

NUTRITION AND INDUSTRIAL CANTEENS

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One of the major problems of Industrial Welfare Work is the supply of cheap but nutritive diet on the workplace to our workers who are almost always haunted by hidden hunger. In the following article, parts of which appeared in the Indian Textile Journal (September), the writer, discussing the value of food to the working population, outlines the objectives, scope and principles of canteen management in industries

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The need for improved diet among industrial workers has been increasingly felt in our country, especially during these years of stress and strain when a good portion of our man-power is engaged in what are known as "essential services." Never before, perhaps, has the attention of informed intelligence and government authorities regarding the importance of industrial nutrition, been so keenly engaged as it is to-day. This increasing importance of industrial nutrition has been felt due to the growing appreciation of what some nutritionists call "the sub-nutritive state" or "hidden-hunger" among our industrial Workers. It only means a moderate degree of dietary deficiency of some kind. The body, when it fails to get the right kinds of food to provide it with energy, to furnish materials for building and repairing it and to provide the substances that help to regulate its complicated processes, suffers from "hidden-hunger." The workers who suffer from "hidden-hunger" will tire more easily, will be more liable to suffer from accidents, resulting from abnormal fatigue, will be more susceptible to minor illness and will be prone to have lower morale. Malnutrition wrecks morale and spells defeatism and despondency. Wilder, an American nutritional enthusiast, states :—

"Nutritional deficiency saps the vitality in so insidious a way that the victim may be unaware that enough is wrong to consult a doctor..... The minor degrees of nutritional

deficiency although they are not fatal nor incapacitating, constitute the hub of the problem of malnutrition... They undermine the will to do... They seriously depress resistance to other diseases and in women contribute to the concurrence of complications during pregnancy...The undernourished are unable to hold jobs if they find them... They become unemployable."

This, by itself, makes an eloquent plea for the urgent need of improved diet among our industrial workers to promote the optimum efficiency and prolonged psychologic well-being which will result in greater working capacity, fewer absences from work and a decrease in the number of accidents.

Food nourishes the body in three ways. (1) In the first place, it furnishes the fuel to yield energy, which finds its overt expression as warmth and work. (2) Secondly, it supplies the structural materials for the growth and structural upkeep of the body tissues. (3) Lastly, it provides substances, which keep bodily conditions in the right manner, so that life processes proceed normally.

Experts are of opinion that something like 40 nutrients are furnished by the already known food materials to the human body. For purposes of convenience and clarity, we shall follow the conventional "four-square grouping of nutrients, namely (a) the Energy requirements, (b) the Protein

requirements, (c) the Mineral or Inorganic elements and (d) the Vitamins. To resort to a mechanical analogy, which is after all only a portion of the whole picture, the human body can be compared to a motor car and the fuel foodstuffs have their counterpart in the gasoline for the automobiles, the protein and some of the minerals to the materials of which the motor is made, the remaining minerals to its lubricants and the vitamins to the ignition sparks whose own energy is insignificant but which perform the indispensable function of keeping the motor running in an orderly way.

(a) *The Energy Aspects of Good Nutrition.*—Every act and moment of our life involves an expenditure of energy and to estimate properly the energy requirements of a worker, it is necessary to allow for the extra calories consumed beyond the fixed working hours and for some of the ordinary pursuits of pleasure and relaxation, which he usually indulges in. Food is the only source which supplies this much needed energy and modern science by the aid of calorimeters, has been able to measure the energy or fuel values of food, with a good amount of precision. That the body burns a little of the foodstuffs to meet the needs of keeping itself warm is anyway a minor factor. For instance, it is calculated, that an average-sized man sitting still or relaxing spends about 65 to 100 calories(*) an hour and requires only 2,000 calories a day; whereas, in the case of a manual worker an eight-hour use of his large muscles may easily double the day's energy output. The more abundant nutrients or foods which are burned (oxidised,) in the body are carbohydrates, fats and proteins. The importance of milk as a complete food in nature, which protects

