CHAPTER I

FOOD HABITS AND NUTRITIONAL VALUES

The present study is devoted to three vital issues about food. In the first instance it traces the relationship between man and food. Man has been relentlessly searching for food since the inception of human life on the planet Earth. In the process he has been devising techniques and developing technologies to make the best use of all sources of food. This is dealt within the first part of the Chapter. The next vital issue is related to the food habits which are really different the world over due to climate, natural endowments, ethical and ethnical and such other influences. The subject matter has been logically presented under the second part of the Chapter: "Influences on Food Habits".

The issue of paramount importance is really the question of nutrition which the intake of food must yield for the development and sustenance of a healthy body and sound mind. It is no wonder that only an insignificant section of the population world over is taking nutritive food and rich diet. A majority continues to suffer from malnutrition. This aspect is presented in the third part of the Chapter: "Nutritive Value of Food".
1.1 MAN AND HIS EARLY FOOD HABITS

Baking has its origin in food habits. Man, ever since the inception of life on earth, as been devising means to feed himself.

The baked food may have been an accidental discovery of the barbarians. Neanderthal man used pointed stones for hunting animals for food. They led nomadic life. Food was the only factor responsible for the migration of Neanderthal man from regions to region.¹

The sharp and pointed stone implements are also known to have been used by Australopithecinae in hunting animals for food². The Neanderthal man first learnt to roast the flesh.³

Climate changes had its own effects on the food supplies to Neanderthal man. In winter, their life was miserable when the food was scanty and in summer preserving the food was difficult. The lack of knowledge to reproduce the sources of food supplies may be regarded as one of the reasons of nomadic life of Neanderthal man. They needed larger quantity of food as they lived in small communities. They had to defend their own regions well from intruders for a steady supply of food. Largely vegetation and hunting were the means of food supply to Neanderthal man.⁴
Palaeolithic man, the successor of Neanderthals, was capable of hunting down larger animals with improvised tools, experience, and skill. They had learnt also to build tents and cover their bodies with animal skins in winter. The discovery of dried and smoked meat in that age was, of course, a step forward to overcome the deficiencies of food due to climatic changes. They also used to make cakes of crushed grains, soaked into pulp and dried in the sun. This type of bread may be rightly regarded as the one ever made by man. Prehistoric finds suggest that primitive ovens were the stones heated with ashes to bake breads.

The foregoing analysis of the early food habits, process, etc. indicates that the art of bread making in one form or the other has been practiced from the very early times. Cakes of barley have been discovered by stone age dwellers. The inhabitants around the Swiss Lake, who lived about 10,000 years ago, had developed the art of baking. Baking was understood by ancient Egyptians and Chaldean. The Bible mentions leavened and unleavened bread. It is a recorded fact about Abraham that he commanded Sarah to make ready three measures of fine meal, knead it and make cakes upon the hearth.

In these primitive times milling and baking were twin arts. Generally the housewives did both the tasks. In Chaldea an oven for baking bread was found in the courtyard
of every house close to the grinding stones. Tomb paintings of ancient Egypt depict all the processes associated with bread making including the planting and harvesting of wheat and grinding, mixing and baking bread.12

The Greek historian Horodotus has given a detailed account of the techniques of bread making in ancient Egypt. In his opinion, Egypt is the motherland of modern bakeries. According to him, there were many varieties of bread and cakes that were made of the basic ingredients of flour, water, salt and leavening. Various seeds and flavours were added. In the valley of the Nile the Egyptian raised barley and wheat.13 They discovered the technique of fermenting the dough and building ovens for lighter bread. The use of yeast for loaf actually originated in Egypt, a technique which is in vogue even today.

The West owes much to Egypt in learning and developing the technique of bread making. There was a difference in shape and ingredients; the bread that had height, breadth and width was made in the West in specially built ovens to heat the dough. Simultaneously from top to bottom, Assyrians and Greeks had adopted the techniques to make tortillas and chapaties. Greeks were proficient in preparing 50 different varieties of bread, as evident from archaeological findings and writings of poets and
historians. The Roman Empire commercialised bread making. Home and public bakeries have been discovered from the excavation of the ruins of Roman Empire.

