REVIEW OF LITERATURE
2. REVIEW OF LITERATURE

The need for research in nutrition education arises due to two important factors: 1. Necessity to educate people as to how to use the available foods efficiently, and, 2. the evolving nature of the science of nutrition. Further, the extent of hunger and malnutrition both in affluent as well as developing countries suggest that methodology adopted for nutrition education till now has had little effect on food behaviour and nutritional status of the people. Changes taking place in the food behaviour seem to be temporary but not permanent in nature. This condition continues to exist till today. However, nutritional status has been improved in select populations of the world where nutrition education was accompanied by food supplementation. Hence, there is a need to evolve effective approaches relevant to the developing population of the world to improve food behaviour.

Davey and McNaughton (1969) stated that nutrition education in developing countries had been disappointing. They also indicated that nutrition education programmes bring about changes in three stages, 1. understanding, 2. acceptance and 3. practising relating to nutrition. However, no research data were provided by the authors in support of these observations. Until reliable data
related to the developmental stages of adoption suggested are available, there is little evidence from which one can draw conclusions. Yet, the above statement does not negate the value of nutrition educators' experience and observations.

The few studies on nutrition education as compiled and reviewed by Brun (1985) are enumerated in Table 1. Though the studies began in early twentieth century, most of them were conducted during the past seven years. The more recent studies which were complex in nature have covered more findings than did those of the previous decades.

<table>
<thead>
<tr>
<th>Decades</th>
<th>Nature of studies</th>
<th>Number of findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date not given</td>
<td>6</td>
<td>88</td>
</tr>
<tr>
<td>1910 - 1919</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1920 - 1929</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>1930 - 1939</td>
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<td>0</td>
</tr>
<tr>
<td>1940 - 1949</td>
<td>23</td>
<td>294</td>
</tr>
<tr>
<td>1950 - 1959</td>
<td>13</td>
<td>105</td>
</tr>
<tr>
<td>1960 - 1969</td>
<td>17</td>
<td>315</td>
</tr>
<tr>
<td>1970 - 1979</td>
<td>125</td>
<td>1645</td>
</tr>
<tr>
<td>1980 - 1984</td>
<td>115</td>
<td>1648</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>303</strong></td>
<td><strong>4108</strong></td>
</tr>
</tbody>
</table>

Source: Brun, 1985
Eighty seven per cent of the total findings were from studies conducted in North America, while such studies from other parts of the world are scant. In the Indian context, and in other developing countries where the need is great the dearth of nutrition education research is strongly felt.

Of the total findings stated above, seventeen per cent of them were from studies where random sampling was adopted. Twenty two per cent however were from studies in which subjects were randomly assigned to conditions, control group was included in sixty four per cent of them while the remaining had no control. These observations indicate the increasing realisation of purposive sampling and control as crucial to research in nutrition education.

Nineteen per cent of the findings were from studies containing national samples while fifty seven per cent contained only local samples. Participants varied widely on sex, age, economic status and cultural background. The reviewer (Bruin, 1985) was of the opinion that the findings of this meta-analysis, have wide applicability.

A variety of instructional strategies were adopted in nutrition education. The per cent occurrence of each instructional strategy adopted in the studies either singly or in combination is presented in Table 2. Eighty one per cent of the findings are from studies where more
than one educational method was used. The use of multiple strategies is therefore extensive. Choosing more than one educational method creates interactions among the instructional strategies that make it difficult, if not impossible, to determine the relative effectiveness of each method.

**TABLE 2. Frequency of Use of Instructional Strategies**

<table>
<thead>
<tr>
<th>Items</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>75.7</td>
</tr>
<tr>
<td>Written materials</td>
<td>69.4</td>
</tr>
<tr>
<td>Directed small group activity</td>
<td>50.3</td>
</tr>
<tr>
<td>Displays</td>
<td>44.8</td>
</tr>
<tr>
<td>Individual counselling</td>
<td>33.1</td>
</tr>
<tr>
<td>Movies, slide shows, closed circuit T.V</td>
<td>31.3</td>
</tr>
<tr>
<td>Commercial mass media</td>
<td>11.0</td>
</tr>
<tr>
<td>Computers</td>
<td>01.9</td>
</tr>
</tbody>
</table>


The data in Table 2 indicate the popularity of usage of traditional methods of lecture and of the reading of written materials. The value of small group activity in nutrition education is currently receiving greater attention from educationists.
The relevant literature is presented in four sections:

2.1 Section: Factors influencing the food behaviour.

2.2 Section: Correlations among the factors influencing the food behaviour.

2.3 Section: Development of evaluative instruments in nutrition.

2.4 Section: Functional approaches in nutrition and health education.

Studies pertinent to the present investigation are limited. Hence all the available sources of information were explored.

2.1 Factors Influencing Food Behaviour

2.1.1 Determinants of Food Choice

Lennon and Fieldhouse (1982) observed that personal health behaviour is the ultimate arbiter of food choice. However, this choice would be limited by a number of factors which operate at different stages during the choice process. They have constructed a hierarchy of determinants as shown in Figure 2.
Figure 2. Hierarchy of determinants of Food behaviour
Source: Lennon and Fieldhouse, 1982
The main factors shaping food choice are illustrated. Personal and socio-psychological factors mentioned are more a function of individual circumstances and experiences while the other factors viz., availability, economics, and acceptability reflect societal influences. The latter factors are often beyond the immediate control of the individual.

In the hierarchy of determinants, one essential factor is not taken cognisance of i.e., knowledge. Fund of knowledge that one has about nutrition is another major influence over the choice of food. Since it is more of an individual nature, it can be placed under the factor, personal.

2.1.1.1. Availability: The fundamental limitation on food choice is the availability, though this may be seen in terms of both physical and cultural factors. The physical factors viz., climate, government machinery, food producers and manufacturers, business men and occasionally the scientific community influence the food supply. Politics often, if not always can be an important influence in food availability; its role is felt more in the present day than in the past few decades. The physical aspect restricts to some extent the variety of foods from which an individual's choice could be made. Further, this choice is governed by cultural acceptability. For instance,
certain caste groups like Brahmins, and Vysyas are identified basically as vegetarians while other groups are identified as non-vegetarians. As such, there exists a great distinction in the choice of foods among different caste groups. Availability of foods to the consumer is thus the result of complex interplay of these factors.

2.1.1.2. Economics: Of the varieties of foods available in the market, people can choose only those foods that they can afford. It is often felt that 'Economics' is the key variable which influences the choice of foods. Generally, affluence is associated with adequate, varied and palatable diet. Change in food choice resulting from higher income is reflected in improved nutritional status. However, change in food choice can also reflect improper food choice resulting in nutritional problems such as those observed among the affluent countries (Jelliffe, 1966 and Hartog and Staveren, 1985).

In his early studies, Orr (1936) demonstrated the effect of income on food choice. Both the amount spent on foods and the types of foods purchased varied with income. Expenditure on food did increase with increased income, but not in proportion to the total income. This is obviously due to a limit as to how much food one could consume. Foods which were bought by high income groups included more of fleshy foods, nuts, dairy products,
fruits etc. Much of this information holds good even in the Indian context. Several dietary surveys support these observations (Rao et al., 1986).

Price rise is not always followed by a decrease in food consumption and conversely, price stability does not necessarily lead to increased consumption. Apart from price fluctuations the nature of the food and availability of substitutes are other important considerations. For example, price escalation probably reduces meat consumption more than that of other foods.

The expenditure on food is rather flexible while the expenditure on items such as house rent, and fuel etc., is fixed. Thus in times of economic hardship expenditure on food might be particularly curtailed. During financial difficulties, even if one persuades people to adopt new food patterns to maintain nutritional adequacy they may not make the right choice of foods. They will consider themselves to be deprived and poor (Mckenzie, 1974).

Devadas (1974) stated that income decides the standard of living of a family. Judged by any parameter, the purchasing power of the majority of the people in India is low. The cost of foods particularly of animal origin, such as eggs, milk, meat and fish is beyond the reach of many while the percentage of expenditure on cereals is high.
Economic status thus has a definite bearing on the quantity and quality of food the people consume. Devadas (1974) further observed that with income from Rs.40 to 60 per capita, the meal pattern was monotonous. One way of assessing whether or not income affects food choice, is to ask people if and how they would change their buying habits provided they have more money. Foods like meat, fruit, fish, milk and eggs are items which would be frequently used in this situation (Mckenzie, 1975).

In low income families, the diets of some members may be maintained at an adequate level at the expense of others. Of course, good nutrition can be achieved with relatively low income, though the resulting diet could be rather monotonous, which might result in insufficient food being consumed to meet energy needs (Lennon and Fieldhouse, 1982).