the diet from shortage of essentials of food from many angles, can never be over estimated. Milk presents these three organic constituents abundantly and in right proportions as well as some water and mineral matter. It also contains vitamins to some extent, but the amounts of those are too small to be seen in such simple ways as are proteins, fats and carbohydrates. Proteins and carbohydrates occur in many other forms of food, too. In fact, one or more of them can be discerned in almost each and every article, known as food. In wheat and rice flour, so extensively used in our country, the typical carbohydrate and starch predominate. The amount of fats, perhaps, is invisibly small. In meat, distinct layers of nearly pure fat can often be seen by the naked eye. It is calculated that the lean portions of meat consist chiefly of proteins with about three times their weight of water and about 1 % of a mixture of salt. The old idea that a manual worker needs more meat is considered to be erroneous in the light of modern researches. The actual protein requirements of the human body are practically independent of the amount of physical exertion and remain fairly constant for sedentary and strenuous workers, but their total food needs are very different. Work in heavy industries requires a high energy expenditure and then the need for fats, starch and sugar which are the energy-providing substances is greater. Strenuous work, if done under generally hygienic conditions, stimulates appetite and improves digestion and hence more foods richer in fats are taken in by the working class with impunity.

Recent investigations into the field of industrial nutrition indicate that

* Calorie means the amount of heat **required to** raise **the temperature** of one kilogram of water to 10 centigrade.

" frequency of meals " bears an important relationship to fatigue. It is now well known that hunger leads to general weakness, irritability of temperament, diminished ability to concentrate and a disinclination to work. It is reported that there is a distinct rise in the muscular ability of the worker soon after meals. The findings of well-controlled studies prove that the productivity of workers accustomed to 3 meals a day improved significantly when the workers were given additional light lunches in mid-shift rest periods. It may be remembered that there is no violation of the principle of nutrition in providing more frequent meals to the workers. The only thing to be guarded against is that the total daily food intake is thereby not made excessive and the requirements of a well-balanced diet are met with. The food served between meals should meet other qualifications which are important in dispensing supplementary feedings to workers, throughout the plant. Also they should require only little preparation, should be easily and quickly consumed and easily preserved with little or no danger of contamination. They should not come into contact with the worker's hands and must not leave an organic residue to litter the manufacturing areas. These are only some of the main things to be borne in mind in the preparation, preservation and distribution of foodstuffs in an industrial canteen. Those who are in charge of the canteens are also to remember that they have to cater to a wide range of tastes, and success in this lies in keeping foodstuffs attractive and appetizing even after repeated use. The food served should be easily digestible and should not cause gastric disturbances.

(b) *Proteins and their Amino-acids in Food and Nutrition.*—The word "protein" has almost a traditional force in our nutritional terms. It has been coined a

century ago from a Greek verb, which literally means "to take the first place" and was given a name to what was supposed to be the fundamental substance of body tissues.

The main contents of protein are nitrogen and amino-acids, the former forming 16% of the total substance. It is said that a typical protein molecule is so large as to contain hundreds of amino-acids, but usually they are of 20 kinds, of which half alone need be supplied by food, the other half being synthesised by the metabolic changes in the human system itself.

Uptill now, there is no consensus of opinion among experts as to how much protein would be best for each individual to take in, in the interests of nutritional well-being. In our country, wheat, rice and cereals furnish over one third of the total protein of our typical dietaries to-day. In western countries, the idea of enrichment of foodstuffs now current enhances the actual value of, and the confidence in, ordinary white bread. Here, in India too, the nutritive value or nutritional efficiency of the proteins of our grain products is a problem of real importance, awaiting immediate laboratory analysis and research. Several independent experiments have already shown conclusively that the proteins of the whole or unhusked wheat or rice are of much higher nutritive value than white flour or polished grains. The influence of tradition among our people is so strong that even to-day many believe that protein carries all nutritional responsibilities beyond those of calories. Modern knowledge of nutrition has shattered this belief and shown that mineral elements and vitamins are as important as calories and proteins. The best sources of essential amino-acids are animal protein rather than

those of cereal or vegetable origin, because the composition of the former is more nearly akin to that of human beings, and hence they are considered to be of higher nutritional value. For the average adult it is estimated that the sources of protein should be equally divided between animal and vegetable matter.

