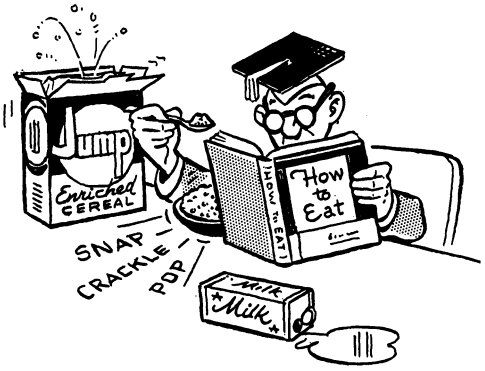
Chapter Six

Generalizations and Facts

ALL PERSONS having responsibility for nutrition education cannot be well grounded in the science of nutrition, and many people who are highly trained in nutrition have given little thought to the way in which their information can best be taught. The nutritionist working with the educator forms an important team in education: the person trained in nutrition to discover and to present the facts, the educator to see that facts are presented to students in the form in which they can be understood and used. In this chapter an effort has been made to organize the practical knowledge in nutrition according to the objectives shown by research in education to be effective in motivating learning. The information is presented in the form of generalizations and statements of supporting facts.

Of the statements in this chapter, those designated by Arabic numerals in bold-faced type and capital letters in light-faced type are primarily generalizations. The subheadings with Arabic numerals furnish supporting evidence or closely related facts. While the information may be useful to people who are not highly trained in nutrition, a sound education in nutrition will enable the educator to make the best use of the material presented. It is to be hoped that as nutrition finds its rightful place in health education, teachers generally will have good training in it.

The difficulty of making general statements in nutrition with a minimum of technical terms is recognized. In this compilation we have assumed that students will learn to call the common nutrients by name. They are briefly defined or described in Appendix E. Because of the widespread use of these terms it is important that people become familiar with them.



Much information is yet in a formative stage . . . .

A further difficulty is presented by the fact that the field is new and much of the information is yet in a formative state. Practical application can scarcely await the elimination of all the uncertainties. Students should, however, be taught the importance of open-mindedness in nutrition and warned of the need of revising their information in the light of future discoveries.

We have attempted to select and formulate statements which conform to one or more of these tests:

1. Results of reliable experimental evidence, derived under carefully controlled experiments and subsequently reaffirmed by other investigators.
2. Practical working hypotheses advanced by experienced research workers in nutrition.
3. Logical conclusions from knowledge in nutrition and related fields.
4. Critical observations of populations and of species survival.

Information from animal experiments is accepted with qualifications when applied to human beings. But in an effort to bring together the useful and important information, this source cannot be disregarded.

Where results of experiments have not completely established the validity of a finding but at the same time have given a strong, positive indication, the generalizations or facts have been qualified by a term such as "there is some evidence." Such qualifications should not undermine the confidence of the educator in using the statements, but rather serve as a reminder of the need of open-mindedness and the maintenance of the research point of view.

This compilation of generalizations and facts is believed to be unique in several respects.

1. Facts have been brought together from widely scattered reports of nutrition research found in textbooks, bulletins, journal articles, and theses.
2. Facts have been stated with a minimum of technical terms so that they may be readily adapted when they are used by teachers, writ-

ers, dietitians, or others who are concerned with education below the professional level.

3. Facts have been organized to show how nutrition can influence the attainment of important goals, and thus the learning of them will be easy to motivate.
4. Facts have been organized under three broad generalizations that show (*a*) the influence of nutrition upon personal development; (*b*) how to attain good nutrition; and (*c*) how to evaluate the nutritional state of an individual.

Each generalization is followed by statements which support or clarify it. Because a given fact may be necessary for understanding several generalizations, some statements are repeated several times. Thus each generalization and its supporting facts form a complete unit.

The statements are not to be memorized by students, but to be used by the educator as a basis for learning experiences (see Chapter 7). They are planned to lead the student to an understanding of sound nutrition, to awaken him to the significance of nutrition as a force in his life, and to provide a base on which his knowledge can grow. The effectiveness of their application challenges the ingenuity of the educator whether he is a teacher, a public health worker, or a columnist.

1. Nutrition can affect how you look by its influence on the different parts of your body and the characteristics which relate to your personal appearance.

A. Although a majority of common skin disturbances are probably not significantly connected with dietary deficiencies, good nutrition plays a role in producing an attractive skin.
   1. The skin of a poorly nourished person is likely to be dull and lifeless.
   2. When food has contained too little protein, minerals, and vitamins, the red blood cells do not have a normal amount of their red coloring matter, and the skin of the individual may be pale in color.
   3. That the skin is affected, directly or indirectly, by state of nutrition, is shown by the fact that skin disorders appear early and conspicuously in many dietary deficiency syndromes and in some cases of hypervitaminosis.
   4. Overeating, which leads to obesity, may precipitate or aggravate skin eruptions.
   5. For some people common foods, such as milk, eggs, strawberries, or wheat bread, may cause a skin rash known as allergy, which may be detected and treated by a physician.

6. Although the acne of adolescence may be unrelated to nutrition, a good diet, together with cleanliness, may help to combat this disorder.
7. Like all other body tissues, the skin is subject to many influences; good nutrition cannot ensure a beautiful complexion, but without good nutrition one is less likely to have it.

B. The teeth are complex parts of the body, subject to the combined influences of diet, nutrition, and heredity from the time of their formation through the period of maturity.
1. An important measure in controlling tooth decay is to provide the building materials — protein, calcium, and phosphorus — plus vitamins A, C, and D, from the prenatal period until the last permanent teeth are fully developed. The proneness of a tooth to decay depends on its physical form, its cell structure, and its chemical composition — each of which may be profoundly influenced by nutrition.
2. Whatever the cause of poor nutrition — whether poor diet, infection, or disease — nutritional deficiency during the formation of the teeth is a threat to their perfect development and future protection against decay.
3. Strong genetic influences toward caries susceptibility or caries resistance have been demonstrated in rats and probably are present in human beings.
4. The environment of the tooth is an important factor in determining whether it will remain free of decay after it has been formed; the action of bacteria on substances taken into the mouth helps to determine this environment.
5. Since acids formed by bacterial action on carbohydrate foods lodged around the teeth may start decay by dissolving enamel, it is well to cleanse the teeth thoroughly after eating.
6. High carbohydrate foods which tend to stick to the teeth, such as hard caramel candy, are likely to produce tooth decay especially in people who are susceptible to dental caries; the more frequently these are eaten between meals, the greater the tendency toward caries.
7. One to 1.5 parts per million of fluorides in drinking water, when used by children whose teeth are in the formative stage, apparently help to protect the teeth against dental caries.

Foods which stick to the teeth, such as hard caramels . . . .

8. A little more than 1.5 parts per million of fluorides in drinking water, when used by children whose teeth are in the formative stage, may produce defects in the enamel known as "mottled enamel."
9. One may be born with a tendency toward poor teeth but this tendency probably can be checked by good nutrition or further aggravated by poor nutrition.
10. Keeping the teeth clean is essential, but it will not replace the need for good food in the protection of the teeth from decay.
11. Fractures in tooth enamel which may occur when one bites hard objects, or when one injures a tooth in a fall or blow, produce places where food particles and bacteria may lodge and start decay.
12. Good nutrition from one generation to the next offers the hope that people of the United States may eventually increase their resistance to tooth decay.
13. For reasons not understood, some nationalities as well as some families have developed marked susceptibility or marked resistance to tooth decay.

C. The muscles, nerves, and mucous membranes of the eyes, and also the processes by which images are received, are sensitive to the nutrition of the individual.
   1. The eyes of the well-nourished, healthy person, with good habits of living, may be expected to be bright and clear.
   2. After very long and very severe shortages of vitamin A, the covering of the eyeball and the mucous membrane around the eye may become dry and hard, and sometimes even blindness may result.

3. The ability to see in a dim light or to adapt quickly to marked change in the brightness of light depends in part on a good supply of vitamin A.
4. Itching, burning, and a grating sensation of the eyes when exposed to fairly bright light may be caused by poor nutrition with relation to riboflavin, probably coupled with other nutritional deficiencies.
5. If there is severe lack of riboflavin, the blood vessels of the covering of the eyeball become enlarged or may burst, and the eye may be clouded by thickened tissue or be bloodshot.
6. Because of the sensitivity of the eye to general body conditions, poor nutrition may affect adversely the efficiency of this organ; in fact, vision and the condition of the eyes are often sensitive indicators of the general state of nutrition.

D. Hair and nails are body tissues which reflect the state of nutrition.
1. The universal relationship of excellent nutrition and care of animals to the fine quality of their coats offers convincing evidence of the benefits which people may derive from good dietary practices.
2. When the food supply of proteins, minerals, and vitamins is poor, the hair may become dull, dry, and harsh, and difficult to manage.
3. Though animal experiments have shown relationships between dietary deficiency of specific nutrients and loss of hair and even loss of color in the fur, there is no convincing evidence to support claims of such relationships for human beings.
4. Change in color of hair, black to red, is a frequent observation in the dietary deficiency disease, kwashiorkor.
5. Good protein food, reinforced with minerals and vitamins efficiently used by the body, help to form firm, well-

shaped fingernails which can be groomed to attractiveness, though dietary measures cannot be regarded as insurance against stringy nails.