Williams (1973) also supported the statement of "Socio-cultural - psychological factors influence the food habits which are the combination of effective and psychomotor behaviour.

2.1.1.3. Socio-cultural-psychological: Irrespective of the financial status, the way in which people spend on food will depend on a range of social, cultural and psychological factors. Gift et al. (1972) suggested that each
culture has a value system which determines the type of food that is suitable for consumption. Food habits are not inherent, they are learnt from parents, relatives and friends.

Naik and Bardhan (1974) Hartog and Staveren (1985) also reported that some socio-economic aspects influence the nutritional practices of Indian women, particularly the poverty stricken group.

Devadas (1974) reported that food habits are the outcomes of the sum total of numerous influences - thoughts, sentiments, beliefs and activities in a group or community. Food habits indicate not only the practices like selection, combination, preparation and consumption but also the psychological, emotional and social values of food. Most of the Indians are bound together by time-honoured customs, traditions, rights and taboos which govern their communities. Their food practices are deep-rooted in their culture which controls the choice and use of foods. While income, food availability, home food production and marketing facilities influence the food preferences of the individual, customs and traditions dictate the manner in which food should be procured, stored, cooked, served and eaten. Eventually distinctive food preferences and prejudices are formed.
That food habits are passed on through generations by a particular prejudice is demonstrated very well in India. For instance, beef is not acceptable for consumption by Hindus as the cow is considered as sacred animal (Mead, 1955 and Lennon and Fieldhouse, 1982). Similarly, horse meat is not accepted by the people in U.K. The reason attributed was that it is detestable or barbaric (Lennon and Fieldhouse, 1982). Differences in food preparation also can be brought about by either economic factors or religion or woman's role in a society.

Special properties either magical or medicinal have long been attributed to food (Hartog and Staveren, 1985). Hypocrates, the Greek physician regarded cabbage as having medicinal properties and recommended the same to his patients for a variety of disorders (Lennon and Fieldhouse, 1982). In India, bittergourd is recommended to diabetic patients by doctors (Swaminathan, 1974). Recent investigations by allopathic medical practitioners have indicated that bittergourd stimulates the secretion of insulin (Sinclair, 1980).

To this day folklore and myth still influence people's ideas about food in certain countries like United Kingdom and India (Hartog and Staveren, 1985). In U.K. pork is considered as good for anaemia; presumably because of its rich red colour. Brown eggs are preferred by many
consumers to white as they believe they taste better and are more nutritious (Brown, 1977 and Lennon and Fieldhouse, 1982). In India, country eggs are preferred to farm eggs as consumers believe that the former taste better and are more nutritious than the latter. Thus eating habits also have a taste base. People believe that consumption of fish and garlic helps to increase milk production of lactating mothers (Kamakshi, 1969; Swaminathan, 1974; Khaman, 1976; Shukla, 1982 and Sreevedamman, 1986).

Swaminathan (1974) and Shukla (1982) also reported certain practices prevailing in the Indian context. Eggs are thought to cause baldness or sterility and hence not consumed by pregnant women. Consumption of papaya fruit by pregnant women is believed to lead to abortion. Pica is a common practice among pregnant women and children. There is a belief that the baby will not be normal if one does not eat clay or starch.

Certain food specialities are associated with festivals and feasts. In U.S.A at thanksgiving function turkey is eaten. Eggs are given during Easter in U.K although they are not part of the Christian ritual (Lennon and Fieldhouse, 1982). India is not an exception in this regard. Specific foods are prepared during certain festivals but again the special foods vary from one state to another and sometimes even within the state (Kamakshi, 1969; Devadas, 1974 and Hartog and Staveren, 1985).
Devadas (1974) stated that religious practices prescribe certain food codes. Some codes are helpful in promoting better nutrition while others might be detrimental to nutrition. Religious festivals are occasions for celebration. Women on these occasions exhibit their dexterity in cooking and talents for originality and innovations. On festive occasions, rural home makers prepare a variety of dishes for the following reasons:

To offer to God in thanksgiving
To pray to God for happiness in the future
To have their secret wishes fulfilled
To eat well at least on one day
To follow the customs and traditions of the ancestors
To feed the poor by those who are better off.

Children look forward to the festival days with great enthusiasm. There are many ceremonies and fasts with appropriate seasonal food preparations and connotations. In many cultures, religious beliefs dictate methods of food preparation. Food therefore has religious significance throughout the life span.

Brown (1977), Lennon and Fieldhouse (1982) and Hartog and Staveren (1985) stated that many social occasions or meetings involve eating and drinking. It may seem possible that eating and drinking in the company of a person
establishes a bond of friendship or closeness. A difference in socio-economic status however can act as a barrier to the companionship in eating. This is due to the idea that eating with people of a different socio-economic status would lower one's status in the hierarchy of the society. Such thinking is common to different societies like the British and the Indian societies.

Foods are an expression of wealth, prestige and social status in all cultures. Through competition between individuals, groups and different social categories, foods and dishes have progressively become indicators of the socio-economic variations. There are foods and dishes for the poor as well as for the rich symbolising poverty or wealth.

Brown (1977) and Lennon and Fieldhouse (1982) reported that foods serve as a status symbol in society and also have associations with economic class. In U.K., fish and chips are considered by many to represent the lower class foods, whereas Dover sole and wine are considered to represent the upper class. In India, ragi and jaggery are considered as a poor man's food while coffee, sugar and commercial milk products are a rich man's food (Kamakshi, 1969; Devadas, 1974; Hartog and Staveren, 1985 and Sreedevamma, 1986).
Prestige demands that one should have rare and costly items of food. Thus, foods that are available in abundance and free of cost such as drumstick leaves and foods which are less expensive such as greens, papaya, amla are regarded as not of any value. Prestige demands that white rice is to be preferred to parboiled rice, sugar to jaggery, hydrogenated fat to groundnut oil and bengalgram to horsegram etc. Prestige may also be a stimulant to changes in food habits. People wish to emulate the elite, those whom they consider superior.

Lennon and Fieldhouse (1982) stated that food produces an emotional response in all people. But, since every one is an individual with different experiences the responses would vary from one person to another. Thus individual food habits are formed and sustained. Babies learn to associate food with relief of hunger and bodily contact. How a child learns about food affects his later eating patterns and his behaviour with regard to food. For instance, if a child is coaxed or bribed as a toddler to eat, then later in childhood he may use "refusal of food" as a means of getting his own way. Introducing a child to a wide variety of foods and dishes is less likely to lead to an adult with very restricted food habits. Majority are aware that food can be used as substitutes for expressing our real feelings may be
of joy, of depression or frustration. Eating can be associated with deprivation of love and as a substitute for love. Some food is closely associated with love from childhood. Deprived children might use food to comfort themselves and make up for lack of love. Familiarity with a food often makes it more acceptable. Toddlers prefer familiar food when they are in strange surroundings, perhaps it gives them a feeling of security. Immigrants of many different cultures use familiar food as a means of feeling secure and not losing their identity in a foreign land. In U.K, Asians and West Indians in particular have their own food stores and are willing to spend more money on familiar foods which have to be specially imported, though expensive.

Jenner (1968), Rao (1968), Hochbaum (1981), Pelto (1981) and Hartog and Staveren (1985) stated that food behaviour is determined more by psychological, cultural and social factors than by physiological factors. In this context, it can be concluded that the aforesaid factors might prevent people from consuming valuable foods, even when they are available within economic means and not producing any harmful effects.

This condition is more acute in India than in other countries. These observations are supported by leading nutritionists in India. Hence, it is imperative to
consider socio-cultural and psychological factors while planning and implementing strategies for nutrition education.

Based on the description above, it can be concluded that certain of the prevailing cultural, social and psychological factors might prevent people from consuming valuable foods, even when they are available, and within their economic means.

2.1.2. Identification of Certain Factors Influencing the Choice of Food - Empirical Evidence

Schuh et al. (1967) observed that food acceptance is a complex reaction determined by the physiological, psychological, bio-chemical, social, educational and sensory reactions of individuals, who move in a framework of race, religion, tradition, economic status and environmental conditions. According to Stewart and Amerine (1973) the ways in which individuals or groups select, consume, and utilize food constitute their food habits.

Casper and Wakefield (1975) studied the influence of personal, attitudinal and motivational factors on the food choices of women. A random sample (591 women) of one per cent of households within each ward, precinct and township of Johnson county, Kansas was selected. The
women who purchased and prepared food mostly were inter-
viewed by one of the seven trained interviewers. The
interviewers collected personal data from the respondents.
The subjects' responses to the attitudinal questionnaire,
indicating the degree to which thirteen personal and non-
personal factors influenced them to try a new food were
recorded. Each respondent was asked to indicate as to
which of the ten reasons stated motivated her to choose
each of the six categories of food.

