein-energy malnutrition. Patients with higher-than-average risk for malnutrition should be more closely assessed and re-evaluated often during long-term hospitalization or nursing-home care.

Resources:

1. Beers, Mark H., MD, and Robert Berkow, MD, editors. "Malnutrition." Section 1, Chapter
2. In The Merck Manual of Diagnosis and Therapy. Whitehouse Station, NJ: Merck Research Laboratories, 2004.
3. WebMD website

Collected by:

J. K. REDDY,
Mgr. (PC&A)