E. Body size is a result of many factors such as diet, secretions of glands, inheritance, disease, and activity.
   1. Increase in body weight in proportion to height is probably the best over-all index of nutrition during growth, since body weight represents the composite of all parts of the body — bones, organs, blood, muscles, and other tissues.
   2. Food deprivation is reflected in change of body weight much earlier than in retardation of linear growth.
   3. The growth spurts during adolescence (about 10 to 12 years for girls and about 12 to 14 years for boys) are natural and should be supported by a well-balanced, adequate diet.
   4. If the food energy intake exceeds the amount of energy used by the body mainly for exercise, maintenance, and growth there will be storage of the surplus and gain in body weight, due to the accumulation of body fat; conversely, if the food energy intake is less than the body needs there will be loss of weight.
   5. Individuals of the same age, sex, and occupation may differ widely in their food energy needs for exercise and maintenance; hence individual differences must be taken into consideration in the use of general figures on food energy or calorie allowances.
   6. Surplus food fat, protein, and carbohydrate are transformed into body fat, which is then deposited about the organs, between the muscles, or in a layer of fatty tissue under the skin.
   7. Fat deposits serve as a reserve supply of body fuel to be drawn upon in case of temporary shortage of, or increased need for, fuel.

. . . the hair may become dry and harsh and difficult to manage.

8. Fat deposits serve to support and protect the organs and to prevent loss of heat from the body surface.
9. Fat deposits under the skin help to soften the angles produced by the bones, and in proper amounts contribute to the attractiveness of the person.
10. The human body adjusts itself to an inadequate amount of food by a decrease in body weight and perhaps in activity and, ultimately, by changes in the chemical processes of the cells.
11. Children who are considerably below the average weight for their height and age may tire more easily and have less endurance than others, although these conditions are sometimes masked by drives which lead to excessive activity; underweight is a health hazard, especially in childhood.
12. That characteristics of body build are inherited is evident in the similarity of bone structure that is often seen among members of a family.
13. The fact that family members often have similar eating habits may account for the tendency toward fatness or thinness sometimes observed in families.
14. Rest influences body weight through its effect on conservation of energy.
15. A safe program for reduction of relatively large amounts of body weight requires the supervision of a physician.
16. The goal toward which one should strive when reducing body weight is a small, steady loss per week with the

Fat deposits in proper amounts may contribute to the attractiveness of the person.

maintenance of a good state of mental and physical efficiency throughout the reducing period.

17. Because of readjustments of the body to a reducing diet, weight loss may not be immediately apparent; it is therefore important to allow sufficient time before becoming discouraged with the results of a reducing program.
18. Excess weight is often accompanied by development of heart and circulatory diseases and diabetes in middle age; it is generally considered a hazard to safety, health, and physical fitness.
19. Because of the great difficulty of reducing and staying reduced, it is wise never to allow the accumulation of excess weight.
20. Emotional disturbances such as sorrow, nervousness, irritability, anxiety, or lack of acceptance socially may increase or decrease the desire for food and also alter the habits of living, thus these disturbances may be reflected in body weight.

F. Posture is in a large measure dependent on the tone of the muscles and the proper development of the bones, both of which are greatly influenced by nutrition.
   1. A well-built and substantial framework together with good muscles provide the basis for a well-shaped body and good carriage.
   2. When children, including adolescents, receive too small a supply of protein, calcium, phosphorus, and vitamins C and D, there is danger that the growth of bones will be stunted or that the bones will be improperly shaped.
   3. Diets poor in calcium, phosphorus, and vitamin D are liable to cause narrow chests, small pelvic bones, knock-knees, and bowlegs.
   4. Malformed bones resulting from poor food supply during childhood remain malformed throughout life.
   5. Malformation of the pelvis in childhood may cause difficult delivery for the mother at the time of childbirth and thus the nutrition of one generation affects the welfare of the next.
   6. When clothing, smoke, fog, window glass, or geographic location prevent direct rays of the sun from reaching the skin, vitamin D should be supplied to growing children and pregnant and lactating women through supplements such as cod-liver oil and vitamin D concentrates, or through vitamin D enriched milk. Since vitamin D supplements are very potent, and because excess can be harmful, they should be given in doses exactly as directed.

7. Because protein is used for building bone, blood, and body tissues such as muscles, organs, skin, and hair, the protein needs are highest in periods of rapid growth.
8. If children continue to increase in height when they have poor diets, they are likely to develop poor posture and malformations of the body.
9. With well-formed bones, firm muscles, and normal pads of fat and connective tissue, the organs are held in their proper place and the disfiguring effect on posture of a protruding abdomen may be avoided.

G. Nutrition can help to produce the glow of good health which greatly enhances personal appearance.
1. The glow of good health is often more important to the beauty of an individual than contours of the face or body.
2. An alert, happy expression and relaxed, erect posture contribute to the sparkling good looks of a healthy, well-nourished person.
3. Poor nutrition makes people look dull, lifeless, lacking in individuality, and prematurely old.

2. Nutrition can affect your personality, vigor, and ambition.

A. Some personality traits associated with state of nutrition of the individual are cheerfulness and cooperativeness, self-confidence and poise, interest in others, and emotional stability.
1. Since good nutrition helps the body function properly, it also helps the individual to feel capable of meeting problems, and thus reduces tensions and frustrations.

. . . helps one feel capable of meeting problems and frustrations.

2. Hungry human beings think of little else than food or subjects closely related to it.
3. People suffering from chronic dietary deficiencies become morose and unhappy and lose their sense of humor.
4. When an individual is extremely hungry, he is likely to be irritable, restless, and lacking in self confidence and judgment; prolonged hunger often makes the individual lose his sense of right and wrong, consideration for others, ability to get along with people, and ambition.
5. Good health helps people to enjoy and take part in activities with their friends; interest in being socially acceptable has been observed to decrease under conditions of poor nutrition.
6. Thiamine has been called the "morale vitamin," because a body deficiency of this vitamin may cause personality characteristics such as fearfulness, apprehension, timidity, depression, irritability, quarrelsomeness, lack of cooperation, and loss of initiative; this probably is not a specific effect of lack of thiamine but more or less a general characteristic of malnutrition regardless of the cause.
7. When families fall into the habit of disorganized meals and carelessness in eating, friction and unhappiness often result; at least one good family meal a day will do much to preserve the unity of the family and promote the personality development of its members.
8. Good nutrition is an important measure in helping to prevent antisocial behavior among teen-agers.

B. Vim and vigor are an outgrowth of the good health which emanates from good nutrition, freedom from disease, and proper habits of living.
1. There is a distinction between the hyperactivity of a nervous individual and the purposeful action of the normal, healthy person.
2. Apathy is a general characteristic of poorly nourished people.
3. There is no reason to believe that any benefits will be derived from excesses of nutrients after the body needs and stores of nutrients have been fully provided.
4. Vitamins will not contribute to the vim and vigor of an individual unless all of the other nutrients, such as protein, fat, and minerals, are supplied in adequate amounts.
5. Animal studies have indicated that raising the level of nutrition from "fairly good" to "excellent" increases adult vitality, length of life, and vigor of offspring.

Skipping breakfast results in a decrease in work . . . .

3. Nutrition can affect how you work by its influence on your physical and mental efficiency.

A. Since physical efficiency requires good muscle and nerve coordination, it must be affected by the state of nutrition.

1. Skipping breakfast has been shown to result in a decrease in maximum work rate and maximum work output in the late morning hours.
2. Good nutrition contributes to the development of firm muscles and steady nerves; it is basic to athletic prowess.
3. Boys and girls engaging in strenuous exercise need more of the energy-rich foods such as fats, cereals, and breads than do less active people of the same age.
4. Beverages containing caffeine and alcohol may cover up fatigue and give a temporary feeling of well-being; in addition, alcohol has a deleterious effect on coordination.
5. Good nutrition alone will not produce a winning athletic team, but undernutrition and malnutrition, including obesity, impair performance.
6. Members of a winning team need an adequate diet every day, not on days of the game alone.
7. To fulfill its function, a training table encourages its members to maintain weight at the desired level and to eat, every day, a variety of foods which constitute a good diet – meat, milk, eggs, cheese, fruits, vegetables, and enriched or whole-grain cereals and breads.
8. Prior to the training season it is desirable to assess the nutritional status of an athlete to determine specific needs for weight gain or loss so that diet may be planned accordingly.
9. Permission to eat and enjoy foods to which they are accustomed aids in building morale in athletes.

10. Participants in some sports may need as much as 100 per cent more food energy than sedentary persons, depending on the sport and the degree of participation.
11. By checking weight frequently, it is possible to tell if an athlete is getting enough to eat in relation to his energy expenditure.
12. The usual requirement of dietary protein for growth suffices for the young athlete since activity does not affect the amount of this substance needed.
13. With intense exercise, carbohydrate may become a limiting factor in sustaining individuals in prolonged events; in such instances there may be a valid reason for ingestion of some form of carbohydrate that is readily metabolized by the body.
14. It appears that no less than three meals a day represent a desirable pattern of eating for athletes, but where sports are protracted and exhausting, up to five lighter meals a day may be preferable.
15. In sports that demand endurance and prolonged activity, there is some evidence that performance is better maintained on a high carbohydrate diet than on a high fat diet, if these foods have been consumed for several days prior to the event.