The results indicated that more than eighty per cent
of the women would readily accept suggestions from hus-
bands, doctors, nutritionists, parents, children and
close friends. About fifty per cent of the women would
follow suggestions from members of their churches and
neighbours and would try a food if it is easy to prepare.
An advertisement through different mass media like news
papers, radio or television would influence only 25 per
cent of the respondents to try a new product. From these
results it was concluded that husbands exerted the stron-
gest influence on women to try a new food, though most
would try a new food if recommended by a doctor, nurse or
nutritionist. The next most influential category inclu-
ded parents, children, close friends. Thus, relatives
and close associates would exert a great influence.
Neighbours, members of church groups and easy preparation
influenced in that order. Advertising was found to be the
least influential factor.

With regard to motivational factors, family (36 per cent) and personal (28 per cent) accounted for 64 per cent of the respondents. The only other factor (13 per cent) that influenced more than 10 per cent was a food being 'good for you' (health belief). The appearance of the food, preparation time, cost and calorie content were minor influencing factors with the majority of the women in selecting a particular food.

Day et al. (1975) studied the food-use frequency and the reasons for the same. Forty Spanish/Mexican/American women in southern New Mexico were interviewed to determine the importance of several factors as reasons for food acceptance. These reasons were grouped into general categories like social, psychological, cultural, sensory, economic, geographic, health and convenience factors. The food-use frequency was reviewed in respect to the stated reasons for serving these foods.

The results showed that for foods served daily or weekly or frequently, the most often mentioned reasons were in the categories of preparation, sensory, economics, geopolitics and health. The high incidence of preparation and sensory reasons for serving foods are in agreement with the observations of Gift et al. (1972) and Pangborn (1975). These researchers stressed the importance
of preparation and flavour considerations in the selection of foods. The importance attached to food cost and food availability had also been identified as a potent factor influencing people's food choices (Gift et al., 1972). The moderately high incidence of economic and geographic reasons given for serving foods in this study, is compatible with the observations of Day et al. (1979). Health reasons (4.64 per cent) for serving foods intensively were not reported as frequently as they had been in similar western Regional Project studies in Arizona, California, Hawaii, Nevada and Washington (Standal et al., 1978). The findings of these studies indicate that concerns about health, and nutrition are major determinants of food choice. For foods served less frequently (monthly/yearly/seasonally), often mentioned reasons were in categories of economics and geographics, preparation and religion and race and culture. Why people choose the foods as they do is essential knowledge for nutrition educators. Nutrition education programmes that stress only health reasons as the basis for improving good habits may have limited success if these reasons are not taken into cognisance.

Reaburn et al. (1979) studied the 'Social determinants in food selection'. The authors suggested that food selection determinants included cultural, social, personal
and environmental factors, which may be visualised as part of a barrier existing between food supply and consumption. They designed a model for food selection as illustrated in Figure 3. This model was proposed to apply to situations where food is available in the market and economically accessible to the choice-maker. Nine food selection determinants were defined as follows.

Since psychologic hunger triggers yearning for satisfaction and contentment, Satiety is the first motive. Tolerance or conversely intolerance relates to any ill effects whereby a food will or will not be selected. Taste refers to the flavour of a food. Familiarity reflects the length of acquaintance with a food. Health belief about a food has a cultural connotation and differs from nutritional knowledge. Price refers to the subjective perception of the cost of a food. Convenience depends on the ease with which a food may be prepared by the choice-maker. Prestige describes a perceived suitability of a food for important guests or special occasions or rich people. Finally, Knowledge is envisaged as a motive for food selection based on the learned nutritional role of a food.

From among the nine determinants, three social determinants—convenience, price and prestige were selected for this study. The authors were of the opinion
Figure 3. Determinants of Food selection
Source: Reaburn, 1979

Dependent variable

Independent variables

FOODS SELECTED
9. Knowledge
8. Prestige
7. Convenience
6. Price
5. Health belief
4. Familiarity
3. Taste
2. Tolerance
1. Satiety

FOODS AVAILABLE
that social values are more amenable to change than cultural values transmitted from generation to generation. It was also assumed that socio-economic factors would have the greatest influence on the food choice of people in the lower socio-economic categories.

The sample consisted of mothers with an age range of nineteen to thirty-five years and having pre-school children. They lived in or near Hamilton where most of their food shopping was done and had a family income sufficiently low. Purposive sampling was used to obtain cultural homogeneity in the sample. Totally 112 women were interviewed at their homes.

The questionnaire consisted of two parts: a demographic section to record the subjects’ occupation, marital status, educational background, family income, and family size. A food attitude section to determine food-use frequency and availability, price, convenience and prestige values of 52 food items as perceived by the subjects. The food list was composed of common Canadian foods representing each of Canada’s food groups. It was compiled from results of dietary recalls previously gathered from 32 women with demographic characteristics similar to those of the present sample. Food-use frequency was used to measure existing food consumption patterns and indirectly to determine the degree of
acceptance of "positive selection" of the various foods. A 5 point fixed alternative scale ranging from 1 'never' to 5 'daily' was used. Score value was calculated for each of the 52 food items. Availability of foods was measured on semantic differential scale with 1 being 'very difficult to obtain' and 5 'very easy to obtain'. Scores for convenience, price and prestige were also calculated in a similar manner.

The results indicated that 52 foods revealed an actual range of frequency scores between 100 and 24.12. Out of 52, 12 items were categorized as high-use (almost daily) foods, 16 food items as medium-use (several times a month) and 24 as low-use (a few times in a year).

Most of the food items (42 out of 52 foods) on the list scored high availability (score range 97.48 to 75.66). Rest of the foods were moderately available because they were seasonal foods. An interesting picture on the social profiles as to how a group of Canadian home makers label selected food items by their social determinants was obtained. The profiles are presented in Table 3. Convenience, price and prestige cannot be judged by people independently because they depend on many other factors. For example, convenience depended on the individual home maker's cooking skills and whether she enjoyed preparing a particular food or not. Positive significant
TABLE 3: Social Profiles of Selected Foods

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soyburger</td>
<td></td>
<td>Turnip</td>
<td>Home made bread</td>
</tr>
<tr>
<td>instant coffee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ground coffee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>purchased cake</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>commercial granola</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price@</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homogenized milk</td>
<td></td>
<td>Pork/chicken liren</td>
<td>Frozen orange juice</td>
</tr>
<tr>
<td>commercial granola</td>
<td></td>
<td></td>
<td>Soyburger</td>
</tr>
<tr>
<td>Prestige+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homogenized milk</td>
<td></td>
<td>Margarine</td>
<td>Beef liver</td>
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<td>home made bread</td>
<td></td>
<td>instant porridge</td>
<td>soyburger</td>
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<table>
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<tr>
<th>Scores</th>
<th>High</th>
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<tr>
<td>*</td>
<td>78.34-100</td>
<td>56.67-78.33</td>
<td>35.00-56.76</td>
</tr>
<tr>
<td>@</td>
<td>75.06-93.34</td>
<td>56.77-75.05</td>
<td>38.48-56.76</td>
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<tr>
<td>+</td>
<td>79.12-100</td>
<td>58.23-79.11</td>
<td>37.34-58.22</td>
</tr>
</tbody>
</table>

Source: Reaburn et al., 1979.
relationship was found between convenience and food-use frequency of six foods listed under high and medium. Price correlated significantly, but negatively with use frequency of three foods listed under medium and low. Prestige and use of six foods listed under high and medium were positively significantly correlated.

Though a relationship between food-use frequency and the three social determinants was identified in fourteen out of fifty two foods studied, the findings indicated that, determinants other than price, convenience, and prestige (taste, familiarity or family preferences) may be more important in the use of the thirty-eight other foods included in this study. Moreover, the effect of social determinants could be inter-related, although this is not apparent from our data. When the price of a food is judged to be high, convenience may lose its importance as a food selection motive (Davies and Macleod, 1971). Personal and family preferences were found to account for food choice of the majority of Kansas women. Convenience together with price and appearance played only a minor role (Cosper and Wakefield, 1975).

Schafer (1979) demonstrated self-concept as an influencing factor in diet selection and quality. The objective of this study was to examine the relationship between the self-concept and food behaviour. The self-concept was related to two aspects of food behaviour

The
nutritional quality of the diet and influences on diet selection. One hundred and sixteen married women were interviewed to determine their self-concepts; diet quality and the amount of influence other persons, media and food courses had on their food behaviour.