Britain made legislation to protect both the baking industry and consumers. The Acts of 1822 and 1838 in England specified the kind of bread and enlisted the ingredients to be used to ward off the health hazards from unhygienic and sub-standard breads.

There is no limit to varieties of bread in different countries. For instance, in Germany, USSR and Scadinavian countries rye bread became predominant with some mixture of wheat flour to improve gluten contents. In Mexico and Latin America, tortilla is the most popular bread. In Middle East and India, flat and dry breads-leavened and unleavened- are eaten. In Ethiopia Injerra bread is eaten which is made from high-protein content grain grown in that country. The bread in Ireland is leavened with baking soda and butter milk and contains no yeast.

From the above description it is observed that the food has been the main preoccupation of man since he inhabited the Earth. In the early stages of evolution, his life was miserable and difficult as he depended mostly upon plants, roots or hunting for the flesh of animals. For this purpose they have to keep moving from place to place. As
time elapsed the pre-historic man learnt to culture seeds from which a coarse bread was made. The collection of food was supported by children and old people. This was the beginning of an organised society. The knowledge also dawned that the consumption of raw grains and meat was unhygienic and hard to digest. This, in turn, led to baking bread and boiling meat. Thus, grains in one form or the other have remained a staple diet of human beings since times immemorial. The present system of food consumption has been acquired after prolonged stages of evolution through the process of successive rejection and acceptance.

1.2 INFLUENCES ON FOOD HABITS

Though food has been basic to survival ever since the inception of human life on this planet, there is no uniform consumption pattern. It has always come under the influence of numerous factors ranging from climatic conditions to religious directives, apart from the social, cultural, economic and political set up. In a sense, all these factors put together underlie the eating behaviour which widely varies not only from countries to countries but within the country itself as well. It would be of academic interest to examine these factors and their impact on food habits with a view to make suggestions for substitutes to overcome the deficiency in nutrition. Such a deficiency has
been taking a heavy toll of life. at least, in underdeveloped and developing countries.

1.2.1 Climatic Influences

Climate is admittedly a factor which has always affected food habits and the pattern of food consumption. Food habits vary from region to region according to climatic conditions. In plains, vegetables grow abundantly and in the hills flocks of goat and other animals are in abundance. The natural choice of people has been to prepare their dishes with the locally available food ingredients. The contrast in types of meals has always been there; in the hunting age meat eaters inhabited polar regions and the ice bound areas; the wheat based dishes were popular in the Nile Valley.18

The climatic influence is perceptible in food habits of the contemporary society. For instance, in Northern India wheat flour is used for making breads while the Southern Eastern India rice is the staple food.

Likewise, European settlers in America could not hold on to their traditional food recipes; they had to make adaptations in the traditional dishes.19

In China, as well, there is a marked contrast in food habits of people in different regions according to climate. Northern China is cold and abounds in sheep, goats
and other animals. People there eat meat. On the contrary, Southern part of China is hot and has coastal water. Meals are prepared with fish. In France, there are regional differences in food habits of the people. For instance in Burgandy potted pork is the favourite dish as against cheese, butter and eggs which are commonly used in preparing dishes in Savoie. Italy has a diverse climate and culture which are perceptible in food habits. Sicily for example, has inadequate local sources of food. People preserve food for dry season by various techniques. Rome is known for lavish feasts since the days of the Roman Empire. The food was available in abundance from surrounding good farm lands. Spain is known for its medieval stew/soup which has become staple dish of the people there as a matter of climatic conditions. The people in Costile and Basque take fish which is abundantly available from the coastal waters. It is the staple food there.

In sum, it can be observed that climate condition in different regions of the world is a significant determinant of the food habits and consumption pattern adopted by people.

1.2.2 Cultural Influences

Food habits are an integral part of the way of life of society. It is a well established fact that ethnic
groups have acquired food habits, among other things, from the cultural and social set up.