B. Good nutrition creates conditions favorable to the maximum mental achievement of which the individual is capable.
   1. Good physical growth provides an individual with the physiological bases for mental, emotional, and social development.
   2. For individuals with poor nutrition, there is reason to believe that the mental alertness and general progress in studies can be improved by better nutrition.

Beverages containing alcohol may impair coordination although they cover up fatigue and give a temporary feeling of well-being.

Forgetfulness is sometimes a characteristic of poorly nourished people.

3. Prolonged hunger and poor nutrition undermine the interest of the individual in mental pursuits such as reading and writing unless highly motivated as by religious zeal or patriotic fervor.
4. Forgetfulness and irresponsibility have been observed as characteristics of poorly nourished people.
5. Deterioration of the mind and nervous system characterizes many deficiency states.
6. No specific foods or nutrients can be expected to increase the intellectual capacity.
7. Mental work, unless accompanied by considerable body tenseness, does not increase the energy needs of the body.
8. Drastic malnutrition of a woman during pregnancy can lead to mental inferiority in the infant, for example, lack of iodine may contribute to cretinism.

4. Nutrition can affect how you grow and develop through its interplay with hereditary influences, environmental conditions, and other factors related to the chemistry of the body.

A. Hereditary factors may set a limit, but within that limit good nutrition can help the individual to attain his optimum growth and development.
   1. Body size and build are influenced by heredity, but inherited tendencies can be upgraded by good nutrition; good nutrition through several generations has been observed to improve the stock.
   2. Racial and family tendencies in body size may be altered through nutrition; a continued state of poor nutrition is not inherited.
   3. That characteristics of body build are inherited is evident in the similarity of bone structure that is often seen among members of a family.
   4. The fact that family members often have similar eating habits may account for the tendency toward fatness or thinness sometimes observed in several family members.
   5. One may be born with a tendency toward poor teeth, but the tendency sometimes can be checked by good nutrition or further aggravated by poor nutrition.

B. Environmental factors exert a strong influence on health, but nutrition can help in the adjustment to many of the stresses produced by environment.
   1. An extremely cold environment or insufficient protection from cold increases the body's need for food energy.
   2. The layer of fat deposited under the skin, which helps to protect the body against heat loss when exposed to severe cold, reflects the adequacy of the caloric intake.
   3. Under usual conditions of clothing and temperature, heat produced by chemical changes in the food eaten is sufficient to maintain normal body temperature.
   4. Inadequate housing or insufficient clothing in severe weather or climates may increase the need for energy to maintain body temperature, and either extra food or stores of body fat will have to be used for this purpose.
   5. Underweight, semi-starved, and thin people, who do not have a good layer of fat under the skin, may have difficulty in maintaining body temperature and may need additional amounts of food to keep warm; if it is not provided, body tissue will be burned for this purpose.
   6. Cold is an environmental factor which further aggravates the effects of poor nutrition in thin and ill-clothed people, especially children and the aged.
   7. An extremely warm environment is likely to decrease the body's need for food energy because of possibly depressed rate of body chemistry and lessened physical activity.

. . . insufficient protection from cold may increase the body's need for food energy.

8. Good nutrition may help to fortify workers in industry against such hazards as exposure to moderate amounts of various chemicals and radiation.
9. Individuals who work at night or are deprived of exposure to sunshine may need to take a supplement containing vitamin D or to use vitamin D enriched milk.
10. When soil and water are known to be deficient in certain minerals, the ill effects may be offset by an automatic source of the substance, as iodides in salt.
11. Excesses of some substances in soil or water, as selenium and fluorides, may bring about nutritional problems.
12. Good nutrition with respect to calcium may help to suppress the deposition in the bones of radioactive Strontium-90.

5. Good nutrition requires that the nutrients, or chemical substances, needed by the body for its functions be provided in ample amounts.

A. The nutrient needs of individuals vary with age, sex, activity, climate, and state of nutrition, and are subject to individual differences due to inherited and acquired conditions and special physiological stress, as pregnancy, lactation, or onset of puberty.

1. The present knowledge concerning the amounts of various nutrients which should be allowed for the maintenance of good nutrition in healthy persons in the United States has been summarized in the Recommended Dietary tary Allowances of the National Research Council;[1] these figures include margins of safety and are selected to cover the expected individual variations (failure of an individual to attain them does not necessarily mean that he is poorly nourished).
2. During the growth period the need for nutrients, such as calcium and protein, is high because the proportion of these nutrients in the body increases during that time.
3. In a specific age group, growing boys usually need more food than growing girls due to their greater activity, muscle mass, and usually larger size.
4. If a child has experienced an extended period of poor nutrition, a liberal amount of nutrients will be necessary over a long period of time to bring the body to good condition.
5. The nutritional requirements during pregnancy, and especially during the latter part, and lactation are generally high and are more likely to be met if good food

[1] *Recommended Dietary Allowances*, Revised 1958. A Report of the Food and Nutrition Board, National Academy of Sciences, National Research Council, Washington, D.C. Publ. 589.

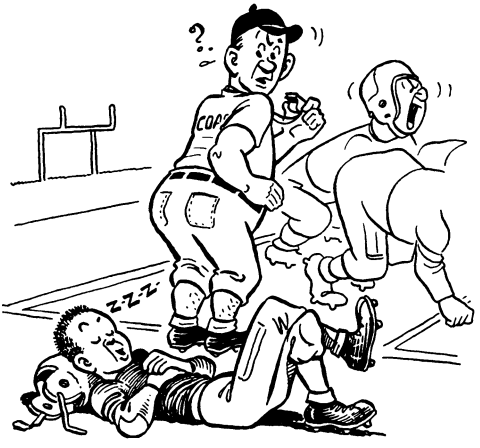
habits have been established in the teen ages or in the period before pregnancy.

6. Because of the cumulative demands that may be made on the body stores during repeated pregnancies and because of the difficulty in making quick changes in food habits, a woman should strive to maintain a continuously good diet during the period of reproduction.
7. Requirements for some nutrients are greater for children than for adults, hence children cannot meet their needs simply by eating a fraction of the diets of adults.
8. A well-planned family meal may be adjusted to meet the varying needs of the different family members.
9. Meals which contain as a basis liberal amounts of protein-rich foods and vitamin-rich fruits and vegetables can be adjusted to meet the needs of each family member by varying the amounts of dairy products, other vegetables and fruits, cereals, fats, and sweet foods.

B. Energy from food is used to do muscular work, to produce body heat, to support growth of the body or the production of new tissue, and to maintain the functioning of the vital organs.

1. Calories represent the energy available in food and the energy needs of the body, hence they are a useful guide in determining the amount of food needed by the individual.
2. Physical activity is the outstanding factor causing variability in calorie needs of healthy people of similar size.

Physical activity causes variability in calorie needs . . . .



3. Based on the Recommended Dietary Allowances, in the United States a small increase in daily caloric intake may be allowed for people living where the mean external temperature is below 68° F. (20° C.), and a small decrease where the average external temperature is above this.
4. In order to prevent increased weight in middle age, a gradual reduction of about 20 per cent in food energy (or caloric intake) should be made between the years of 25 to 55, unless exercise has increased considerably.
5. Weight and weight change indicate the nature of the adjustment of the caloric intake to the individual's needs.
6. Food energy value of the diet depends on fats, carbohydrate, and protein content since their end products release energy as they are broken down in the body cells.
7. After digestion, sugars and starches are about the same because digestive juices break the links between the units which compose these foodstuffs.
8. Since fats as foodstuffs provide two and one-fourth times as many calories as the same weight of carbohydrates or proteins, the caloric value of foods increases as the amount of fat in the foods increases.
9. The caloric value of foods becomes less as the water and fiber content increase.
10. With low-caloric diets as those of small children, sick people, elderly people, or people who are reducing, the the foods chosen must be highly nutritious, or essential nutrients will not be supplied.

C. Protein contains nitrogen in the form of amino acids which are used in growth, functions, and maintenance of the body.
1. The total protein need of normal adults is influenced primarily by body size, not by activity.
2. Because protein is used for building tissues such as muscle and bone, and for formation of the constituents of blood, protein needs are high in periods of rapid growth, which includes production of new tissue.
3. Per pound of body weight, growing children and adolescents need from two to three times as much protein as do normal adults.
4. During the second half of pregnancy and all of the lactation period, women need an estimated increase of 35 to 65 per cent in protein in the diet.
5. Liberal amounts of protein in the diet are needed to aid in recovery from wounds, burns, and wasting illnesses.
6. Because there is limited provision for storage of protein in the human body, a liberal amount of this substance needs to be eaten daily.

7. Lack of protein in the diet will lead to wasting of body tissues, even though plenty of carbohydrate and fat are available for fuel.
8. Proteins in foods are broken down to amino acids in the digestive tract; good nutrition with respect to protein depends on the amino acids available for absorption, not on a particular food source of protein.
9. Some of the amino acids can be produced from others in the body in amounts adequate to meet the body needs; some cannot, and those which cannot be so produced are called "essential"—i.e., they must be provided by the diet.
10. Proteins which contain all of these essential amino acids in adequate amounts are called "complete proteins."
11. Good mixtures of amino acids may be obtained from a variety of foods from vegetable sources, but foods from animal sources are richer in protein and more liberally supplied with the essential amino acids.
12. Because of the superior amino acid content of proteins from animal sources, a diet carries a high safety factor when perhaps half of the protein is from animal sources.