The data provided evidence of a relationship between self-concept and diet quality. Women who had a positive self-concept tended to have better quality diets. It was also found that their self-concepts were not related to acceptance of nutrition information from other persons. Women who had a positive self-concept were influenced by nutrition information from the media and from education courses. This might be due to the fact that the respondents who had a positive self-concept might have required less time and energy to maintain their self-concepts. Therefore, they could turn outward and consider the needs of their family and their role responsibilities. As a result, they could spend more time in ensuring an adequate diet. On the other hand, those respondents with a lower self-concept might have been more disposed to turn inward in an attempt to maintain their self-concept. Hence, they would spend less time in behaviour which is not related directly to the self, such as improving the nutritional adequacy of their diet.
Women with positive self-concept are more likely to feel that they have control over the events in their lives rather than being controlled by their environment. They seek information from their environment to make decisions and do not merely respond to various sources of influence. On the other hand, women with a negative concept are likely to feel that they do not have personal control over the events in their lives. They accept other forces beyond their self-control as sources of influence on their lives.

Seafar and Keith (1981) studied the type of influences on food decisions across the family life cycle. Married couples 336 of them, were randomly selected. Personal concerns - weight and health cost, family members, spouse, children, parents etc., information-casual and information selected were the factors studied. The results demonstrate that the external constraints of cost of food and the personal concerns for health and weight were the most important considerations in food decisions. Further, their importance was fairly constant over the life cycle. Family members also had an important influence and that was constant over time. However, family members who are not part of the nuclear family were not greatly considered and the influence diminished over the life cycle. Casual information, had moderate influence as against selected
information which had least influence and both diminished over time.

Chandralekha and Kamala (1981) studied the factors influencing food selection in the Indian context. Sixty mothers whose pre school children were attending nursery school were selected as a sample. Thirty of them were exposed to nutrition education training organized by the department of Home Science, Sri Venkateswara University, Tirupati for a period of six months. The remaining were not exposed to any nutrition education programme and thus served as control. The possible factors that influence mothers' food choice were selected viz., self, family, taste, appearance, availability, familiarity, health belief, convenience, price and prestige. Nutrition education was considered as an intervening variable to check its association with the factors influencing food selection. Food-use frequency was determined. Thereby fourteen foods were selected two from each of the seven food groups. For each food item, the mother was asked to state the factors influencing for its inclusion in the diet in order of preference (i.e., first, second and third).

The data indicated that food selection was influenced by many factors to varying degrees. So the factors influencing mothers' selection of each food were distributed over three degrees of intensity - greatest (70 - 100
per cent), moderate (40 - 69 per cent) and least (0 - 39 per cent). Familiarity and family were found to be the greatest influencing factors with regard to selection of cereals. All the factors with the exception of cost, convenience and prestige were found to have both moderate and least influence over other food selection. Cost, convenience and prestige were found as only the least influencing factors. The summarised findings revealed that familiarity, taste, family and availability were found to be the higher order (50 per cent) of influencing factors in food selection while health belief, self, convenience, cost, and prestige were found to be the lower order (50 per cent) of influencing factors in both the groups of experimental and control. This suggests that nutrition education might not have made any impact over the change in factors influencing mothers' food selection.

From these findings it is implied that mothers generally exercise food selection based on two facts - primarily, foods with which the family is familiar and perceived as tasty, family preferences and local availability of foods exert a secondary influence. From these observations it is clear that 'family' both directly and indirectly influence mothers' food selection to a great extent. Cost was not considered as a prominent influencing factor though
it is the fact with most of the people. This might be due to self-prestige. Convenience does not seem to be an important influencing factor. This might be because Indian mothers enjoy cooking and also consider it as their main role. Self was considered as the least influencing. This suggests that the Indian mother generally gives a higher priority to family preferences than to her own.

Hochbaum (1981) and Hartog and Staveren (1985) observed that the social, psychological and cultural dynamics which determine what, when and how people eat are as complex and varied as those that determine all of human behaviour. No single theory can encompass what is nutrition behaviour. What theories are set forth to explain such behaviour are invariably more of general theories of human behaviour applied or adopted to specific phenomena of nutrition behaviour. As such they can be very useful for a better understanding of certain aspects of this behaviour, of its manifestations under conditions or in certain populations and of some of the vast array of factors and forces that may shape it. In this context, nutrition educationists have put forth few models of nutritional behaviour which reflect the complexity of the nutritional behaviour (Pelto, 1981), one such model is presented in Figure 4.
Fig. 4. Lifestyle model of Dietary behaviour
Source: Peito, 1982
2.1.3. Factors Influencing Food Behaviour

2.1.3.1. Food habits are formed: Mead (1944) defined food habits as the culturally standardized set of behaviours in regard to food manifested by individuals who have been reared within a given cultural tradition. Lennon and Fieldhouse (1982) stated that food habits are characteristic and repetitive acts performed under the impetus of the need to provide nourishment and meet social and emotional goals. The acquisition of food habits may be seen in terms of socialization processes. Socialization is a concept embracing the actions of imparting culturally valued norms: more specifically knowledge, values, attitudes and routines considered worthwhile by a community (Tones, 1978). It operates in different ways throughout the life span as illustrated in Figure 5.

Lennon and Fieldhouse (1982) suggest that primary socialization occurs in the early childhood years mainly through the influence of the parents, siblings and of other close relatives and friends. In food matters, the strongest influence is the mother who is usually most intimately involved with good preparation and serving. Transmission of norms and internalization of routines occur at this time, as the child identifies with the parents' behaviour. Processes of reinforcement, modelling and imitation result in new behaviours being adopted and
Figure 5. Nutrition career. Source: Tones, 1978
integrated with previous experience. Appropriate behaviour is sanctioned, undesirable behaviour is discouraged, thus the child learns through a system of reward and punishment.

In addition to the acquisition of routines and habits during primary socialization, the period of secondary socialization is very important. At this stage knowledge is acquired which is necessary for a rational explanation of behaviour. It also serves as a reinforcement for the maintenance of behaviour. Characteristically, secondary socialisation occurs in a more formal context than does primary socialization. The main agency involved at this stage is the school. The child is exposed to a wider range of environmental influences and to constantly differing values and options. In the Indian context, majority of the children do not have the advantage of schooling. They may be at a disadvantage with regard to the wider range of influences at the school (UNICEF Report, 1984; Crellin, 1985-86; Kumar, 1985-86 and Mathai, 1985-86). The female child is at a greater disadvantage than the male (Mankar, 1978 and Mathai, 1985).

Environmental experiences are important. For example, petty snack shops and school meals can set the stage for nutritional practices. How can any one blame children for ignoring the messages like "do not buy eatables from roadside vendor" "excessive candy is harmful to health",
when eatables are actually sold by the roadside near the premises of the school. This may be the beginning for undesirable practices.

Individuals frequently adopt values, attitudes, and behaviours of social groups to which they belong. This process is referred to as anticipatory socialization (Tones, 1978). If children adopt values and behaviours in anticipation of future roles, it could be one of the family's and school's functions to provide anticipatory guidance. For those children who are deprived of school experiences, particularly in India, nonformal education agencies could provide such guidance (Crellin, 1985–86 and Kumar, 1985–86).

Hansen (1980) stated that advertising persuades people to develop an appreciation to taste the food irrespective of its quality. The main objective of food advertising is to promote brands of food rather than actual foods. Some advertisements tend to mislead people regarding the nutritional value of food. Hence, nutritionists have the responsibility to be concerned about advertising either to improve this process or to educate the masses about misleading advertisements.

2.1.3.2. Changing food habits: Lennon and Fieldhouse (1982) reported that once values, attitudes and routines are established, any attempt to change them
might be regarded as "resocialization". This process should be the main concern in nutrition education. The law of primacy states that earlier influences are more powerful and long-lasting than later ones, and the marked lack of success in persuading people to alter their dietary habits illustrates this precisely. Even when modifications are required for specific therapeutic reasons they are not always carried out. This idea was also stressed by Thorndike (1968) on the basis of certain experiments.

McClintock (1972) described attitudes as evaluative responses. They are formed along with beliefs and values. Attitudes and beliefs are normally subjected much to modification and change, but values tend to remain constant over longer periods of time.

Family attitudes regarding health and disease influence the feeding practices of the mothers. For instance, women and children are often the direct victims of discriminations in food priorities (Degarine, 1966, and 1972 and Srikantia, 1969).

Although it is easy to believe that nutrition is concerned with persuading people to act in their own interests, it is not always clear what those best interests are? There are dangers of educators imposing their own values and attitudes on other groups. For this reason,
nutrition and health education should confine itself to providing facts, so that the individual has a rational basis for making his own decisions. However, it is well-known that mere provision of information is no guarantee that behaviour change will ensure, even if the information is comprehended and accepted. Hence, there is a need not only to provide people with information but also to put them through a positive process of decision-making in order to prepare them for later, vital decisions.

The foregoing suggests the need for research aimed at the discovery and identification of factors influencing food behaviour. This viewpoint was also expressed by Hochbaum (1981).