(c) *The Mineral Elements in Food and Nutrition.*—The development of 20th century science has fully appreciated the idea that the body's framework or skeletal system of bones and teeth owes its strength and normal form to the fact of its being well-mineralised. Speaking from the common sense point of view even, it is not difficult to understand that the chemical elements are the ultimate constituents of which the physical world (both "living and non-living) is built. Mineral salts are the things that 'put life into' the proteins of the body tissues and fluids. Small elements of such soluble mineral salts are constantly present in the soft tissues and fluids of the body. But some of these inorganic elements are required by the body in rather substantial amounts, notably calcium, iron, magnesium, phosphorous, sodium, chlorine, potassium, iodine and sulphur. There are also more numbers of other elements to be added to this list of essentials to life, many of which, however, have not been subjected to adequate tests, to determine, whether or not, they should be included as indispensable food elements. Special attention, however, has been paid to four main mineral elements, namely, calcium, phosphorous, iron and iodine, because, optimal amounts of these are least likely to be provided by a hit-and-miss method of food selection.

Calcium and Phosphorous are the outstanding elements of mineral matter in the building up of our bones and teeth.

The soft tissues of the body contain considerable amounts of phosphorous but only very small amounts of calcium. Rickets, so common among working class children in India, is due to low amounts of phosphorous which can be amended by proper food supplies. But calcium, deficiency is a more important problem in nutrition, because it results in a shortage of bone-building materials. In our usual dietaries themselves, there are adequate amounts of phosphorous present without any special planning on our part. But calcium deficiencies in nutrition are much more important and there is no good way of detecting them, especially in the initial stages. Still, present day knowledge of life-time relationships has made it abundantly clear that most people are born calcium poor. By this, it is meant that the human body at birth has not only a much smaller amount but also a much smaller percentage of calcium than the normal fully developed body contains. There is no doubt that the characteristic of being born with soft flexible bones has a survival value for the human species, for it renders the process of giving birth easier and safer. Having born thus safely, the calcium contents of the body have to catch up promptly and concurrently with the other aspects of its development and this requires an accentuated need for calcium, compared to the other body-building materials. An adequate intake of calcium produces a gradual decalcification of the bones. Fractures occur as a result of insignificant little jolts and tumbles, particularly among adults of middle-age and above. A weak skeleton is a hazard even in the ordinary pursuit of life, not to speak of the strenuous industrial occupations. To prevent this, the best thing is to supply the body with liberal amounts of calcium and phosphorous. Of the ordinary foods not one is

superior to milk' as a source of calcium or phosphorous. A pint of milk per day for every adult would be most helpful in fulfilling these requirements.

The results of what are known as "Calcium Balance Experiments" on animals have made it abundantly clear that a liberal amount of calcium intake through food is increasingly beneficial both to the development of the young and to better health and longer life in the adult. A liberal amount of calcium in the food results in a better development of the internal structures of the bones, particularly in the porous ends of the long bones, where it means a greatly increased surface of bone mineral in contact with the circulating blood and, therefore, a much more prompt and effective restoration of the blood calcium to full normal concentration even after all the many small wastages that occur in everyday life as well as under various conditions of extra work have taken place. The more quickly and completely the blood recovers from every decline in its calcium content, the better the body maintains its highest degree of health and efficiency. In our country milk and green vegetables are the chief sources of dietary calcium. Surprising as it sounds, there are countries using bone as food to make up calcium deficiency.

Iron.—There is no need of special planning so far as this particular mineral is concerned, since natural whole grain or enriched or restored breadstuffs and cereals occupying their full normal place in our food habits and dietaries containing other foods which we generally use will usually furnish enough iron. The only individuals who need more of iron are anaemic patients and they should be treated as a medical rather than a normal nutritional responsibility.