D. Many mineral substances are present in the body and serve important purposes; these minerals include compounds of calcium, phosphorus, chlorine, sulfur, sodium, potassium, magnesium, iron, copper, iodine, fluorine, manganese, zinc, and cobalt.
   1. These substances cooperate with protein and the vitamins in such important body functions as building bone and teeth, forming the red blood cells for carrying oxygen to the tissues, producing enzyme systems, and in making gland secretions which control many body activities.
   2. When children and adolescents receive too small a supply of calcium and phosphorus, together with shortages in proteins and vitamins, especially C and D, there is danger that the growth of bones will be stunted or that the bones will be improperly shaped.
   3. According to present standards, calcium is one of the substances most frequently deficient in the diets of the people in the United States.
   4. If growing children and young people are to utilize calcium effectively, it is important that they receive vitamin D in amounts up to 400 International Units per day plus a liberal supply of phosphorus.
   5. The amount of calcium needed by the body varies with individuals, depending upon the supply which the body has previously received, upon individual differences in utilization, and upon other constituents of the diet.

6. A child whose diet has been poor in calcium for a long time needs more calcium and substances related to its use in the body than does a child whose diet has been adequate in calcium.
7. Hemoglobin, the iron-containing coloring material in red blood cells, has the ability to carry oxygen from the air to the body tissues where it combines with food nutrients and yields energy.
8. The iron requirement is higher for rapidly growing boys and girls than for adults because red blood cells are required for the increasing volume of blood that is a part of the growth process.
9. Because the normal life of red blood cells is about 100 days, numerous substances including protein, iron, copper, and the vitamins of the B complex are needed continually to rebuild them.
10. A remarkable example of the body's ability to conserve its resources is that a portion of the iron resulting from the normal destruction of red blood cells is stored in the liver and utilized in the manufacture of new red blood cells.
11. When there are short-time dietary deficiencies of iron, the body needs will be met so far as possible by supplies which are stored in the liver, spleen, and bone marrow.
12. Anemia may be caused by such conditions as poor diet, profuse menstrual losses, loss of blood through injury and illness, or excessive destruction of red blood cells as from infection.
13. Adolescent girls frequently have diets with too little iron.
14. The thyroid gland attempts to adjust to an insufficient supply of iodides by increasing in size; this condition results in one of various kinds of goiter, namely, simple goiter.
15. Adolescent girls and pregnant women are more subject to simple goiter than are other people.
16. Extensive evidence indicates that during tooth development a controlled intake of fluorides, such as is provided by drinking water containing about 1 part per million, results in substantial protection against dental caries.

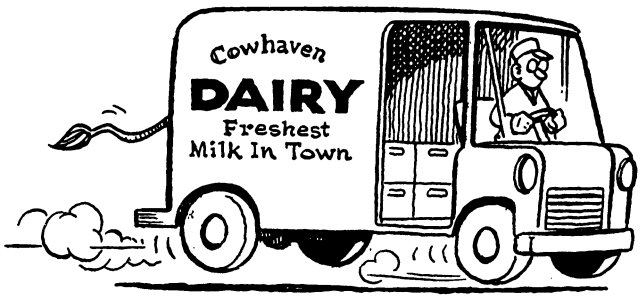
E. Vitamins are chemical substances, distinct from the main components of food (fat, protein, carbohydrate, and water) but necessary for the life process.

1. Vitamins aid the body tissues in making use of their building and maintenance materials, hence serious deficiency of vitamins will result in widespread disorders.

2. Vitamins are concerned in the chemical processes involved in growth and thus are needed in liberal amounts by children and youth and by women during reproduction.
3. The amounts of specific vitamins needed vary with body size, food energy value of the diet, state of nutrition of the individual, and conditions that make for excessive losses or destruction as infection or chemotherapy.
4. With the proper selection of natural foods it is unnecessary for the healthy adult to take vitamin supplements.
5. There is no evidence that amounts of vitamins beyond the maximum needed for body functions and stores will result in added vigor and health.
6. Although some vitamins may be stored, many cannot, and therefore should be supplied in the diet every day; excesses are useless, and, if taken over a long period, may endanger health.
7. Statements of dosages of fat-soluble vitamins A and D should be carefully heeded because excesses of these vitamins are not readily removed from the body and may become toxic.
8. Since vitamins are present in foods in very small amounts, they may be lost in processing and preparing for eating unless methods appropriate for their retention are used.
9. Many vitamins dissolve in water and can be destroyed when exposed to light and oxygen, or when heated, especially in the presence of an alkali such as baking soda; these facts should be considered in order to conserve vitamins during food preparation.

6. Good nutrition is promoted by selecting foods which provide the nutrients in amounts needed by the body.

A. Food is one of the most important factors influencing health and well-being of the individual; it is a factor which the invidual can control during most of his life.
   1. The nutritional state of the individual depends largely on the selection of food and the ability of the body to utilize the nutrients contained in the food eaten.
   2. Education and training in the wise selection of food for health are important, since humans are not known to have inherent impulses or drives to select the food they need.
   3. When people refuse to eat many foods, or for some reason cannot have a variety of foods, they are likely to fail to obtain some of the needed nutrients.
   4. Many combinations of foods or patterns of eating may result in a good diet; food guides are helpful in food selection but should not be regarded as inflexible standards against which to assess the adequacy of the diet.



5. A good type of diet for healthy people in the United States consists of meat, milk and other dairy products, fish, poultry, eggs, dark-green, leafy and deep-yellow vegetables, citrus fruits or other vitamin C-rich fruits and vegetables, whole-grain or enriched cereals and breads, and enough fats, sweets, and other fruits and vegetables to meet — but not exceed — the energy needs of the body.
6. There is much evidence that the people of the United States could improve their diets considerably if they replaced some of the calorie-rich, nutrient-poor foods in their diets with milk, dark-green leafy and deep-yellow vegetables and foods rich in vitamin C such as citrus fruits, some melons, and tomatoes and cabbage, when used in liberal amounts.

B. Milk and some products derived from it provide the main source of calcium in the diets of the people of this country, and in addition are an excellent source of protein and riboflavin.
   1. The diets of children and growing youth, which include one quart of milk a day, are likely to be adequate in calcium, protein, and riboflavin.
   2. One quart of vitamin D milk usually contains enough vitamin D to enable children of all ages and pregnant and lactating women to meet the recommended Dietary Allowance[2] of vitamin D.
   3. Two dips, or about one cup, of ice cream provide as much calcium as one-half cup of whole milk.
   4. A scant one-fourth cup of nonfat dry milk solids is equivalent to one cup of skim milk.
   5. One cup of fresh, whole milk is approximately equivalent in nutrients to one-half cup of undiluted evaporated milk or a one-inch cube of cheddar cheese.
   6. Milk is valuable whether used in a beverage or in prepared foods such as creamed or scalloped vegetables and cream soups.

[2] *Ibid.*

7. Such desserts as ice cream, custard, bread pudding, cornstarch pudding, and custard, pumpkin, and cream pie contribute one-third to one-half cup of milk per serving to the diet, while cake and cookies contribute little or none unless highly enriched with milk solids.
8. Unless a conscious effort is made to use cheese and foods which have been prepared with milk, it is difficult to obtain the recommended amount without using some milk as a beverage.
9. When skim milk is substituted for whole milk in order to reduce the calorie intake, it should be liberally supplemented with foods of high vitamin A value, as dark-green leafy and deep-yellow vegetables, eggs, and liver.
10. Because of the high nutritive value of milk, it is one of the most important foods to include in a reducing diet or most other diets in which the total intake of food is small.
11. Like any other food, milk is not fattening unless taken in excess of the energy needs.
12. For habitual use, plain pasteurized milk is preferable to flavored milk.

C. Whole-grain or enriched breads and cereals are carbohydrate-rich foods which are economical sources of food energy, protein, iron, and vitamins of the B complex — riboflavin, niacin, and thiamine.

1. Cereal foods afford one of the cheapest sources of food energy.
2. Cereals and breads can usually be eaten in liberal amounts without digestive difficulty.
3. Because amino acids are unequally distributed among cereal foods, it is desirable to use a variety of cereals along with some foods from animal sources, as meat, milk, and eggs.
4. When a single cereal food comprises the bulk of the diet, as it does with some nationalities and some economic groups, the nutritive value of the cereal largely determines the adequacy of the diet.
5. Dietary deficiency diseases, as beriberi and pellagra, are most prevalent where people are dependent on a single highly refined cereal.
6. Diets which contain large amounts of cereal foods are liable to be inadequate unless they are supplemented with foods rich in calcium, vitamin A, and vitamin C, and with foods containing animal protein.
7. The nutritive value of a cereal food depends largely on the extent to which it has been milled, subjected to high temperatures, and enriched.