2.1.4. Identification of Certain Factors Influencing Food Behaviour-Empirical Evidence

2.1.4.1. Knowledge: Lovett et al. (1970) studied the impact of nutrition education programme on second grade level school children in terms of their knowledge and practices. The nutrition education was for a duration of six months. Pre-test and post-test was the methodology used for evaluation. The experimental group showed significant increase both in knowledge (360 per cent) and practices (151 per cent). From these findings, the authors implied that knowledge definitely contributes to practices but, to a limited extent (50 per cent).
Carruth et al. (1971) conducted a study to find out the increase and retention of knowledge by cartoon approach in nutrition education. The target group was secondary grade school children. The experimental groups obtained mean knowledge scores of pre, post and retention tests as 72.38, 84.05 and 80.99 respectively. The subjects showed a significant difference between the pre and post scores. The retention test scores on the other hand revealed that the amount of information lost during the six weeks time lapse was not statistically significant. This knowledge lead to improved practices also.

Alford and Tibbets (1971) conducted a study to prove that "Nutrition education increases the consumption of vegetables by children". In the first camp session 71 children (experimental group) were observed for vegetable eating practices and given an educational programme on "importance of vegetable in the diet". The consumption was recorded before and after education. A control was also kept without giving nutrition education. Vegetable consumption increased significantly in the experimental group along. From these findings, it can be concluded that increase in knowledge results in increase in practices.

In contrast to the above studies Amudson (1956) reported that nutritional knowledge did not influence the nutritional practices.
Hoorweg and McDowell (1979) reported on the impact of nutrition education conducted in Africa. The results indicated that desired changes in nutrition knowledge, in food preferences and in better recognition of symptoms of malnutrition were observed.

Devadas et al. (1974) reported on nutrition education conducted in four primary schools. One school was provided with school lunch alone, second school with nutrition education through curriculum alone, third school with school lunch along with nutrition education through curriculum and fourth school served as control. The programme lasted for a period of six months. The authors compared the nutrition knowledge and practices of 932 children and the practices adopted by their mothers in turn. School lunch programme combined with the nutrition education curriculum had a significantly higher beneficial effect than the curriculum alone.

Devadas et al. (1979) studied the impact of a nutrition and child-care education programme on fifty mothers over a period of five months. The impact was measured in terms of nutritional knowledge and dietary practices of mothers. The nutrition knowledge scores of the participating mothers were significantly higher than the scores of control group of mothers. On this finding it implies that promising changes were not observed in dietary practices compared to that of knowledge.
Devadas et al. (1982) evaluated and reported the impact of a nutrition education programme which lasted for a six month period. The target group was 130 members of women's clubs in selected villages. The women were directed towards economically and nutritionally beneficial activities. This intervention programme improved the mothers' nutritional practices. In the same year Devadas (1982) conducted an education project designed to develop an awareness about food, health and sanitary practices. The target group consisted of fifty women and one hundred children from rural area. The health and sanitary practices of women and children participated, were improved. Another study was done by Devadas and co-workers (1982) to assess the effectiveness of a nutrition education programme which lasted for six months. The participants were 50 home workers. Positive results were observed.

Devadas (1986) conducted a baseline survey among 2900 households drawn from two slums and six community development blocks, Tamil Nadu, India. Based on the findings of the survey, priority concepts in nutrition and health education and environmental sanitation were identified. These concepts were incorporated into the existing elementary school curriculum and suitable instructional materials were developed. Five day orientation was
provided for all the 6,000 teachers from the 660 primary schools in the selected area. The orientation training was conducted by instructors who had bachelor's degrees in education and master's degrees in nutrition. The trained primary school teachers, in turn, taught the nutrition and health and environmental sanitation lessons in their classes. Evaluative criteria were knowledge of children and teachers, practices of the mothers and the anthropometric and clinical status of the children. Children for evaluation were restricted only to classes 3-5.

Significant changes in knowledge were observed in both the groups of teachers and children. Training given to teachers was proved to be promising. Positive changes occurred in the practices of the mothers of primary school children. Reduction of nutritional deficiency symptoms was observed. In view of the encouraging results, author suggested for further expansion of the programme throughout the country.

Aforesaid findings in the context of India, reflect that nutrition knowledge is definitely one of the potent factors influencing nutritional behaviour. But, the nutritional behaviour of the people is not encouraging. This might be due to the limited scope the lay publis have to nutrition information sources such as mass communication.
Thus in India nutrition education programmes have demonstrated that a higher percentage of knowledge gain is possible than the change in practices. Very little attention is being paid to improve the attitudes toward nutrition and also to assess the attitudes. These findings reflect that the methodology adopted for nutrition education is not suitable to bring about changes in attitudes and practices to a great extent. This generalization was supported by Whitehead (1973) who reviewed nutrition education research in the world-wide context.

Hochbaum (1979) and (1980), Yankelovich (1979) Sims (1981) stated that nutrition educators have falsely assumed that lack of nutrition knowledge prevents people from choosing foods wisely. Yet, recent evidence indicated that the lay public increasingly requests more information about food, diet and health. Hochbaum (1981) reported that nutrition education in general is still shaped by three largely invalid assumptions: 1. awareness of the health effects of nutrition is a potent motivation for people to regulate their food intake; 2. lack of nutrition knowledge that prevents people from eating more rationally and 3. informed people will eat more rationally as long as they can afford and have access to proper nutrition. However, there is ample and convincing evidence that knowledge of good nutrition by itself has only limited, if any, effect on nutrition related behaviour.
Social scientists, nutrition and health educators are becoming increasingly aware that the attainment of knowledge does not necessarily result in the modification of the behaviour of individuals.

2.1.4.2. Attitude: Summers (1970) and Perry (1976) independently proved that attitudes have the quality of motivation. Attitudes were found not only to contribute to routinising behaviour, but also have a directional quality. In that directional quality, they involve an affective dimension such as person's evaluation of liking for or emotional response to the attitude object. For instance, Baker (1972) reported the influence of a teacher's negative attitude on the subsequent selection of squash by her elementary-age pupils. Her negative attitude towards squash resulted in similar behaviour by the children.

Perkins et al. (1980) studied the relationship between the teachers' and students' attitudes related to nutrition at the school level. Positive significant relationship was found between the nutritional attitudes of teachers and students. These attitudes also lead to nutritional behaviour in both the cases.

The above studies reveal that attitude is one of the important factors influencing the food behaviour of individuals.
2.1.4.3. Personality: If a relationship between attitudes and behaviour is important in terms of modifying future behaviour, then the question arises as to who is more likely to respond to nutrition intervention. Do some individuals have a more flexible approach towards innovation and the unfamiliar? Personality characteristics are documented as factors influencing nutritional behaviour of individuals (Janis, 1954; Jalso et al., 1965 and Day and Blaker, 1974).

Janis (1954) found that personality traits were frequently used to account for individual differences in observable effects when all stimuli for a group were held constant.

Jalso et al. (1965) studied the relationship of age, education, socio-economic level and personality-rigidity to nutritional opinions and practices. They classified the participants as food faddists and non-faddists.

In the "Rehfisch personality rigidity test", the subjects who received low scores were rated as rigid (faddists) while high score subjects were considered to have flexible characteristics (non-faddists). Qualities attributed to rigid people were inhibition, conservatism, intolerance, obsessional tendency, social introversion and anxiety and guilt.
The faddist group was concentrated in the lower income categories, while the non-faddist group was more diversified throughout the range and tended to concentrate at the upper income levels.

Correlation co-efficients among age, income, education, nutritional opinion scores and personality rigidly scores were all significant at 1 per cent. Age was negatively correlated with all other variables.

In the subsequent assessment of personality traits, food faddism was positively and significantly related to rigidity. It was found that as the number of food-fads increased, the degree of individual rigidity increased.

Day and Blaker (1974) studied the association between personality traits and resistance to change food behaviour. Significant positive relationship was observed between negative personality traits and degree of resistance to change. In contrast, significant negative correlation was seen between positive traits and resistance to change.

Schafer (1979) examined the relationship between the self-concept and food behaviour. Self-concept was viewed as to how a person defines and feels about him/herself, and is related to how that person will behave in his/her social environment. Only two aspects of food
behaviour - diet selection and quality were selected. The self-concept was measured using a set of self-descriptive adjectives (such as cooperative - uncooperative and open-minded - closed-minded). Standard methods were used to measure diet selection and quality.

The results indicated a significant positive relationship between self-concept (reflects some of the personality traits) and diet quality. Respondents who had a positive self-concept tended to have better quality diets. Further, such respondents were significantly influenced by nutrition information in the mass media and from education courses in their diet selection. They were not influenced by information received from others which might be a secondary source.