Iodine enters the body almost entirely

as iodide, through drinking water and table-salt. Refined salt is essentially sodium chloride alone, since the purification of salt results in nearly a complete loss of the iodide which was naturally present. Iodine deficiency can best be guarded against by the use of iodised salt. Sea-food in the diet too supplies ample quantities of iodine. The daily iodine requirements of the adult are approximately 0.045 mg. The thyroid is capable of storing excess iodine and for that reason iodine need not be present in the daily diet. Sodium chloride is one of the specific concerns for certain group of industrial workers.—For example, the fact of workers engaged in occupations resulting in profuse sweating leading readily to heat cramps or exhaustion is associated with serious salt depletion. The loss of salt is greatest during initial exposure to heat. Iodine tablets are now available in the market and an effervescent drink with iodine salt duly sweetened can solve this problem.

(d) *Vitamins.*—The idea has been so much before the public that a formal introduction to the vitamin family is superfluous. Though called by a group name, they are not a natural and closely related group and merit individual study and judgment as a nutrient. Each member of this indispensable group has its own part to play and excess of one will not compensate for the deficiency of another. Vitamin deficiency is a form of malnutrition. Deficiency diseases such as pellagra, beriberi, scurvy and rickets are found to be caused by this. Modern scientific research into this field has revealed more subtle forms of diseases too. Slowly accumulated evidences indicate that inadequate diets may be responsible for such symptoms as easy fatigue, indigestion, loss of weight, depression, retarded learning, interference with vision and lowered resistance to disease. Stomatitis, dental caries, cheilitis,

glossitis, and bleeding gums are evidences of malnourishment seen daily by the dental profession.

It is not easy, nor is it necessary, for an article of this type to go into details regarding each and every one of the vitamins. Modern scientific tendencies are to give each of these substances a distinct and independent name, when sufficiently acquainted with its chemical nature. The use of alphabetical sequence is only a device for convenience.

Vitamin A is a colourless fat-soluble substance occurring to an important extent in milk, eggs, fish liver oils, the livers of other animals, leafy green vegetables, dried apricots, etc. It incidentally contributes to that alertness so necessary for safety in the workshop. A lack of Vitamin A results in the retardation of growth and dryness of the skin. It is essential to the maintenance of the normal cellular structure and function of the body's internal and external surface membranes. Vitamin A shortage can result in injuries of the mucous membrane in any part of the body and troubles in respiratory, digestive and excretory systems. It has been also found to result in "night blindness"—a diminution of one's ability to see in a dim light or to adapt one's vision to a change of intensity of illumination. Recent reports from America that the keenness of the sight of aviators and industrial workers has been increased, and the night accidents of the automobile industries decreased, by the use of diets of higher Vitamin A value, though lacking in the conclusiveness of laboratory findings, bring us some important suggestions. Interesting and impressive evidences on the constructive side are also available through well-controlled experiments on rats (who resemble human beings very closely in their reactions to Vitamin A) is a large

factor in the building of hitherto accepted normal levels of performance to better health and longer life. Experiments on growing boys have also shown that the entire Vitamin A lends an extra impetus even to an already normal rate of growth and development. It may be remembered in this connection that the much popular term "Protective Food," to milk, fruits and vegetables has been attributed by Mc Collum, because of their high Vitamin A values.

Vitamin B1 (Thiamine) is essential at all ages to the right use of the fuel foodstuffs, particularly of the carbohydrate. Shortage of this particular vitamin results in the circulation of deleterious products of incomplete oxidation in the blood and usually leads to the failure of appetite and an onset of functional disorder. The prevalence of beri-beri in our country, especially in the South, where people predominantly live on rice may be attributed to this.

Vitamin B2 or G (Riboflavin).—This is "the second member of the B group of vitamins" and an important factor in the oxidation of enzymes (organic substances formed in living tissues and functioning by favouring or expediting—stirring up or speeding up—some of the natural chemical reactions that are involved in our nutritional and other life processes) of our tissues and in the maintenance of their stamina and resistance to strain and to several diseases. Pellagra can be easily conquered by riboflavin. Milk forms the best source in this case too.

Vitamin C (Ascorbic acid).—The name ascorbic acid is given to Vitamin C, because it is the substance which prevents scurvy and cures it with dramatic promptness, if it is not too far advanced.