As a matter of fact, each culture differs in different ways. For instance, in various groups of people, different customs have arisen which determine foods that should or should not be eaten. This accounts for resistance of different ethnic groups to change dietary habits. The cost of ignoring customs, traditions, beliefs, taboos, tastes, preferences etc., can be very high for the producers. For example a U.S. Company had installed a corn-Processing Plant in Italy. This Company could not capture the market, because Italians thought of Corn as "Pig Food". Likewise, Campell Soup had miserably failed to sell its US tomato formulations because of the consumers' preference for bitter taste.24

Taboos and social customs, significantly in less developed countries and tribesmen, are the chief reasons of existing food habits. In some tribes of Nigeria, eggs and meat are taboos; they believe that children fed on eggs and meat grow up to become thieves.25 Taboos are responsible for malnutrition among such groups of people. Similar other taboos prevail in the case of the pregnant women. The diet of pregnant women in some countries are restricted because people believe it necessary to ensure a small baby ad easy delivery.26 She should not eat snails so that her baby will
not salivate too much. She should not eat pounded yams because the pounding is likely to have an effect on the child’s brain. On the other hand, pregnant woman is encouraged to eat food left by rats since this will help ensure on easy delivery such as rats are supposed to have.27 Another dangerous belief, found in some Asian countries, is that a diet rich in animal protein makes a lactating mothers milk toxic to her young child.28

"Alternatively, certain meals may be associated with a period of misery. In the displaced persons camps in Europe in 1945 it was useless to try to induce parents to feed turnips to their children although large stocks were available and vegetables were scarce; turnips meant captivity and hard times and were not acceptable inspite of need".29

In the above cited cases there seems to be scientific basis for the belief and customs about food. These are not only incorrect but also harmful from the point of view of nutritive diet. Margaret Mead emphasises the traditions as one of the foremost factor in food habits. According to her “each society or culture has a set of traditions pertaining to food and eating that is passed on from generation to generation. These traditions vary widely, from the most self-indulgent to the most ascetic.30 Besides
in some societies children are taught to eat all they can hold as fatness is a desirable trait. In others, gluttony of any degree is a disgrace. Restraint in eating may be particularly emphasized for women and children. In France, children are reputedly trained to develop a discriminating palate to prize quality over quantity in food. The primitive African child learns early to prize grasshoppers and grubs as food. Unlike the American child who learns to drink milk.

All in all, it can be said that cultural influences such as customs, traditions, taboos, etc. have a far-reaching impact on food habits and consumption pattern.

1.2.3 Social Influences

Among different influences, perhaps, the social influences impact the food habits and consumption patterns to a large extent. The social influences are discussed in the following paragraphs covering reference groups, both primary and secondary and also influences by the aspiration groups.

Reference Groups: A Consumer’s behaviour in the matter of food intake is influenced not only by major cultural factors like cultural attitude, values and practices, but also by Consumer’s reference groups, family and status. A reference group implies attitude, values and opinions of a
group to which an individual belongs. A reference group has also been defined as "a group of people which influences a person's attitudes, opinions and values".33

Among different influences, perhaps the Social influences impact the food habits and consumption patterns to a large extent. The social influences are discussed in the following paragraphs covering reference groups—both primary and secondary, and also influences exerted by aspiration groups. These groups are classified into:

(1) Primary group comprising friends, neighbours and family members (Informal)

(2) Secondary group which consists of fraternal organisations, professional associations etc. (Formal)

(3) Aspirational groups related to influence of sport heroes and movie stars or young mind.

The consumer reference groups come into existence through socialisation process. It is concerned with knowledge, values, attitude and routine habits in a community.34 The type of food the people take and manner in which they are consumed are the products of the influence of social factors. The impact of these factors cause a change in the dietary habits of the people. The acquisition and formation of food habits are therefore, made through socialisation process.
Primary Reference Group: The members of primary groups play an important role in primary socialization process in the matter of food consumption and nutrition. Primary socialisation takes place early in childhood through the influence of mother, close friends and relatives of the family. Of all these, the strongest influence is that of mother in the formation of food habits who is closely associated with the preparation of food and presentation.