2.1.4.4. Food beliefs: Brown et al. (1963) found that housewives have some nutritional beliefs in U.S.A. but, these beliefs do not necessarily influence their food purchases.

Storrer (1977) conducted a survey in Baroda, India and commented that "why people eat and what they do depend upon what local foods are available, on ability to import food and on personal economy, but this is not all." She observed that peoples' beliefs about food have an important influence on food behaviour which constitutes
food selection, preparation, serving and consumption. These beliefs may be religious, traditional, medicinal or pseudo scientific in origin.

Storrer said that there are several different food belief systems operating throughout the world and one which is widely distributed in varying forms is that of 'hot' and 'cold' foods. This classification has been observed in South America, Central America, Malaya, Pakistan, some Mediterranean countries, the Sahara, Philippines, China and in India. These beliefs in many parts of the world are of ancient origin.

In India, by tradition, it is the women who have acquired the skills and assimilated the beliefs governing food and its preparation. Hence, the information on 'hot' and 'cold' concept and its application was obtained from women.

The data revealed that the 'hot' foods were said to produce giddiness, thirst, fatigue, sweating, inflammatory reactions and accelerated effect on digestion. The 'cold' foods were said to cause cheerfulness and pleasure of mind, to sustain life and to impart strength and steadiness to the body. Cereals, pulses, green leafy vegetables, other vegetables, milk and milk products and fruits were said to be 'cold' foods while fleshy foods
and spices were labelled as 'hot' foods. Oils and roots and tubers were distributed in both the categories. Regarding the application of beliefs, 'hot' foods were avoided during pregnancy and 'cold' foods during lactation. During infancy and childhood certain of both 'hot' and 'cold' were avoided. During fever time, 'hot' foods were avoided and 'cold' foods during cough and cold.

The author concluded that to the Indian communities, food beliefs are not idle superstition but concepts which are important and meaningful to them especially during physiological stress. Such beliefs are often disregarded by nutrition educators which means that dietary advice given by them may well be ignored. Therefore, they need to have deeper understanding of belief systems and act accordingly.

Devadas (1968) reported that the concept of 'hot' and 'cold' is not in terms of the temperature sense, but in the sense that some foods are believed to produce heat in the body. Similarly 'cold' foods produce a cooling effect in the body. Therefore 'hot' foods are considered suitable for certain conditions like lactation, cold and stomach pain. Cold foods are good for certain conditions such as fever, pregnancy etc. A few of both 'hot' and 'cold' foods are recommended and a few of them are avoided during specific conditions.
The studies reviewed on knowledge and attitude indicate the positive impact of nutrition education over knowledge, attitudes and behaviour. Similar trend was observed through meta-analyses made by Brun (1935). A separate analysis was conducted of findings from these studies to indicate the degree of impact of nutrition education. The meta analyses included three aspects: Voting method, Effect size and Z-score. These analyses might most accurately portray the degree of impact of nutrition education on nutrition knowledge, attitudes and behaviour. The results are presented in Table 4.

The voting method indicates that nutrition education promoted significantly greater knowledge by 244 to 5 with 139 no differences. The weighted effect size of 1.12 indicates that the average participant in a nutrition education programme achieved at the eighty seventh percentile of the control. The weighted Z score of 19.21 indicates the probability that the effectiveness of nutrition education due to chance was less than 0.001. The fail-safe n for such a finding was 8.210. The unweighted effect size is 1.05 (at the eighty fifth percentile of control group) and the Z score is 31.90 (P < .001). Thus the voting method, effect size and Z score results clearly indicated that nutrition education as described in journal research articles is effective in promoting nutrition knowledge. Similar trend was observed in both the variables
TABLE 4: Meta-Analyses of Findings for Journal Articles

<table>
<thead>
<tr>
<th>Items</th>
<th>Knowledge</th>
<th>Attitude</th>
<th>Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Voting ND</td>
<td>139</td>
<td>101</td>
<td>596</td>
</tr>
<tr>
<td>P</td>
<td>244</td>
<td>88</td>
<td>810</td>
</tr>
</tbody>
</table>

Weighted Effect size
|       | M         | 1.12     | 0.44      | 0.49      |
| SD    | 1.65      | 0.26     | 0.52      |
| N     | 50        | 19       | 60        |
| Z     | 19.21     | 8.18     | 16.76     |

Z-score
| N     | 61        | 24       | 77        |
| Fail- | 8,210     | 566      | 7,868     |
| safe n |          |          |           |

Unweighted Effect size
|       | M         | 1.05     | 0.43      | 0.52      |
| SD    | 1.49      | 0.53     | 1.17      |
| N     | 184       | 77       | 511       |

Z-score
| Z     | 31.90     | 14.03    | 39.32     |
| N     | 223       | 86       | 630       |
| Fail- | 83,137    | 6,130    | 357,162   |
| safe n |          |          |           |

| N = Negative findings |
| ND = No significant difference |
| P = Positive findings |
| M = Mean |
| SD = Standard deviation |
| n = Number of studies |


of attitude and behaviour which is clear from Table 4.

Reviewed studies reveal that a study of the influence of a factor in isolation is not possible because of
inter-relationships between the factors. Hence the correlations of various factors were explored by nutrition educationists.

2.2. Correlations among the Factors Influencing the Food Behaviour

In most research and evaluation studies in nutrition education, one finds that knowledge, attitude and behaviour are the common variables being measured. The foundations for this focus are strongly supported in educational theory.

Nutrition education is aimed at influencing the knowledge, attitudes and behaviour related to nutrition. These three outcomes of nutrition education are related. Although several social-psychological theories state that knowledge, attitude and behaviour should be consistent (Insko and Schopler, 1967), a number of studies indicate that their relationships are not simple or automatic (Wicker, 1969; Swanson, 1972; Liska, 1979).

The relationships among knowledge, attitudes and behaviour are more intricate. Behaviour typically has multiple causes. The view that nutrition knowledge and attitudes will determine nutrition behaviour simplifies the complexity involved in food selection, preparation and consumption. Behaviour is mostly determined by many
motivations operating at the same time; therefore food behaviour is usually the result of many motivations rather than one. Most individuals value health and so it is assumed that they will adopt a lifestyle commensurate with assuring lasting health. Whether they do or not, depends upon internal influences such as nutrition knowledge, attitudes, personality traits and anxiety/depression and external factors like socio-cultural expectations, food availability, cost of food, advertising appeals, food popularity and a desire to keep up with the peers. Despite the fact that external factors may determine the immediate behaviour than do internal influences, the degree to which knowledge, attitudes and behaviour are related has been the subject of considerable debate. Brun (1985) also emphasized the above view points and expressed the same opinion based on his extensive review related to nutrition education.

In this context Pelto and Pelto (1978) and Kolasa et al. (1979) and Kolasa (1981) encouraged researchers to study the knowledge, attitudes, beliefs and practices of individuals and groups. Glanz (1991) said that it is very important to evaluate the intervening variables such as knowledge, attitudes and beliefs presumed to be related to improved nutritional behaviour.
2.2.1. Correlations of Factors Influencing Food Behaviour-Empirical Evidence

Peterson and Kies (1972) determined the nutrition knowledge, attitudes and the relationship of knowledge and attitudes of kindergarten I, II and III grade teachers in the State of Nebraska. Simple linear correlations were used to determine the relationship between knowledge and attitudes of the teachers. The correlation was 0.04 (significant at 10 per cent level).

It is generally believed that greater knowledge of nutrition will lead to more desirable attitudes toward nutrition. However, the data from this study indicated only a minor relationship between nutrition knowledge and attitudes toward nutrition. The attitudes were reported to influence behaviour, independent of one's knowledge. These findings suggested that a greater knowledge of nutrition will not necessarily increase the positive attitudes, but attitudes pave the way to behaviour.

Schwartz (1975) investigated the nature of relationship of nutritional knowledge to attitudes and practices and their interrelationships among the respondents. He employed the knowledge - attitude - practices (K-A-P) model adopted from the cognitive - affective - behaviour
theory in the field of social psychology. The sample consisted of 1969 female graduates from select Ohio High Schools.

Data were analysed to determine as to which of the following four models describe the interrelationship of nutrition knowledge, attitudes and practices of the graduates.

\[
\begin{align*}
\text{Model I} & \quad \text{K} \leftarrow \text{A} \rightarrow \text{P} \\
\text{II} & \quad \text{K} \\
& \quad \text{A} \\
& \quad \text{P} \\
\text{III} & \quad \text{K} \\
& \quad \text{A} \\
& \quad \text{P} \\
\text{IV} & \quad \text{K} \\
& \quad \text{A} \\
& \quad \text{P}
\end{align*}
\]

K - Knowledge; A - Attitudes; P - Practice

As illustrated in the model I, attitudes mediate knowledge and practices. Knowledge and attitudes together interact to influence practices in model II. Model III reflects the independent influence of knowledge and attitudes on practices. In model IV, knowledge influences practices both directly and indirectly as mediated by attitudes concurrently.