"It is essential to the integrity of the cement substance which lies

between the cells of the body's various tissues and keeps each cell properly set and supported for the performance of its part in the work of the body. This involves, among other things, the prevention of haemorrhages or oozing of blood through tissues, which due to a shortage of Vitamin C occur in almost any part of the body ; the maintenance of healthy conditions of the gums and teeth ; the development and maintenance of right relations between the ends of the growing bones of a matrix suitable for normal calcification within each bone ; the prevention of some forms of anaemia ; the regulation of heart muscle or muscle tone generally."

There are interesting indications to show that Vitamin C has an important part to play in what has been attractively called "the preservation of the characteristics of youth." It resists toxins formed by certain species of bacteria.

Vitamin C is a substance which is easily decomposed, especially when heated in contact with air and with catalytic substances which increase the rate of oxidation. Short-time cooking in copper vessels with little or no contact with air is the best method to retain Vitamin C.

Two more important facts about Vitamin C need to be noted.

(a) Some foods hold their initial Vitamin C value much better than do other foods, e.g. Tomatoes are much better in this matter than other foods like cabbages.

(b) Apples and potatoes, though not outstanding in their Vitamin C contents, being extremely popular, can be considered as a good source, provided they are taken in, in abundance and handled properly. Apples may be eaten raw and in season.

Potatoes should be cooked with little contact with air and eaten with as little delay after preparation.

Vitamin D (The Antiarchitic Acid).—It is a fat soluble substance which prevents rickets. As to the sources, it can be found to some extent in egg-fat and milk and in much greater concentration in fish-liver oils. Compared to the last, the first two are negligible. Direct sunshine or artificial light containing suitable ultraviolet rays produces Vitamin D in the human body.

Other *Vitamins*.—Much is yet to be known about the Vitamin family. There are some more members added to the B group, and E and H also have been found by experts. Mention may be made in this connection of what is known as Niacin (Nicotinic Acid) which is said to have powers of killing pellagra. It has been found capable of curing the black tongue in the dog. But it should not be forgotten that curing the symptoms does not restore the pellagra patients to full health. Nevertheless, it must be admitted that Niacin deficiency is a part of what is wrong with pellagra patients.

poly-vitamin Preparations *in Industry*.—It is only a simple fact that good nutrition must be based on a good diet of natural foodstuffs. It is not advisable to assure the industrial workers indiscriminately that they can obtain optimum nutritional health through the ingestion of a certain number of vitamin capsules regularly. Distribution of polyvitamin capsules or synthetic vitamins, without proper guidance, is not at all advisable ; for :—

" Supplementing the diet with synthetic vitamins fails to make provision for deficiencies in protein, fats, carbohydrates, minerals and the numerous necessary factors which have not been made available in crystalline

form, but are nevertheless essential for the maintenance of health."

True, under certain conditions, it may not be advisable to depend upon the available "natural foodstuffs" alone for all the essential food factors. It is best to fall back upon the recommendations of the U.S. Department of War Food Administration, so far as this matter is concerned. In very eloquent terms they declare, that "Where there exists an excessive loss of salts or vitamins from the body, where energy output and, therefore, metabolic requirements for these substances are extraordinarily high, or where therapeutic amounts are indicated, the need for the administration of available foods may be present...Again, where the available food supply cannot be depended upon to satisfy even the average requirements for certain essential food factors, either because of deficiencies in supply or due to irremediable losses in the storage, transportation or preparation of foodstuffs, indications for the use of food concentrate or synthetic vitamins may be present... Such conditions should be defined by a trained dietician or a plant physician."

In the prophylaxis of vitamin deficiency diseases, foods naturally rich in vitamins such as "Yeast liver, certain fish liver oils, and wheat germ" are considered preferable to the synthetic vitamins. Wherever possible, such foods should also be incorporated in the therapy of nutritional diseases along with sufficient amounts of the indicated synthetic vitamins.