(a) Family Influences: Mothers express attitudes towards their children through feeding, affection, encouragement, irritation, worry, protectiveness which leave a lasting impression on the sensitive mind of a child. This is how a child's behaviour is shaped through a system of reward and punishment. The role of mothers and grandmothers is not only considered essential in the case of child feeding but also in the case of diets of pregnant and lactating women. During child sickness or delivery of next issue young mothers are frequently dependent on their own mothers for help. If these women are not consulted at these crucial periods, young women may remain untrained in future times of need. Ritchie found in upper Burma that the older women of the family and the neighbourhood has strong influence on the young mothers. They are considered as privileged prescribers of diet. These elders believe that restrictions in the diet of pregnant and nursing women are necessary for the health of
the mother and baby. Their ignorance and wrong advice may cause much suffering and even loss of life.  

Besides the role and influences of mother, other family members also matter in affecting the pattern of food consumption. Husband and wife are recognised as heads of the family. They operate as buying agents. Traditionally the wife is supposed to be the main purchasing agent for the family members and controls most of the food items that reach the table, but the husband may exercise indirect control by making his taste known. Apart from this, in some societies, man of the family control the purchases of food items. For example, in a food consumption survey in a village of West Africa it has been observed that men of the household exercise direct control on the purchases of food either by shopping himself or by giving or withholding money.

The family has therefore a profound influence on a variety of food intake by the people. This is so because the selection of food to be eaten is made by parents and grown up members of the family. The choice of food reflects the environment in which the parents have grown up themselves. This includes the geographic region of their origin, their educational level, income etc. Generally an atmosphere of economic security and contentment encourages the positive value of food. On the other hand an environment of anger,
hostility and tension leads to negative food values.

Besides the above, another dimension is the accepted norms in all civilised societies by which different categories of people such as parents and children, husbands and wives, hosts and guests etc. should behave with each other. The distribution of quantity and quality of food occurs quite often according to these relationships. In this process, food is distributed according to the status. Thus the male members in a family are frequently given a better diet especially in developing societies. The most to suffer in such situation are the women of child-bearing age and children. Such primitive beliefs lead to malnutrition and permanent damage to children. In addition boys often have priority over girls. It is well documented that in most countries of Africa and Asia more girls die of infectious diseases than boys.

Besides, food habits are also affected by a family's economic status. The economic status would be measured by the form of savings and the income yielding assets as well. It is generally observed that an individual buys goods within the limit of his financial budget. It is corroborated by expenditure on food by high income and low income groups. According to Engle's Law, the budget for food sows wide difference in the amount allocated to food by the two income groups, high and low. The high
income group includes in their menus usually protein-rich milk, butter, cheese, meat etc. They are able to buy them in and out of season, regardless of the variation in prices. On the contrary, the low income group has got to be very selective in the matter of food items; they can afford only such low cost food items as vegetables, bread, cereals etc. to fulfil their calorific and nutrient needs. This fact has not lost its significance to the modern marketers who follow closely the pattern of personal income while launching their products. As a result of which a large variety of food items are seen as a mark of status in modern society- high quality and expensive food for high status and vice-versa. For instance a food item superior in quality or requiring special skill to prepare ranks high in social status.42

(b) Peers Influence: Sometimes within the groups there are some specific persons who influence and mould the attitude and behaviour of the individuals. These specific persons are those reference groups with whom individuals have normally a close association. Such persons are called Peers groups. For instance, among college students, the peers are the classmates and amongst children the peers may be friends.

Peers seem to give lead to their companions in Social behaviour, including the matter of diet. This usually means confirming to their ways and standards because
deviation from the expected behaviours of the group is likely to arouse hostility. The wish to conform can have undesirable and desirable effects in nutrition programmes.43

It is worth noting that schools are a part of socialisation process in respect of food preferences of the school children. Usually, such preferences take the shape of standards set by peers of the group and school teachers. "A child in a school is exposed to a wide range of influences and to constantly differing values and opinions, thereby acquiring knowledge regarding many varieties of food which improve one's health. Socialisation which is nutritionally oriented can, therefore, be enhanced by the provision in schools."44 Children are, therefore, highly influenced by the kind of food that are popular with their peer groups. Often they also scorn certain food which they generally like because they are quite different and are not in conformity with the prevailing pattern of other children. They are also, sometime, susceptible to the suggestions coming on their part of their teachers and classmates and learn to like food which they have not been familiar with in their home life.