The findings supported the model I i.e., relationship of knowledge to attitude and attitude to practices but did not support direct relationship between nutrition...
knowledge and practice. Attitudes and practices were positively correlated, but specific beliefs or attitudes in support of specific practices were not investigated. It is evident from this study that knowledge influences attitudes and in turn attitudes influence practices.

Sims (1976) examined the nutrition knowledge of a group of mothers of preschool children in relation to selected demographic and attitudinal variables. The nutrition knowledge of respondents was measured using a test developed by Eppright and co-workers (1970). Certain environmental factors both demographic and attitudinal were also measured and their relationships to nutrition knowledge were assessed.

Correlations between nutrition knowledge and selected demographic and attitude variables are presented in Table 5. The data reveal that the variables - socio-economic status, occupation, education'scale and "Nutrition is important" attitude were highly positively correlated with nutrition knowledge. The variables which were highly negatively related to nutrition knowledge were stage in life cycle, food dollars spent, total number of persons in home and 'Parents are all wise' and 'Powerlessness' attitudes.) These highly correlated factors were more important predictors of the nutrition knowledge than others. Moderate degree of relationship was observed
TABLE 5: Correlation between Nutrition Knowledge and Selected Demographic Attitude Variables

<table>
<thead>
<tr>
<th>Demographic variables</th>
<th>Nutrition knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Socio-economic status</td>
<td>0.53**</td>
</tr>
<tr>
<td>2. Occupation-education</td>
<td>0.51**</td>
</tr>
<tr>
<td>3. Income</td>
<td>0.20*</td>
</tr>
<tr>
<td>4. Stage in life cycle</td>
<td>-0.35**</td>
</tr>
<tr>
<td>5. Food dollars spent</td>
<td>-0.37**</td>
</tr>
<tr>
<td>6. Total persons in home</td>
<td>-0.47**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitude variables</th>
<th>Nutrition knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &quot;Nutrition is important&quot; attitude</td>
<td>0.53**</td>
</tr>
<tr>
<td>2. &quot;Equalitarianism&quot; attitude</td>
<td>0.21*</td>
</tr>
<tr>
<td>3. &quot;Parents are all wise&quot; attitude</td>
<td>-0.42**</td>
</tr>
<tr>
<td>4. &quot;Powerlessness&quot; attitude</td>
<td>-0.42**</td>
</tr>
</tbody>
</table>

*Significant at 0.01 level
**Significant at 0.001 level

Source: Sims, 1976.

between nutrition knowledge and income and 'equalitarianism' attitude. From the findings, it is evident that the mothers who possessed the highest level of nutrition knowledge were characterized by the following: higher socio-economic
status, fewer persons in the house, young earlier stage in the family life cycle, and less authoritarian and 'Nutrition is important' attitudes.

Krause and Fox (1977) investigated the factors influencing the nutrition knowledge and attitudes of physicians practising medicine in the University of Nebraska mail survey technique was used.

The assumption that physicians had gained a bulk of their nutrition knowledge by way of post-graduate study and experience was not supported by the findings. A significant negative correlation was found between the nutritional knowledge and years of practice. No significant relationship was found between nutrition knowledge and attitudes. Attitudes toward nutrition were generally favourable.

Carruth et al. (1977) determined whether or not a significant relationship existed among nutritional knowledge, attitudes, personality traits and nutrition related behaviours. Respondents were selected purposively from Missouri's Expanded Food and Nutrition Education Programme. The experimental group received five weeks training on weight modification concepts. Both experimental and control groups were pre and post tested for their knowledge and practices. Direct observations were made of
only experimental group's nutritional practices. Cattell and Eber's Sixteen Personality Factor Questionnaire (Form E) was used to characterise them either as adaptable (flexible) and or as self-opinionated (rigid). Carruth's attitude questionnaire was used to measure their adaptability toward changing nutritional practices.

The data indicated that the training resulted in a significant positive gain in nutrition knowledge. Nutrition knowledge was not significantly correlated with nutritional behaviour. Positive significant correlation was found between personality - flexibility and behaviour. Same relation was observed between attitudes - change proneness and behaviour. Significant negative relation was obtained between age, a personal factor and nutritional behaviour. Further, multivariable analysis documented that nutrition knowledge was not as potent a predictor of nutritional behaviour as were attitudes: personality traits and age.

Reddy and Chandralekha (1978) studied the relative influence of certain selected factors on the nutritional practices of rural mothers of preschoolers. Sixty respondents were selected purposively from the target group of OXFAM Project, Department of Home Science, Sri Venkateswara University, Tirupati, Andhra Pradesh, India. Factors selected were nutrition knowledge, attitudes.
socio-cultural beliefs, socio-economic status, age and personality flexibility. Standard instruments were used to find out personality and socio-economic status. For other variables, instruments were devised.

The results are presented in Table 6. The relationships between the nutritional practices and each of the selected factors were examined. Nutritional practices were significantly related to knowledge, attitudes.

<table>
<thead>
<tr>
<th>TABLE 6: Interfactor Correlation between Certain Variables and Nutritional Practices of Rural Mothers</th>
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<tbody>
<tr>
<td>Factors</td>
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<tr>
<td>Practice</td>
</tr>
<tr>
<td>Knowledge</td>
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<tr>
<td>Attitudes</td>
</tr>
<tr>
<td>Socio-economic status</td>
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<tr>
<td>Socio-cultural beliefs</td>
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</tbody>
</table>

*Significant at 5 per cent level

**Significant at 1 per cent level

socio-economic status and socio-cultural beliefs. No significant relationship was found between the practices and age as well as personality. Negative correlation was seen only between nutritional practices and socio-cultural beliefs and the rest were positive correlations. Regression equation revealed the relative intensity of influence of the significantly correlated variables. The pooled influence of four significant variables - knowledge, attitudes, socio-cultural beliefs and socio-economic status was accounted to 64.8 per cent while the remaining 35.2 per cent might be accounted for unexplored factors. Out of 64.8 per cent, knowledge (29.2 per cent) and socio-cultural beliefs (20.2 per cent) had maximum influence and attitudes (12.8 per cent) and socio-economic status (2.6 per cent) came in that order. The reasons for this order may be many, but the most significant ones are culture and procedural constraints/limitations related to nutrition education and evaluation.'

Sujata (1981) conducted a similar study to explore the relationship amongst certain factors - nutrition knowledge, attitudes, socio-cultural beliefs, socio-economic status, personality and age. The respondents were rural mothers of preschool children (70) from Chandragiri block, Chittoor, Andhra Pradesh, India.
The results indicated that knowledge and socio-cultural beliefs were the most significant influencing factors to nutritional practices. Attitudes, age and socio-economic status followed were in that order of influence. Among the influences, negative influence was observed with regard to socio-cultural beliefs and age. There was no significant relation between personality and nutritional practices.

O'Connell et al. (1981) felt the role of teacher's attitude and beliefs toward nutrition in nutrition education as crucial. This feeling led them to assess nutrition-related attitudes and beliefs of teachers of Pennsylvania State U.S.A. Valid instruments were used to measure their attitudes and beliefs toward nutrition. The results indicated that one group of teachers had high positive scores of attitudes and beliefs irrespective of their prior training in nutrition. The other group showed positive high scores only after training. The findings reveal that nutrition knowledge facilitates development of positive attitudes but cannot guarantee. This might be because attitudes have a strong base and backed by many social, cultural, personal and psychological factors, other than knowledge. Though it was predicted that positive attitudes of teachers lead to their better teaching in nutrition, this was not proved in the present study.
Examination offered was that for many teachers positive attitude was not accompanied by a personal willingness or interest in teaching nutrition. The author indicated that more research is needed to explore the possibilities of motivating such individuals.

2.2.2. Correlations among Nutrition Knowledge, Attitude and Behaviour

An overview of these studies indicates that relationships among knowledge, attitude and behaviour were increasingly examined by various researchers in the recent past.

(2.2.2.1. Knowledge and Behaviour: The process through which nutrition education affects nutrition knowledge, attitudes, and behaviour begins with nutrition information being presented to participants. Presenting information does not mean that the information will be attended to, learned, retained, or applied. Knowledge does not, in and of itself, cause changes in behaviour or even attitudes except under a very limited set of conditions (Watson and Johnson, 1972). In many cases people do not assign weight of information in strict accordance with its importance (Hogarth, 1981; Kahneman and Tversky, 1979; Nisbett and Ross, 1980; Tversky and Kahneman, 1974). Being informed does not mean that people will act intelligently in promoting health and preventing
disease. Information is often disregarded, altered and used to justify and rationalize current behaviour rather than to stimulate behavioural change. It needs prior education to effectively interpret and use information.