Having seen the four-squared aspect of nutritional values, it becomes imperative for us to consider the proper groupings of foods with due regard to their nutritional values and their place in the diet. Food should not be merely a substance just to stop persons from being hungry, but it should be capable of helping the

individual to grow up. This brings us to the idea of the "Balance Diet." But it does not in anyway hold that every time we prepare our food there should be an actual weighing of the food materials and their mixing up in the right proportion. The human system is able to tolerate occasional variations in the diet. The only thing we have to guard against is a long-continued excess or deficiency of one or more components which will impair the working of the human system. Tables of a balanced diet in India with due considerations for moderate expenses, which the average labourer will be able to afford, are now available in many publications on health matters in our country, such as those of the Bombay Presidency Health Week Association, the Health Bulletins published from the Government of India Press, etc. It may be worthwhile for us, within the scope of an article of this type, to enunciate some of the broad principles of such a grouping rather than enter into a discussion of accurate details. It can be best done by quoting the seven-fold classification of the U.S. Department of War Food Administration. Preceded by the admonition to eat at least one food from each of these groups and followed by the remark that 'then you may eat any other food you like,' the classification runs thus :

- (1) Green and yellow vegetables.
- (2) Oranges, tomatoes, grape fruits or raw cabbage, or salad greens'
- (3) Potatoes and other vegetables and fruits.
- (4) Milk and milk products—fluid, evaporated, dried milk or cheese.
- (5) Meat, poultry, fish or egg—or dried beans or nuts or peanut butter,

- (6) Bread, flour and cereals—natural wholegrain, enriched or restored.
- (7) Butter and fortified margarine (i.e. margarine with added Vitamin A.)

Enriching of bread by using skim-milk is a recent process adopted in nutrition policies. 6% as much skim-milk powder as flour can be used in bread making, with distinct nutritional advantage and no detriment to the physical properties of the bread. Diets better balanced from the view point of the newer knowledge of nutrition have enabled factory employees to work with higher efficiency and less fatigue increasing both the quality and quantity of their output, with fewer accidents to themselves and their material.

Some Specific Nutrition Problems in Industry.—To-day a large portion of our industrial population carry their meals in lunch "dubbas." Tradition has a great sway over the regulation of the food habits in our country, and the pity of it is that they go by caste, community and even region. True it is, that some of the Indian Industries have made an attempt to provide some in-plant feeding through canteens. But the extreme poverty of the workers, coupled with the lack of provision and low quality of the food served in the all-too-meagre existing canteens, necessitates the labourers bringing their meals from home. In large and extensive plants, a single cafeteria is inaccessible for the major population in the factory, within the short time of the lunch period. Even when good combinations are available in some of the canteens, a large percentage of the workers are found to choose luncheon combinations that are poorly balanced. This undesired ration is partly due to the

faulty food habits of our people and partly it is stimulated by disparity in prices. Milk, fruits and vegetables in our country remain the food of capitalists and spiritual aristocrats, and it is far from the reach of an average labourer's economic means.

Poverty of cooking and serving facilities in the rapidly expanding plants is another important problem we have to face. This situation is further aggravated by the low-grade restaurants which spring up around the factory, over which the management has no control. The culinary facilities in the homes of the workers are grossly inadequate and it is not uncommon that workers come to the factory without any breakfast. It has been authoritatively stated that one half of our fuel is eaten up in the form of sugar and bread. To this may be added the refined fats which make up two-thirds of our energy intake in the form of "inert calories" furnishing fuel only and nothing else. In a large majority of cases amongst the working classes, the limited food budget is spent unwisely along with the prevalence of fixed or faulty food habits.

These findings referring to the factory and home, make it clear that while nutrition remains a family and individual problem, it is as well an industrial problem. There are a number of ways in which industrial leaders can help to improve the nutritional status of all their workers.

Three Main Lines of Approach.—The three main lines of attack in the improvement of nutritional standards through industrial canteens can be directed towards (1) Education, (2) Provision and (3) Economy.