Secondary Reference groups: Secondary group is the formal process of socialisation determining an individual's behaviour relatively to others in the groups, viz members of
association, members of the religion, occupational status groups etc. This reference group influences both the hopes and fears of those who associate themselves with them and also the actual behavior of the latter by laying down written or unwritten restrictions, perceptions and fashions and they may be able to enforce conformity by threats of disapproval or expulsion.45

(a) Influence of Recognized Authority (Official Groups) : Government officials are the recognised authority who exert their influence on food habits of the people. In socialism, the state has absolute control on type of food to be consumed. However, capitalism gives liberty to consumers to indicate their preferences by means of collective demand for food items in the market subject to standards which the state may choose to set for regulating the production and distribution. Indirectly these rules impinge on the consumer's right to consume what they want to. In fact consumerism gives lead to consumers in acquiring new food habits. The state seeks to guide consumerism along the right lines in the interest of the public health. It applies to the mixed economy as well. Here both private and public sectors co-exist and work together. All decisions are taken jointly in respect of food production and distribution. As such, the public, at large, have an unlimited choice among consumption items. It is, therefore, quite apparent that
food habits of the people under this economic system are influenced quite differently.

(b) Influence of Opinion Leaders: Buyers who exert the most influence on buying behaviour are called opinion leaders or influentials. These people possess a certain social status and popularity in the society. By virtue of their high visibility as being political leaders, scientists, etc. they are able to exert a persuasive influence on potential buyers. Through various media such personalities identify themselves with particular brand of convenience food items.

(c) Influence of Aspirational Groups: This is another pertinent reference group i.e. the group of people to whom the individuals generally look forward to for the sake of forming opinions, behaviours, habits and attitudes. In other words we, individuals often adopt the attitude and behaviour of some social group to which we would like to belong. This process is normally known as "anticipatory socialization". This reference group, therefore, provides anticipatory guidance. In this group may be included eminent sports players, politicians, film stars, singers etc.

In the manner described in this sub-section, it can be observed that social influences exert a significant impact, through different sources such as primary and
secondary groups, and aspirational groups, in the pattern of food consumption.

1.2.4 Individual Characteristics

Individual Characteristics such as age, various stages of life cycle, occupation and economic factors also influence the quality and variety of food intake. The type of food the people consume is always associated with the age factor i.e. baby food in earlier years and special diet in old age are considered as staple food.48

Today, adults are leaving the traditional family home to set up an independent household. The modern housewife's role has also changed considerably. Ladies who used to play the role of food managers are no longer under social obligation to acquire special skill and knowledge to prepare good food. Both husband and wife are generally educated and are free to pursue their career and occupation for additional income. This is the result of the industrialisation of society which has altered the lifestyle. Consequently purchasing behaviour as well as consumption pattern have also changed significantly. This unique situation presents special problem of meal management leading to preference towards fast and ready-to-eat baked products.
Industrial workers in contrast to white collar workers have a resistance to different types of food which does not conform to their dietary habits. This segment is largely drawn from rural areas and prefer substantive and stomach filling food. Besides, the regional impact, the food habits are also fashioned by beliefs and other preferences of the ethnic groups. The social and ethno-cultural tastes are fulfilled under the constraints of economic factors, including income and price substitutes. Industrial workers consume food mostly consisting of wheat flour or cheap variety of rice in combination with cheap type of meal or vegetable. This type of food fulfills their need for nutrition to some extent.

The above discussion with regard to food habits reveals that a number of factors such as climatic, cultural and social and individual characteristics exercise a great influence on the food consumption pattern due to which the concept and awareness of the need for a balanced diet is lacking among the masses. A change in behaviour towards nutritive diet can be brought about by means of improved and effective promotional techniques. Consumer education and extension programmes are the various devices for exploration in knowledge on 'Balanced Diet'. The next section focusses on a discussion of the nutritive value of food.
1.3 NUTRITIONAL VALUE OF FOOD

Food industry has come of age by producing convenience food and chemical additives for consumers to derive nutrition at reasonable prices. Nevertheless, the problem of malnutrition, undernutrition and imbalances in food has assumed ever growing importance. It is the problem of three-fourth of the world population, including that of India. A study of nutritive value of food, therefore, is essential in the context of the present research study.