D. Meat, poultry, fish, eggs, and legumes are excellent sources of protein, iron, niacin, riboflavin, and thiamine.
   1. Two to three servings of foods of this group are usually found in the adequate diet.
   2. For adults, a daily diet which includes one pint of milk, one serving of meat, and one egg or a serving of legumes is likely to ensure an adequate supply of protein.
   3. When it is necessary to make a substitution for meat as a source of protein, various combinations of milk, cheese, eggs, dried beans and peas, and peanuts may be used.
   4. Meat substitute dishes should contain liberal amounts of protein-rich foods as milk, eggs, legumes, or cheeses; starchy dishes with a sprinkling of cheese, meat, or eggs are not to be regarded as meat substitutes.
   5. Although meats differ somewhat in their nutritive value, beef, pork, lamb, poultry, and fish are generally interchangeable in the diet.
   6. Although the best proportion is not known, it seems desirable and practical in the United States for some of the protein in one's diet to come from animal sources.
   7. Edible organ meats such as heart, kidney, and liver are valued for their protein, mineral, and vitamin contribution to the diet.
   8. Eggs are a good source of protein, iron, vitamin A and some of the B vitamins; their frequent use as such or in prepared foods contributes to a good diet.

E. Vegetables and fruits add variety and nutritive value to the diet.
   1. The daily use of at least three to five servings of fruits and vegetables comprises a good dietary guide.
   2. The deep-yellow vegetables and fruits usually contain an abundance of yellow pigments, called carotenoids, which are partly converted into vitamin A in the human body; there are other yellow pigments which do not give rise to vitamin A, and some yellow foods, as oranges and rutabagas, are not exceptional sources of this vitamin.
   3. In some foods, as the dark-green leafy vegetables, tomatoes, and prunes, other pigments conceal the yellow pigment, and these foods are valued as a potential source of vitamin A; dark-green leafy vegetables are therefore classed with the deep-yellow in daily food guides.
   4. Citrus fruits, strawberries, cantaloupe, broccoli, sweet peppers, and turnip greens contain large amounts of vitamin C; tomatoes and cabbage are less rich in vitamin C but are practical sources because of economy and availability.

5. The importance of citrus and tomato juices as dietary sources of vitamin C has led the Council of Food and Nutrition to develop the following minimal criteria for the vitamin C content per 100 ml. (Approx. one-half cup) of these foods: orange juice, 40 mg. for single-strength juice at the time of packing; grapefruit juice, 30 mg.; orange-grapefruit juice blend, 35 mg.; tomato juice, 17.5 mg.[3]
6. When potatoes are used frequently, they supply a substantial amount of vitamin C, though the amount actually obtained will vary with the method of preparation.
7. Other vegetables and fruits supplement the food energy, minerals, and vitamins furnished by dark-green leafy and deep-yellow vegetables, the vitamin C-rich fruits, and potatoes.
8. All fruits and vegetables except legumes furnish negligible amounts of protein; most are also poor in calcium.

F. Fat foods may be eaten as needed to complete the requirement for food energy, to provide specific nutrients, and to make one feel satisfied by the food eaten.
1. In the digestive tract, fats are broken down mostly to smaller fragments, glycerol and fatty acids; fatty acids differ in chemical nature and some serve special purposes in the body.
2. Fatty acids differ conspicuously in the length of the carbon chain which comprises them and the completeness with which the remaining combining power of the carbon atoms is used to hold hydrogen atoms; when the carbon atoms are fully linked with hydrogen atoms, the fatty acid is described as saturated; when hydrogen atoms are missing, the fatty acid is unsaturated, or polyunsaturated, depending on the number of carbon atoms incompletely hydrogenated.
3. The character of a fat is largely determined by the chain length and degree of saturation of the fatty acids that comprise it; the process of hydrogenation is used commercially to convert a soft or liquid fat to a varying degree of firmness.
4. High blood plasma concentration of cholesterol, a fatty substance, has been associated with the deposits of this substance in the walls of blood vessels with subsequent impairment of their elasticity, and possible, though as yet not proved, relationship to coronary heart disease.

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[3] Importance of Vitamin C in the Diet: Food Standards. Report of the Council on Foods and Nutrition. *Jour. Amer. Med. Assn.*, 160:1470 (April 28, 1956).

5. Cholesterol is an important substance formed within the body as well as consumed as such in foods; its concentration in blood plasma is determined by chemical processes in the body plus a variety of factors, including diet.
6. Some of the dietary factors that appear to lead to the elevation of blood cholesterol are: food energy, or calories, in excess of energy needs; high intakes of fat foods, especially if rich in certain saturated fatty acids and cholesterol; high intakes of proteins especially from animal sources; high intakes of rapidly absorbed sugars.[4]
7. High blood plasma concentrations of cholesterol can be lowered by a variety of dietary factors: relatively high dietary intakes of polyunsaturated fatty acids (notably linoleic); high intakes of nicotinic acid; use of starches instead of sugars; diets of strict vegetarian-type; and stepped-up energy metabolism whether induced by exercise or by chemical stimulation.[5]
8. Present evidence of health problems arising from intake of fat is sufficient to warrant a recommendation that fat be eaten in moderation and that a variety of fats be chosen for daily consumption.
9. The fat content of the diet can be controlled roughly by paying attention to the amounts eaten of visible fat of meat, the use of table fat, nuts, and rich sauces, gravy, salad dressing, and rich desserts.
10. Vitamin A — which is carried by fats in butter, cream, and egg yolks, and in very small amounts in meat fats — is lacking in unfortified, refined fats of vegetable origin.
11. When oleomargarine is fortified with vitamin A, its vitamin A value is equal to the average concentration in butter over the seasons.
12. In a low-cost diet, when the expenditure for table fat is disproportionately high, the nutritive value of the diet suffers.
13. Fish-liver oils or concentrates of vitamin D are used to supply this vitamin, since foods in their natural state contain it in negligible amounts.
14. Fish-liver oils contain vitamin A and iodine, in addition to vitamin D, whereas many other vitamin D preparations contain vitamin D only.
15. Fat-rich diets are usually high in calories, and the continued use of such diets by relatively inactive people leads to obesity.

[4] C. M. Coons, "Fats and Other Fatty Acids." *Food*, USDA Yearbook of Agriculture, 1959, pp. 74–87.
[5] *Ibid.*

16. Fat foods are as completely digested as are carbohydrate- and protein-rich foods.
17. Because fat foods are somewhat more slowly digested than others, they provide a "staying" quality to the diet.

G. Sweets provide a concentrated source of food energy and are useful in adding calories to diets containing enough of the nutrients, in making other foods palatable, and in adding interest and satisfaction to meals.
   1. Sucrose, or common table sugar, contributes only calories to the diet and when taken between meals in the form of candy or concentrated sweets, may diminish the appetite for the following meal.
   2. Most candy and soft drinks furnish only food energy, while milk, fruit, and fruit juices furnish food energy plus nutrients needed for many body processes.
   3. Very active adolescent boys and girls may need the extra food energy furnished by desserts such as pudding, cake, and pie.
   4. For children who have an abnormal craving for sweets, special effort should be made to see that they have liberal amounts of milk, meat, fruits, and vegetables.
   5. With the correction of faulty diets, by increased use of milk, meat, fruits, and vegetables as needed, children have, been observed to lose their abnormal craving for sweets.
   6. Good dental hygiene is especially important for children after eating concentrated or sticky sweet foods, since acid substances formed by bacteria on the food residues adhering to the teeth may cause decay.
   7. Because sugar can be quicky digested and absorbed, its food energy is quickly released to the body, but foods containing protein and fat provide food energy over a longer span of time.

H. Some substances when eaten or ingested create nutritional problems.
   1. Alcoholic beverages yield calories but few nutrients to the body, and if taken in large amounts may increase the needs for several nutrients; for a combination of reasons people addicted to alcohol are often poorly nourished.
   2. Mineral oil dissolves the carotene of green and yellow vegetables and fruits, and if used along with these foods may interfere with the absorption of this substance and reduce its value as a source of vitamin A to the body.
   3. Some foods, as spinach, contain oxalic acid which interferes with the use of calcium by the body; these foods,

however, often contain several nutrients in large amounts and so should not be excluded from the diet.

4. Since raw egg white contains a substance which interferes with the use of one of the B vitamins by the body, it is best not to use raw egg white frequently.

7. Good nutrition is promoted by handling and using foods so that they will furnish their maximum of the nutrients.

A. Nutrients such as vitamin C, which are soluble in water and changed by exposure to air, are easily lost or destroyed in food preparation.

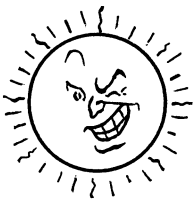
1. The liquid in which vegetables are cooked contains valuable minerals and vitamins, and, if not served with the foods, may be conserved by use in soups, sauces, and gravies.
2. Fruits and vegetables such as apples and potatoes lose much of their vitamin C content when sieved or mashed, as the increased contact with the oxygen of the air decreases their vitamin C content.
3. Appearance, quality, and nutritive value of vegetables and fruits are conserved by quick cooking in small quantities of water.
4. If fruits and vegetables are kept at room temperature after slicing or chopping, they may rapidly lose vitamins through exposure to oxygen in air and to light.
5. Keeping vegetables hot after they are cooked, or reheating cooked vegetables, cause loss of some color, flavor, and vitamins.

B. In cooking foods, the addition of an alkali, such as baking soda, increases the losses of some of the vitamins, especially vitamin C and thiamine.