(1) *Education.*—The recommendations of the National Research Council in America can be profitably adopted in our country with certain modifications to suit our

requirements. The gist of the recommendations can be listed thus :—

- (a) Employment of a trained dietician for supervision in the factory canteen and advice to the worker's family.
- (b) Introduction of information about nutrition in plant publications.
- (c) Use of pay-envelope slips, listing items of good food of high nutritional value, which are in season or in the market, available at reasonable prices and within the reach of the average worker.
- (d) Placing artistically written posters emphasising the importance of good nutrition or capable of creating an interest in good food habits at strategic sites about the plant, where employees usually pass or wait in line. (It may be noted that materials capable of evoking a personal interest and periodical changes in the slogans or cartoons may be particularly effective).
- (e) Free distribution of pamphlets and bulletins on Health and Nutrition matters to the workers.
- (f) Conducting classes and demonstrations by the dietician and other nutritional experts for the worker and his wife.
- (g) Maintenance of cafeterias, where foods of high nutritional values are served attractively so as to make the labourers appreciate their gustatory possibilities and nutritional worth.
- (h) Helping the employees in growing vegetable gardens in their homes and on company-owned properties is another avenue of approach. Their efforts may be encouraged and aided by contests, classes in gardening and by collective purchase of tools and seeds. The State department of Agriculture should tender advice and all possible assistance to the workers.

(2) Provision.—Industry should take a keen interest in the type of food served in the plant at mid-day lunches and any supplementary feedings furnished in between meals. The meals served in the plant should at least contribute one-third of the specific nutrients. Vegetables and salads should be prepared in an attractive manner and with minimum losses in their vitamin and mineral contents. Enriched white bread and whole grain products can be extensively used. Special lunches emphasising the use of alternative foods (e.g. bajri, jawar, maize etc.) can be offered at slightly lower than the prevailing prices to increase their acceptability. A wide variety of the so called "protective foods " such as milk, fruits and vegetables should be made available to all the labourers throughout the factory, through travelling wagons, at or below cost to encourage their consumption in preference to non-protective foods.

The aesthetics of food also is a point worthy of consideration in this connection. In combining the menu, the observance of the psychological factors which influence the appetite and making the diner satisfied with the appearance and flavour of the food served, are important matters. A little stretch of imagination on the part of the dietician can easily accomplish

this. Menus with a limited number of choice which are varied from day to day are found usually more desirable by workers than a frequent repetition of dishes and a "sameness" produced when a large number of food choices are used daily. Frequent changes of menu have an element of surprise which adds interest to the food selection. Some broad suggestions in obtaining satisfactory combinations may be noted down below, which can be adopted with slight adaptations as warranted by local requirements and tastes.

- (a) Planning wholesome nutritious meals that appeal to the eye, stimulate the appetite, satisfy the hunger and give pleasure to the diner.
- (b) Seeing that good menu planning goes hand in hand with good cooking to produce foods which are appetising and in which food nutrients are conserved.
- (c) Balancing the flavours of the menu—e.g. accompanying a bland food with a savoury one ; serving strong-flavoured food with a mild-flavoured one; enhancing the flavour of a neutral food with an acid one, etc.
- (d) Contrasting soft foods with crisp, crunchy ones. At least one food in the menu should be crisp.
- (e) Varying the shapes of food served in the plate as e.g. avoiding several round mounds of foods or two or more squares in one plate.
- (f) Combining colours harmoniously—e.g. using yellow, green

or red food to contrast with white or neutral colour combinations etc.

- (g) Seasoning bland food with piquant flavouring by the use of articles such as tomatoes, onions, etc.
- (h) Seeing that the vegetables on the menu are cooked just until done and served immediately to preserve their colour, flavour and vitamin contents.

Success of such a food combination policy requires a mental selection of foods that taste and look well and the using of imagination how food will look when served, and taste when eaten. Such forethought on the part of the dietician will save many on unpalatable meal from being cooked and served only to be wasted largely.