1.3.1 Importance of Food and Nutrition

It is true that food is the basic input for our body. Intake of the right kind and amount of food ensures good health which may be evident from our appearance, efficiency and emotional well-being. In fact, food supplies certain essential chemicals that body depends on to provide energy for use in building, repairing body structure and for regulating body processes. 49

Food is a pre-requisite to nutrition. Diet should be of nutritive value if the health of the individual is not to suffer. It should be derived from different types of food as no single food provides all essential nutrients in the amounts necessary to promote physical growth and maintain health. Therefore, to be well nourished, a large variety of food should be consumed.
The science of nutrition includes the study of those principles by which the sufficiency of diet can be measured. In other words, it deals with what nutrients we need, how much we need, why we need these and where we can get them.50

Various researches undertaken in the field of nutrition have shown "the benefit of good nutrition in attaining optimum body size, a sturdier body structure, superior mental capacity, resistance to infection and increased work capacity which includes stamina and endurance".51 Good nutrition is, therefore an essential part of preventive devices as it can add years to the life span.

1.3.2 Health Nutrients and Nutritional Care

Health is not confined to physical well being. It is defined by the World Health Organization as the "State of complete physical mental and social well-being".52 Health presupposes a sufficiency of nutrients.

Nutrients are components of food that are needed by body inadequate amounts in order to grow, reproduce and lead a normal healthy life. There are six major groups of nutrients: (1) Carbohydrates (2) Fats (3) Protein (4) Minerals (5) Vitamins (6) Water. Broadly speaking, these nutrients serve three functions in the body. First,
nutrients such as carbohydrates, protein and fats provide the body with fuel that releases energy when oxidized. Secondly, nutrients such as proteins and minerals provide chemicals for building and repairing body tissues. Thirdly, all nutrients play a part in regulating body processes or helping the body synthesize its own regulatory substances. The details of the sources of functions of these major groups of nutrients have been shown in Table No. 1.1.

Nutritional care on the other hand is the use of nutritional knowledge to plan meals and preparation of these meals in an acceptable and attractive manner to feed people. It would be deterrent to malnutrition which signifies lack, excess or imbalance of nutrients in the diet. It involves assessment of existing meal patterns and improving these in acceptable manner. The objective of quality of food can be attained through an organised effort. This requires the development of a complex system involving various disciplines.

A food of high quality can be produced for processing and packaging through the application of farm technology. This further requires transportation and marketing facilities in order to make the food available to masses at the time and place where needed. Educational programmes for importing nutritional knowledge in schools as well as at community levels is an additional need in this
regard. Governmental control is also necessary to ensure the supply of nutritive food at a price within the reach of masses. Steps are also to be taken towards the efficient use of food within the home, institution and at public eating places.

In this way various disciplines of life science, human behaviour, economic and communications are required to be inter-linked in nutritional studies.

Table No. 1.1

MAJOR GROUPS OF NUTRIENTS: SOURCES AND FUNCTIONS

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Sources</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td>cereals, baked products, vegetables, nuts, legume, sugar, honey</td>
<td>Source of energy (4 Calories/gm)</td>
</tr>
<tr>
<td>Fats</td>
<td>shortening, oil, butter, margarine, meat, eggs, cheese, milk</td>
<td>Source of energy (9 calories/gm), supply essential fatty acids and carry fat-soluble vitamins. Add flavour and satisfy hunger.</td>
</tr>
<tr>
<td>Proteins</td>
<td>meat, poultry, fish, eggs, milk, cheese, dry beans, nuts, cereals</td>
<td>primary building blocks of all cells. Digest and metabolize food (enzymes); regulate growth and body functioning (hormones); resist infection (antibodies). Source</td>
</tr>
</tbody>
</table>
Vitamins

A
Liver, eggs, butter, margarine, whole milk, cheese, dark green and deep yellow vegetables, deep yellow fruits.

Needed for normal growth and eyesight
Helps keep skin healthy

B-Complex (thiamin, roboflavin, niacin and others)
Liver and other meats, whole grain and enriched cereal products; lean pork (thiamin) milk (riboflavin)

Help body use calories; aid nerve functioning, stimulate normal appetite Help prevent anemia

C (ascorbic acid)
citrus fruits and juices, melons, strawberries, tomatoes, broccoli, cabbage, peppers, spinach, potatoes

Helps hold cells together; strengthens blood vessels, promotes healing. Necessary for normal teeth, bones.