1. Addition of soda may preserve color of green vegetables but may cause some loss of vitamin C, thiamine, and, to a lesser degree, riboflavin.
2. Small excesses of baking soda in quick breads, as biscuits and cornbread, may abolish the benefits of enrichment.

C. Exposure of foods to light has a harmful effect on some nutrients.

1. Riboflavin, which is liberally supplied by milk, is destroyed when milk is exposed sufficiently to direct sunlight.
2. Storage in a dark place or opaque containers helps to retain the nutritive value of foods.



Sometimes a villain!

D. Since people eat foods that taste good to them, it is important that foods be prepared so as to be palatable.
   1. When meat is cooked at a low, or moderately low, temperature there is less loss of the juices.
   2. The cooking methods of meat will vary with the kind of meat; dry heat may be used for tender cuts, as steaks or roasts, and moist heat for the less tender cuts.
   3. Tough cuts of meat can be tenderized by long cooking with moist heat at, or just below, boiling temperature; this produces chemical changes in the connective tissue.
   4. When cheese is cooked at high temperature, it becomes tough and stringy; when heated gently, it softens to a creamy consistency and retains its original flavor.
   5. Eggs will be most tender if cooked at relatively low temperatures; sizzling hot fat and boiling water result in poorly cooked eggs.
   6. Overheating fat in frying causes it to decompose and produce irritating substances.
   7. Although the general rule for cooking vegetables is to cook in a covered pan in the smallest amount of water possible and for the shortest time possible, there are exceptions: green vegetables will become dull and brown if cooked in a covered pan, and most strongly flavored vegetables, except cabbage, will be less palatable if not cooked in a fair amount of water.

E. Foods must be made safe for human consumption even though the nutritive value may be slightly impaired.
   1. Pasteurization makes fresh milk safe for human consumption but does not improve its nutritive value or remove the necessity for sanitary practices in later handling.
   2. Milk sold from an open can or container can seldom be considered safe and therefore cannot be considered economical at any price.
   3. After frozen foods are defrosted, they require the same precautions in handling as do fresh foods.
   4. Frozen prepared foods, as creamed chicken, are not sterilized in processing, and hence should not be thawed and allowed to stand but should be cooked from the frozen state.
   5. Mixtures containing milk and eggs are an excellent medium for growth of bacteria and therefore should be cooked immediately or refrigerated.
   6. Because of the danger of ingesting trichinae, small organisms which are sometimes imbedded in the muscle fibers of pork, it is necessary to cook this meat thoroughly, although some of the thiamine may be destroyed.

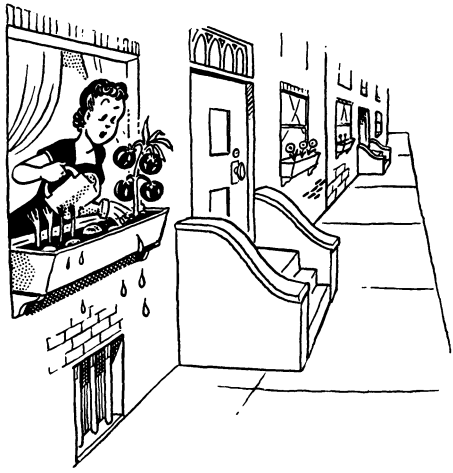
7. The acidity of foods helps to protect against losses of vitamin C in commercial canning; citrus juice and tomatoes remain an excellent source of vitamin C after canning.

F. Since the nutrients in foods are not usually distributed equally in all parts of the food, discarding portions of food may reduce its nutritive value.
   1. Large amounts of the minerals and vitamins in vegetables often lie directly under the skin, so that vegetables cooked in the skin usually retain more food value than those cooked by other methods.
   2. Through refining grain, the nutritive value of flour and meal is diminished.
   3. By discarding the outer green leaves of a head of lettuce, this food loses much of its value as a source of vitamin A and iron.
   4. Since the juice of acid fruits represents only a portion of the whole fruit, it is probably unwise to replace whole fruit entirely by juices.
   5. Fat from meat which is left as plate waste reduces the calorie value of meat.
   6. Amino acids and fat may be lost if drippings from meat are discarded.

8. Good nutrition may be furthered for low-income families through wise and economical food budgeting and buying.

A. Enough money from the family budget should be allotted to food to ensure an adequate supply of the nutrients needed by all of the family members.
   1. A good plan for budgeting the money to be spent for food will vary with the circumstances of the family, but care should be taken to allow enough money for milk, meat or other protein-rich foods, and the vitamin-rich fruits and vegetables.
   2. Poor nutrition is likely to become prevalent in periods of rising food costs or loss of income unless people see the wisdom of allocating money for food even at the sacrifice of some immediate comforts and items that may reflect the family's standards of living to the public.
   3. Through home food production food costs may be substantially reduced.
   4. Nutrition education makes it possible for many people with low incomes to have diets nutritionally adequate.

B. Wise, economical food buying involves consideration of unit cost, amount of waste, nutrients supplied by the food, and



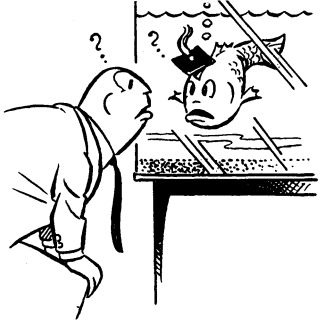
Home food production substantially reduces food cost.

time, energy, and further expense in preparing the food to serve.

1. Protein-rich foods are often expensive; after the need for them is supplied, economy may be gained by using carbohydrate- and fat-rich foods to meet the energy needs.
2. If a cut of meat contains much bone, connective tissue, or gristle, it may be expensive even though the price per pound is low.
3. Fruits with thick skins or bruised spots, and vegetables with a large proportion of coarse outer leaves or shriveled skins may not be economical purchases because so much of them cannot be used for food.
4. A careful study of the unit cost of fresh, dried, canned, and frozen fruits and vegetables may be necessary to determine the most economical form in which to purchase the food.
5. Milk is an economical source of a number of nutrients; cream is expensive to buy in relation to the nutrients it furnishes.
6. Substitution of dried or evaporated milk for fresh milk is often economical, and is highly desirable if the sanitation of fresh milk is not safeguarded.
7. Good, low-cost diets may be obtained through the liberal use of cereal foods and legumes, supplemented with inexpensive forms of milk and cheap vitamin-rich vegetables such as cabbage, carrots, or tomatoes (home grown or canned).

9. Good nutrition demands that one be able to discriminate between fact and fallacy in the vast amount of advertising, food misinformation, and popular beliefs about the use of foods.

A. Sound information about the nutritive value of foods and the nutritional needs of the body provides the best basis for making intelligent choices of foods in the midst of the mass



No food serves a special purpose — such as fish serving as a brain food.

of information and misinformation confronting the consumer.

1. There is no reason to believe that any combination of sanitary foods is harmful or poisonous, or that certain foods when used together have some unusual reaction on the body.
2. Foods lose their identity in the digestive tract where the nutrients, regardless of their individual sources, are made available to the entire body; no food serves a special purpose, as for example, fish serving as a brain food.
3. Excesses of vitamins above those needed for the use and stores of the body will not be likely to yield special benefits in the form of extra vim or vigor.
4. Vitamin pills will be beneficial only to the person who has a real deficiency, and many pills contain a number of vitamins which the person does not need in amounts greater than he receives in his usual diet.
5. Special diets, advertised to meet specific conditions, often are seriously deficient in some nutrients and would be harmful if used over a period of time.
6. Claims regarding great nutritional benefits derived from using special types of cooking equipment are often misleading; furthermore, claims regarding "disastrous toxic effects" are unfounded.
7. Acid fruits and vegetables do not produce an acid condition of the blood or of the body.
8. No foods or diets now known can produce any spectacular benefits for arthritis, rheumatism, or cancer.
9. Money spent for "health foods" and "health aids" will usually be better spent for nutritious foods which contribute toward a good diet.
10. Although the individual should always be receptive to new ideas regarding the use of food, food fads and sensational claims should be viewed critically in the light of the best current knowledge in nutrition.

10. Good nutrition is promoted by maintaining the body in a condition favorable for utilizing the nutrients.

A. Since infection may increase the need for certain nutrients, it may be a factor in bringing about a state of poor nutrition on an apparently good diet.

1. Well-nourished children are less likely than poorly nourished children to contract many infections.
2. Growth of children whose diets apparently have been good may be retarded by infection.
3. Nutritional deficiency, whether caused by poor diet, infection, or disease, during the formation of teeth, may result in their improper development and predispose them to decay.
4. Nutrient needs may be increased by illness at the same time that food intake and use are decreased; if the condition is chronic, malnutrition may become a complicating factor.
5. Protein-rich foods furnish materials from which the body can build substances in the blood which help to guard against infection by disease organisms.
6. Large amounts of protein in the diet aid recovery from wounds, burns, broken bones, and wasting illnesses.

B. Emotional stability and relaxation aid in maintaining good nutrition.
   1. Emotional disturbances such as worry, sorrow, anger, and anxiety, often increase or decrease the desire for food and thus affect body weight and health.
   2. People sometimes try to compensate for lack of social acceptance by overeating and consequently they become overweight.
   3. Hyperactivity associated with nervous tension often results in chronic underweight.
   4. Adequate rest helps maintain body weight through its effect on conservation of energy.
   5. After extreme exercise and tension, a period of rest is needed before a meal is eaten.