The length of mid-shift meal periods is another problem to be considered. A minimum period of 30 minutes should be provided by the factory ; 15 minutes for the actual consumption of food, and the other 15 as an additional allowance for toilet preparations, changing clothes, going to and from the cafeteria, luncheon room or canteen and the time spent in food service line. In large plants the overall length of the mid-shift meal period can be kept to a minimum by a decentralisation of eating facilities through the use of mobile kitchens and canteens, stationery canteens, strategically situated lunch-rooms, etc. Where distances from the work-room to the canteen are too great, hot meals must be brought by means of pre-heated food conveyors and served to workers in areas set aside near their work-centres. These food conveyors should run on a definite time-schedule to permit

the optimum usage of a lunch period at each station.

"Between-meal" rest periods and refreshments is another matter meriting attention. A rest pause of 10 minutes each, with an opportunity to obtain refreshments during the middle of the first and second half of each shift, is an effective means of combating fatigue, decreasing accidents and lost time and sustaining promotion. The foods offered during the rest periods must be such as would permit a ready service and digestion, with a minimum amount of preliminary preparation on the part of the worker. Milk, citrus fruit juices, tomato juice, fruits and sandwiches with enriched or whole-grain bread with substantial fillings are satisfactory foods for between-meal lunches. It is important to be borne in mind that coffee and tea, although stimulating for a short time, have negligible food value in them, even when taken in with cream and sugar.

Women workers in industry, by virtue of their biological and psychological make-up, deserve special consideration. Curiously enough, several dietary surveys of industrial workers are all in agreement as regards their findings that the eating habits of women are worse than those of men. Plants employing large numbers of women should be particularly careful to make adequate provision for their nutritional requirements. An active nutrition education programme also should be instituted in their favour. The employment of women workers in night shifts is not yet a problem in India. In the west, women with domestic duties as well as young girls are employed in night-shifts too; and in the former it results in the break-up of the family ties, whereas in the latter the loss of sleep affects their growth.

(3) *Economy*.—It is imperative that good meals must be provided at reasonable

prices for a successful nutritional programme. To achieve this, all cafeterias, kitchens, lunch-stands, etc., should be under plant management and should be run on a non-profit non-loss basis. A canteen should not be a means of obtaining funds for employee functions or benefits or any other extraneous purpose. It has been found that cafeterias, rolling kitchens or lunch-stands operated by concessionaires—whether it be a private company or an employee's benefit association—were generally less satisfactory than the management-owned ones. The reason perhaps for this is their policy of "we give the men what they want."

A well-trained dietician managing the canteen can keep down the cost by intelligent marketing. Having the knowledge of when and where to buy as well as understanding the quality and nutritive value of foods is a phase in a dietician's professional training and is of particular value in low cost feeding.

The employer also can help a great deal in bringing down the cost of maintaining a canteen. In plant-owned and employee-managed lunch-rooms or canteens, the management usually provide space and basic equipment and can also subsidize those services such as heat-light and water. Even otherwise, effective management and a large turn-over will make the canteen "pay its way" to meet all the overhead charges from the takings. It is best that an employee elected committee assumes responsibility for the operation of the food service employing its own commissary manager.

Conclusions.—Canteen work should be recognised to be a very "tough" one. It calls forth immense energy, staying power and continuous good-temper. Cooking is a job that has to be learned

and practised as any other skilled technical job in the process of industry.

An inspiring and instructive Health Education Programme should be undertaken for the promotion of better nutrition in collaboration with a number of national agencies, both public and private.

Last but not the least, is the general atmosphere prevailing in the canteen and its psychological reactions on the worker. It must be remembered that the workers enter the canteen not as servants but as their own masters, as customers and not as employees. The discipline enforced on them should be voluntary and of a purely social nature and should not be extraneous and coercive. Intelligent and sympathetic management can create a sense of belonging to the factory and of

self-respect in the worker's mind by tactful handling. The practice of putting up notices regarding canteen matters can be cited as an instance in point. It should be free from all tinges of authority and command. Terms like "workers must" should be judiciously avoided and must be substituted by pleasant polite wordings like "customers are requested" etc. In short, the canteen should be run on a thoroughly democratic basis giving the employees a free hand in the management of its affairs. Democratically elected committees and their periodical meetings with a view to eliciting suggestions of improvement from members can go a good way towards success. The only thing to be borne in mind is that complaints and criticisms should be followed by constructive suggestions.