D
fortified milk, sunlight

Helps build strong bones and teeth

Minerals:

Calcium
milk, yogurt, cheese, canned salmon with bones, green leafy vegetables, soybeans

Helps form bones & teeth; aids functioning of heart muscles and nerves; helps blood coagulate

Iodine
iodized salt, sea foods

Prevent goiter, helps the thyroid gland function properly

Iron
Liver and other red meats, shellfish, dry beans, dark green vegetables, egg yolk, dried fruits, prune juice, whole grain and enriched cereal products

Forms hemoglobin, which feeds oxygen to the cells. Prevents fatigue. Increase resistance to infection

Magnesium
nuts, whole grain products, dry beans, fortified milk, sunlight

Helps body use calories, helps
green vegetables form bones & teeth
Phosphorous Well distributed in food supply Helps body use calories, helps form bones & teeth

Source: Adapted from (Fonosch Gail G. and Kvitka Elaine Friedkin: Meal management - Concepts and Applications (San Francisco: Camfield Press, 1978) p.46.

1.3.3 Food Groups for Nutrition

The food consumed is comprised of rice, wheat, dal, vegetables, fruits, milk, eggs, fish, meat, sugar, butter, oil, etc. The different foods are made of a number of chemical components called nutrients.

There is one popular model known as "Basic Four Food Groups" which classifies food into four groups namely milk, meat, fruit and vegetable and breads and cereals. These groups are important suppliers of several nutrients and ensure well balanced nutritive diet. The basic food groups and their key nutrients are provided in Table 1.2.

1. **Milk Group**: The group includes dairy products (i.e. all form of milk). This group provides a significant amount of calcium, riboflavin, protein and vitamin A.

2. **Meat Group**: The meat group including eggs and dry beans, peas and nuts as well as meat, poultry and fish, ranks first as source of Protein, Phosphorous,
magnesium, iron, Thiamin, Niacin, Vitamin B. Because of a high level of consumption, this group ranks second as a source of Vitamin A and riboflavin.

Table 1.2

THE BASIC FOOD GROUPS : KEY NUTRIENTS

<table>
<thead>
<tr>
<th>Food Groups</th>
<th>Key Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>Calcium</td>
</tr>
<tr>
<td></td>
<td>Riboflavin</td>
</tr>
<tr>
<td></td>
<td>Protein</td>
</tr>
<tr>
<td></td>
<td>Vitamin A</td>
</tr>
<tr>
<td>Meat</td>
<td>Protein</td>
</tr>
<tr>
<td></td>
<td>Niacin</td>
</tr>
<tr>
<td></td>
<td>Thiamin</td>
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<tr>
<td></td>
<td>Iron</td>
</tr>
<tr>
<td></td>
<td>Riboflavin</td>
</tr>
<tr>
<td></td>
<td>Vitamin A</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>Vitamin A*</td>
</tr>
<tr>
<td></td>
<td>Vitamin C**</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
</tr>
<tr>
<td></td>
<td>Thiamin</td>
</tr>
<tr>
<td>Breads and Cereals</td>
<td>Thiamin</td>
</tr>
<tr>
<td></td>
<td>Iron</td>
</tr>
<tr>
<td></td>
<td>Niacin</td>
</tr>
</tbody>
</table>

* - Especially in dark green and deep yellow vegetables, such as leafy green vegetables, broccoli, pumpkin and other yellow squash, and carrots and in deep yellow fruits such as carrot, and in deep yellow fruits such as cantaloupe, mangoes and apricots.

** - Especially in citrus fruits, melons, strawberries, tomatoes, broccoli, cabbage, peppers, spinach and potatoes.

Source: Adapted from Fonosch Gail G. and Kvitka Elaine Friedkin: p.57.
3. **Fruits and Vegetable Group**: Fruits and vegetables are the key sources of vitamin A, Vitamin C, iron and thiamin.

4. **Breads and Cereal Group**: The chief cereals are rice, wheat, maize, barley and millets. It provides carbohydrates and starch.