C. The nutritional requirements of the undernourished person may be greater than those of a normal person of the same size.

Emotional disturbances often decrease the desire for food . . . .

1. A continued state of malnutrition may reduce the ability of the body to utilize nutrients.
2. The muscles of the digestive tract and the functioning of the digestive organs are impaired by poor nutrition.
3. In certain kinds of nutritional deficiencies the appetite is markedly decreased.

11. Good nutrition is promoted by wise distribution of foods among meals and snacks.

A. The organization of the food of the day into meals and snacks is one of the most important steps in attaining good nutrition.

1. An organized plan of eating makes for convenience and control of food intake, but the physiological benefits of regularity are yet to be shown, as is the optimum frequency of eating.
2. Animal experimentation indicates that frequency of eating may be a factor influencing the utilization of nutrients, but insufficient evidence is available to recommend alterations in current practices of human beings.
3. Breakfasts containing generous amounts of protein of good quality are more likely than others to maintain a feeling of satiety, alertness, and well-being throughout the morning and perhaps even into the afternoon.
4. Skipping breakfast has been shown to result in a decrease in maximum work rate and in maximum work output in the late morning hours.
5. A substantial proportion of some nutrients (especially protein furnished by animal foods) distributed through the meals of the day may be important to the efficient utilization of the nutrients.
6. If one meal is missed during the day, careful planning will be required to furnish the nutrients needed by the body in the other two meals.
7. Excessive hunger, brought about by missing meals, may lead to discomfort and indigestion because of overloading the stomach when meals are eaten.
8. If enough time is allowed for meals, they are more likely to be enjoyed and less likely to be reduced in amount or missed altogether.
9. Informality and freedom from physical discomfort or embarrassment increase pleasure at mealtime.

B. Snacks comprise an appreciable portion of the day's food for many people, and should be highly nutritious.

1. If snacks provide nutrients not liberally supplied in the

three meals of the day, they can help in maintaining a good diet.
2. Food eaten in snacks must be considered in planning or evaluating the day's diet.
3. Snacks tend to be rich in carbohydrate and poor in most nutrients, hence they add little but calories to the diet.
4. If fruit and fruit juices, raw vegetable strips, simple sandwiches, and milk are available as snacks, children may be less tempted to eat rich foods that may spoil their appetite for the next meal.
5. Well-chosen snacks not only give a sense of well-being but they supplement the day's meals so that total food intake fully meets the individual's requirements.
6. Suitable mid-morning and mid-afternoon snacks have been observed to increase the efficiency of many industrial workers.
7. Eating sweet foods not long before meals diminishes the desire to eat at meals.

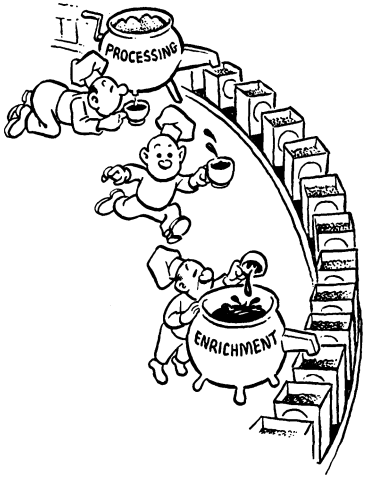
12. Good nutrition is promoted by supplementing or processing foods as needed.

A. Under normal conditions individuals can obtain the needed nutrients, except vitamin D, through natural foods.
1. Vitamin and mineral supplements are valuable adjuncts for use by physicians in the treatment of many conditions.
2. Fish-liver oils or concentrates of vitamin D are prescribed for children and others known to need this substance since foods in their natural state do not contain vitamin D except in very limited amounts.
3. When clothing, smoke, fog, window glass, or geographic location prevent direct rays of the sun from reaching the skin, vitamin D needs to be supplied to growing children and pregnant and lactating women through supplements like cod-liver oil and vitamin D concentrates, or through vitamin D milk.
4. Natural foods probably have some important, as yet unknown, factors which vitamin preparations may not contain unless they are concentrates of some naturally occurring substances such as liver, yeast, and cod-liver oil.
5. If large amounts of certain minerals or vitamins are taken, they may increase the need for others and so create deficiencies where none existed in the beginning.
6. Some vitamin preparations such as concentrates of vitamins A and D taken in excess of the prescribed dosage may be toxic to the body, and may endanger health.
7. If milk cannot be taken, calcium compounds are often

prescribed by a physician as a supplement to the food intake.

8. If one has been ill or undernourished, vitamin preparations may be needed for a time to furnish the amounts required to hasten recovery.

B. Enrichment and fortification of some foods are good measures when foods have been impoverished in processing and when diets of people are known to be generally lacking in the substances added.
   1. Enriched flour is white flour to which three B vitamins — thiamine, riboflavin, and niacin — and iron have been added in amounts approximately equal to those lost in milling.
   2. Enriched flours, bread, and cereals improve diets without changing food habits since almost everyone eats these foods in some form every day.
   3. Enriched bread is white bread, which contains specified amounts of iron, and the B vitamins — thiamine, riboflavin, and niacin.
   4. Enriched flour and bread are especially effective in improving diets of low-income families, since these families usually eat large quantities of such foods.
   5. One quart of vitamin D milk usually contains the Recommended Daily Dietary Allowance of vitamin D for children of all ages and for pregnant and lactating women.
   6. If iodized salt is used on the table and in food preparation, it will supply enough iodine to prevent simple goiter.
   7. When oleomargarine is fortified with vitamin A, its vitamin A value is equal to the average concentration, over the seasons, in butter.
   8. Since citrus fruit juices and tomato juice are important sources of vitamin C, standards have been set for the



Restoring nutrients lost in processing . . . .

vitamin C content of these juices; these standards are to be attained by care in selecting and processing the food used rather than by adding synthetic ascorbic acid.

C. Chemicals in food processing serve many useful purposes: as nutrient supplements, anti-spoilants, flavoring agents, moisture-content controls, or means of improving functional properties.
   1. Chemicals have varying degrees of toxicity, but they are not harmful to man when used in recommended amounts and under proper safeguards.
   2. Consumer protection against improper use of chemicals in food is afforded by self-regulation of chemical and food industries, and by several branches of government.
   3. A 1958 amendment to the food and drug law provides that industry must prove the safety of chemicals used in the processing of foods before the chemicals can be sold for use in foods; this applies equally to substances added directly to foods and to substances likely to contaminate food during processing and packaging.

13. Nutrition plays a special role in the prevention and treatment of some physiological conditions which are prevalent.

A. Weight control may be achieved through proper adjustment of food intake to the body needs.
   1. For good nutrition, reducing diets should include the amounts of meats, eggs, vegetables, fruits, and milk needed to supply the nutrient requirements, and should limit fats, breads, and cereals so as not to exceed the food energy requirement for the reducing regime.
   2. To avoid feeling hungry when reducing, one may eat liberal amounts of low-calorie fruits and vegetables.
   3. If prolonged reducing diets do not furnish protein, minerals, and vitamins needed for growth or maintenance, the body may be permanently damaged.
   4. Meals recommended for people who need to gain weight include liberal use of fats, whole-grain or enriched cere-

Underweight people may need more than three meals per day.

als, sugars, meats, eggs, cheese and whole milk, and plenty of fruits and vegetables.

5. To obtain the amount of food needed to gain in weight, it may be necessary for underweight people to eat more than three meals per day and to take much rest.

B. Good intestinal hygiene depends on the maintenance of good muscle tone, a favorable type of bacteria in the intestinal tract (intestinal flora), regular time for elimination, and perhaps ability to relax from mental and emotional strain.

1. A generally good diet, possibly with regularity in eating, contributes to the conditions which promote good elimination.
2. Fruit and vegetables in the daily diet provide nutrients needed for a healthy digestive tract and, in addition, roughage which helps in moving the intestinal contents along the digestive tract.
3. Although it is important that waste materials be regularly removed, the body is protected against toxic products formed by bacterial action on these residues, and overanxiety about elimination serves only to aggravate the situation.

C. Although the exact relationship of nutrition to dental caries is not known, good nutrition may help to prevent dental caries, to check progressive decay, and to increase the resistance to dental decay in the next generation (see 1B).

D. Liberal amounts of protein, iron, and the B vitamins help to maintain the hemoglobin and red blood cells of the blood at a high level, and thus to prevent anemia; it is especially important that adolescent girls take dietary precautions to ensure good stores of iron and high levels of hemoglobin in the blood (see 5C and D).

E. The severe lack of certain nutrients, usually accompanied by other stresses and strains, will result in dietary deficiency diseases which, though rare in this country, are prevalent throughout the world; some of these conditions with the nutrient involved are: *scurvy*, vitamin C; *beriberi*, thiamine; *pellagra*, niacin; *xerophthalmia*, vitamin A; *endemic goiter*, iodine; *kwashiorkor*, the nutritional disorder affecting many children in the world today, complete protein.