Cereals belong to the family of grasses and constitute the most important groups of food plant the world over. By reasons of easy availability, high yield, low production cost and less spoilage grain is used more abundantly than any other food materials.

**Rice** - It is rich in starch which is food of very digestible form. It is poor in protein, fat and minerals. Therefore it is eaten with vegetables, dals, ghee, meat and fish to make up for this deficiency. A variety of tasty dishes e.g. Idli and Dosa in Southern India and Pulao and Kheer in Northern India are prepared from it.

**Wheat** - It consists mainly of Starch. It also contains some protein, fat, and is rich in mineral matter. The chief protein of wheat known as gluten becomes sticky when heated and forms a dough. This dough is used for making breads, chapaties, puries, biscuits, cakes etc. It is the staple food of a third of a world's population.
Maize - It consists of starch, protein, fats, salts and water. It is deficient in Vitamins. It is of great importance in United States and Western Europe and is a staple food in South America. In India it is principally consumed in the form of Corn-flakes, Popcorn and roasted corn. Unlike wheat, maize is not very suitable for leavened bread.

1.3.4 Nutritive Value of Wheat-based bakery products

The Wheat-based bakery products contain protein and fats in addition to some vitamins and minerals. The baked products are made with whole grain in the form of bread, biscuits, ready-to-eat or cooked breakfast items. It is considered as staple food of a third of the population in the world.

The importance of wheat items is highlighted by British Investigators as follows:

"The progress of 169 under-nourished children, 4 to 15 years of age, was observed in a German Orphanage following World War II when food supplies were limited. The calories in the diets consumed by the children were distributed in these percentages: bread, 75; potatoes, 6; soup, vegetables, fruits, butter, margarine, 15; and milk, cheese, meat, and fish, 4. Whole wheat, enriched and unenriched white breads were used. The diets were not low in protein but only 8 to 9 gms were derived from animal sources. Supplements of Vitmins A, D and C, were included.

At the end of first year the children had more rapid gain in height and weight than would be expected of normal children at the same age level; bone development was somewhat more rapid than
normal, skin conditions improved; and muscle tone increased. The children were judged to be in excellent physical condition. No differences were observed in growth, development, or health with any of the breads tested, but the Vitamin B reserved were somewhat better in those children who had eaten bread enriched to the whole wheat levels. These results clearly demonstrated the nutritive efficiency of unusually large amounts of bread.

Further, the researches on the caloric properties of wheat establish certain facts which are described next. The seed or kernel of the cereal grain is divided into parts; the Bran, Germ and Endosperm. The Alourone layer just below the brown layer is sometimes identifies as a fourth part.

The Bran: The brown outer layers. This part contains:

1. Bulk-forming carbohydrates
2. B. Vitamins
3. Minerals, especially iron

The Aleurone Layers: The layers located right under the Bran. They are rich in:

1. Proteins
2. Phosphorous, mineral

The Endosperm: The white center. This consists mainly of:

1. Carbohydrates (Starches and Sugars)
2. Proteins.
This is the part used in highly refined white flours. Less refined flours and refined cereals are made from this part and varying amounts of the aleurone layer.

The Germ: The heart of wheat (embryel). It is this part that sprouts and makes new plant when put into the ground. It contains:

1. Thiamin (Vitamin B-1) Wheat germ is one of the best food source of thiamin.
2. Protein. This protein is of value comparable to the proteins of meat, milk and cheese.
3. Other B Vitamins
4. Fat and the fat-soluble Vitamins E
5. Minerals, especially iron
6. Carbohydrates.

Cereal grain fulfill important nutrient needs except calcium as corbic acid and Vitamin A.55

In this way wheat is rich cereal and fulfils all the requirements of nutritive diet to a large extent.

The wheat-based products are highly popular in most part of the world including Mexico, Central America, Europe, Northern India, Central China and other parts of the world because it is the cheapest cereal food full of nutrients.

Thus wheat is considered to have high nutrition value. It is highly desirable if nutritional knowledge is
used to combine the bread with other food items to have a 'balanced diet' for proper health and good physique. One of the ways to overcome the problem of nutritional deficiency, more particularly, in rice eating areas, is to make the consumption of wheat-popularised through bakery products having regional taste and flavour.
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