14. Good nutrition is promoted by establishing good food habits and good attitudes toward food.

A. Good food habits require that individuals be able to change the kinds and amounts of food they eat as they change in age,

physical and physiological needs, and social or economic level.

1. As individuals grow older and become more sedentary, they must curtail their calorie intake if they are to avoid overweight and its accompanying ills.
2. If appetite and hunger have become geared to large amounts of food during periods of considerable activity, eating must be controlled when activity has been reduced.
3. With increased incomes and access to good food, a person must be able to control his use of rich foods and social eating and drinking if he is to avoid overweight and possible obesity.
4. When people have learned to like a variety of foods, they can more easily adjust their diet to meet changing conditions.
5. Some knowledge of the nutritive value of foods is important in making dietary adjustments for changing conditions of life.
6. Pregnant and lactating women may need to accustom themselves to larger intakes of some foods than they usually have.

B. The development of food habits is the result of many influences.

1. When parents have some knowledge of nutrition and of the psychology of feeding children, they may do much to help their children form good food habits.
2. The example set by parents and teachers is a powerful force in forming good food habits.
3. The school lunch is one of the best means of showing children the essentials of a good meal.

The development of food habits is the result of many influences.

4. Food habits often reflect the family's customs, nationality, and religious background.
5. Modern advertising influences the food habits of people directly through information about the product and indirectly through associations built up around it.
6. Food habits of people are sometimes revolutionized through new products on the market.
7. Social customs of groups to which one belongs are powerful factors in determining food habits.

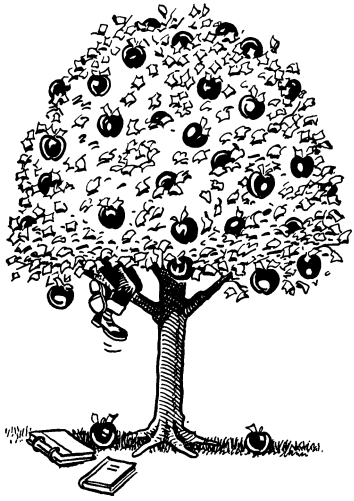
C. The development of good attitudes toward food and eating is basic to the development of good food habits.
1. If people can be helped to understand the relationship of nutrition to the values they hold high, they are more likely to become interested in developing good food habits.
2. The primary purpose of eating is to provide for the body needs.
3. Although meals should be pleasant and eating enjoyable, pleasure should never become the primary purpose of eating.

D. Continuously good food habits are conducive to the best state of nutrition.
1. The past state of nutrition is an important factor in determining how the present diet is used by the body.
2. If a child is not fully developed or physically fit because of a long period of faulty eating, a liberal amount of nutrients will be necessary over a long period of time to rebuild a good body condition.
3. The best way to ensure good nutrition during pregnancy and lactation, when the needs are extremely high, is to establish good food habits in childhood and to follow them consistently through the teen ages.

15. Good nutrition requires assuming responsibility for one's own nutrition.

A. Many of the factors which influence nutrition are under the direct control of the individual.
1. From the variety of foods available the individual has the power to choose or reject, and thus to determine the nutritive value of his diet.
2. Regular hours for eating meals, plenty of outdoor exercise, freedom from hurry and worry, and a nutritious diet help to maintain a good appetite and improve a poor one.
3. By choosing snacks which provide the nutrients not liberally supplied by the meals of the day, many people can improve their nutrition.

Assuming responsibility for one's own nutrition! ! !



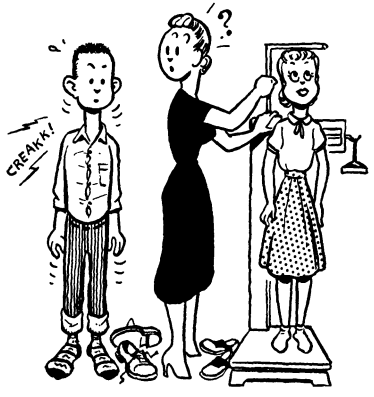
4. Eating a wholesome nutritious breakfast helps people to avoid feeling nervous, tired, and irritable before noon.
5. Adequate rest helps maintain body weight by conserving energy.
6. Missing meals has been shown to be highly related to adequacy of the diet.
7. By taking enough exercise, the danger of excessive intake of calories will be reduced.

B. For some factors which influence nutrition, the responsibility of the individual must be exercised through participation in community, state, and national affairs.
   1. A sanitary food supply requires proper legislation and public opinion.
   2. Fluoridation of a city water supply requires group action and necessitates an informed public.
   3. The enforced enrichment of processed foods, when in the interest of public health, requires action at the state and national level.
   4. Maintaining a sound economy with a high rate of employment and reasonable prices on basic food commodities is important to good nutrition.
   5. Conditions which facilitate distribution from point of production to point of need are essential for obtaining adequate nutrition.
   6. Protection of the public against exploitation is a responsibility of the citizens.

16. A continuous check of nutritional state may be made by keeping a record of body measurements, notably height and weight.

A. Height-weight-age tables are helpful in evaluating the growth of children, but comparisons should also be made of the child's present state with his past over a period of time.

1. Ideal reference tables are based on measurements of children known to be in good nutritional state and to represent the population under study in environment and nationality background.
2. Children who deviate markedly from standards of body size may nevertheless be healthy if they are growing and have the other characteristics of good health.
3. Children who are considerably below the average weight for their height and age may tire more easily and have less endurance than others, although these conditions may be hidden by drives which lead the child to excessive activity.
4. One of the easily detectable signs of undernutrition is the failure of children to make expected weight gains; this can be observed by periodic, perhaps monthly or triannual, measurements of height and weight.
5. Growth is manifested in increase in chemical content of the tissues as well as body size, hence, body measurements are not the only means of assessing nutrition.
6. During the adolescent period normal boys and girls of the same age may differ by four or five years in their physical development.
7. Girls begin the adolescent spurt in growth about 2 years earlier than boys, but the growth spurt of boys, when it comes, is greater than that of girls.
8. Rapid growth in weight during adolescence begins in girls at approximately 10 to 12 years, and in boys at approximately 12 to 14 years; this rapid growth usually is greatest in the year before the establishment of the sexual function.
9. Increases in rate of weight gain of adolescent girls should not be ignored; increases that represent a normal spurt in growth should be adequately supported nutritionally.



. . . normal boys and girls of the same age may differ in their physical development.

B. Height-weight tables are useful guides for adults in maintaining proper weight.
   1. The significance of deviations from standards should be interpreted in the light of the health and the body build of the individual.
   2. Generally, deviations from standards of more than plus or minus 10 per cent suggest the need of readjustment of factors related to the energy balance.

C. In order to compare body measurements taken at different times, the procedures used should always be the same.
   1. Heavy clothing and shoes should be removed before weighing.
   2. Comparisons of weights are best if they have been taken at the same time each day.
   3. Accurate measurement of height requires that the subject assume a standard posture and that the reading be made with the eye on the level of the figure indicated by use of a right angle marker placed on subject's head.

17. Since inadequacy of the diet is one of the first steps toward poor nutrition, a continuous check of the diet is an important measure in the maintenance of good nutrition.

A. If the amounts of food eaten during the day are known, the nutrient intake may be computed from tables of food composition.
   1. These figures may be compared with standards to determine the relative adequacy of the diet.
   2. Because of variations in foods and differences in needs of people, the evaluation may be somewhat inaccurate as applied to a single individual.
   3. When records are kept over a suitable period of time or for large numbers of people, a fairly accurate assessment of the adequacy of the diets may be made for an individual or for a population.

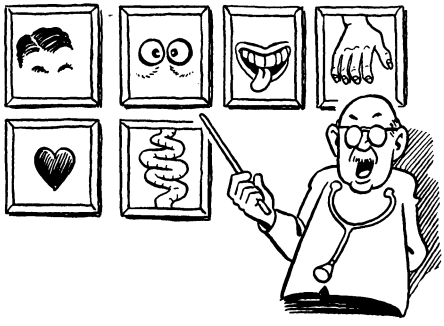
B. When a well-kept record of the day's diet is inspected for the kinds and amounts of foods used, a rough estimate of the adequacy of the diet may be made.
   1. Some training in recognizing sizes of servings is important to the accuracy of this method.
   2. In the use of this method it is important to learn the variety of foods included in the different groups and to know which foods are interchangeable.
   3. Various check lists of food plans have been developed for rating diets according to foods used; these are helpful but should be used with caution because there are many ways by which people may obtain good diets, and food plans are not infallible.

C. Certain blood tests may reveal whether or not the intake of substances, as vitamin C and carotenoids, has been adequate.

D. When an individual is unduly susceptible to such conditions as infection, fatigue, constipation, depression, and hyperirritability, he should investigate his diet and the habits of living which influence the utilization of food.

E. The final test of the quality of the diet is in the people themselves, as stated by Leitch, "The diet of the people of most beautiful physique, most abounding energy, and least ill health is, at any given stage in our study of diet, the inspiration of and check on our theories of optimum diet."[6]

18. Other criteria for judging the nutrition of the individual are based on the study of body composition, functioning of the various parts of the body, and outward clinical manifestations which can be judged by the physician.



[6] Leitch, I., and Aitken, F. C., "Technique and interpretation of dietary surveys," Nutr. Abs. and Revs. 19, No. 3, pp. 507–25, 1950.