2.2.2.2. Attitude and Behaviour: Since attitudes are thought to be pre-dispositions to action (McClintock, 1972), the failure to find a high correlation between attitudes and behaviour in early social psychological research was frustrating (Wicker, 1969; Fishbein and Ajzen, 1972). Nutrition educators have shared this frustration as the correlations between nutrition related attitudes and behaviour have been found to range from approximately 0.01 to 0.55 in studies that sampled different populations, attitudes and behaviours. In energy food consumption research, attitudinal variables have indicated little association with energy food consumption (McDougall, et al., 1981 and Ritchie et al., 1981). Millions of people aspire to health, are aware of the link between well-balanced meals and health, and can afford to, yet still persist in undesirable practices.

2.2.2.3. Knowledge, Attitude and Behaviour: A number of studies measured more than one dependent variable and therefore, it was possible to compute correlations among nutrition knowledge, attitude and behaviour. Brun (1985) computed calculations for both effect size and
Z-scores. The results are presented in Table 7. Significant relationships exist between nutrition knowledge and behaviour as seen by statistically significant (P 0.02) correlations. The relation between nutrition attitude and behaviour is also significant, as indicated by the Z-score correlation. The relation between nutrition knowledge and attitude did not reach statistical significance.

Thus there has been mixed evidence as to whether or not knowledge, attitudes and behaviour are related. The relationship among the three variables is considered to be complex and incompletely understood. Nutrition education research focusses on significant relationships between nutrition knowledge and behaviour as well as nutrition attitudes and behaviour. These outcomes will be of interest to nutrition educators and social psychologists involved in attitude modification and change.

2.3. Development of Evaluative Instruments in Nutrition Education

Knowledge about the factors which influence the outcomes of nutrition education is crucial. Method of measurement of both factors as well as outcomes is equally essential. Further, precise assessment of the influencing factors is vital, otherwise the quality of information
<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation</th>
<th>Number</th>
<th>Significance level (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge and Attitude: Effect Size</td>
<td>.17</td>
<td>29</td>
<td>.19</td>
</tr>
<tr>
<td>Knowledge and Behavior: Effect Size</td>
<td>.50</td>
<td>38</td>
<td>.001</td>
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<td>Attitude and Behavior: Effect Size</td>
<td>.20</td>
<td>23</td>
<td>.18</td>
</tr>
<tr>
<td>Knowledge and Attitude: z-Score</td>
<td>.09</td>
<td>35</td>
<td>.31</td>
</tr>
<tr>
<td>Attitude and Behavior: z-Score</td>
<td>.47</td>
<td>28</td>
<td>.006</td>
</tr>
</tbody>
</table>

Source: Brun, 1985
collection would be affected. The interpretations based on such information may not be meaningful to the group concerned and in turn the outcomes are far behind the expectations. This line of thinking was expressed by the recent researchers in the field of nutrition education (Carruth and Anderson, 1977; Glanz, 1981; Olson and Gillespie, 1981; Coates, 1981; Hochbaum, 1981; Lennon and Fieldhouse, 1982 and Brun, 1985).

Aforesaid research is limited to some factors like knowledge, attitude, belief, behaviour toward food and nutrition. On the other hand, the standard tools and procedures are available for evaluating demographic factors and personal characteristics. Yet, most of the nutrition education programmes are evaluated through the assessment of their outcomes using the available instruments. As a result, the true effects of nutrition education and their interdependency as well as inter-relationship are not very clear.

This situation has warranted researchers who are interested in functional nutrition education. In the developed front, few of them made attempts in the recent past, to develop the tools and scales for evaluating nutritional knowledge, attitudes, beliefs and behaviour (Eppright et al., 1970; Jones et al., 1975; Munger and Jones, 1975; Jones and Munger, 1976; Carruth and Anderson, 1977; O'Connel et al., 1981 and Bell et al., 1981). Such attempts have been
scanty in the Indian context where the need is more due to complex nature of food behaviour. The wide application of these tools is restricted due to their specificity to the purpose and cultural variation. There is a need either to modify them or to use them as a base to develop new instruments to suit the local conditions.

Therefore, the principles adopted and procedures suggested by researchers of nutrition education are reviewed herewith.

2.3.1. Assessment of Nutritional Knowledge Attitude, Behaviour and Beliefs

2.3.1.1. Knowledge: Eppright et al. (1970) developed a knowledge test composed of 23 true-false items concerning the factual information on nutrition. By this test the score of nutritional knowledge could be obtained in terms of total number of correct responses. Each respondent was also asked to answer oral questions in this regard. The principle behind the use of true/false items in knowledge test was to enable the respondents to provide valid answers.

Schwartz (1975) revised the instrument of Eppright et al. (1970). The modified instrument provided two responses for each statement. The first response was of true/false type while the second was of 4-point continuum viz., very confident to very doubtful.
McNutt (1977) criticized the methodologies that have been used to measure nutrition knowledge. He complained that most researchers have tended to assess the "recitation of the names of nutrients and their isolated functions rather than probing the individual's competency to select a diet appropriate to his or her nutritional needs". He concluded that as a result, the extent data provide few clear guidelines for nutrition educators who wish to modify people's food choices by providing them with nutrition information.

Dugdale et al. (1979) reported that nutritional knowledge could be obtained scientific as well as non-scientific sources. Non-scientific includes misconceptions and fallacious opinions. Therefore, the testing of levels and accuracy of the nutritional knowledge is essential.

Dugdale and co-workers evolved an innovative methodology for assessment of nutritional knowledge. The simplest and most common questions were formulated. The author preferred the question form to statement because it stimulates thinking about the ideas in the respondent. The procedure involved assessing the correct level of knowledge was dividing the number of correct responses by the number of questions. If the respondent was given an additional alternative of 'do not know' to each of the questions much more information could be obtained. Through this alternative the
respondent admits that he has either no knowledge or is uncertain about the correct answer. Conversely, if the subjects mark only 'yes' or 'no' alternative, he believes that he has that knowledge. This knowledge could be designated as 'perceived' knowledge. The level of perceived knowledge could be obtained from the three alternative questionnaire by using the formula viz.,

\[
\text{perceived knowledge} = \frac{\text{Number of questions marked yes/no}}{\text{Total number of questions}}.
\]

However, the fact that a person has an idea on a given subject is no guarantee that the idea is accurate. Such accuracy is obviously important and could be derived from the three alternative questionnaire as follows:

\[
\text{Accuracy of knowledge} = \frac{\text{Number of correct responses}}{\text{Number of responses marked yes/no}}.
\]

These three aspects of knowledge are related one to another. Correct knowledge = Perceived knowledge $\times$ Accuracy of knowledge.

A high level of correct knowledge is the ultimate aim of nutrition educators. If the respondent's level of correct knowledge is unsatisfactory, the three alternative procedure enables the investigator to identify as to where the problem is? This method of assessment of knowledge was tested by Dugdale et al. (1979) and found to be valid and reliable.
Olson and Sims (1980) described that an information processing approach provides a conceptual foundation for explaining the effects of people's nutrition knowledge on their food behaviour. This perspective focusses on the psychological processes involved in acquiring nutrition information, storing it in memory, retrieving it at a later time and using it in decision-making. Further, they suggested that multiple measures of the content an organization of peoples' nutritional knowledge structures must be developed. The reliability and validity of these indices must be established. Then it is easy to examine how different types of knowledge structures are related to the use of new nutrition information for making correct food choices. They concluded that the results of such research has the potential to help nutrition educators and policy makers, develop more effective nutrition information programmes.

2.3.1.2. Behaviour: Pelto (1981) reported that the method of participant-observation was articulated by Malinowski in 1961. This method was modified by many researchers and came to an usable form. This technique facilitates for systematic exploration of relationships among events through interviewing, meticulous eye witness and administering tests. Thus the method was converted to scientific use.
Schwartz (1975) suggested a procedure with two dimensions for assessing nutritional practices. The two dimensions were:

1. Dietary intake was assessed based on frequency of intake during a 3-day period.

2. Descriptive statements indicative of observable nutritional practices such as use of supplements etc. These items could also be quantified as in the case of knowledge test.

Carruth et al. (1977) documented three types of nutritional related behaviours in their study. They were:

1. Requests for free literature from the respondents,

2. Verbal affirmations of nutritional practices from the respondents. An example of verbal behaviour would be "respondent recommending the Basic - 4 food groups as a basis for menuplanning,

3. Observed overt nutritional behaviours of respondents. An example of overt behaviour would be "a respondent eating a meal that contained foods selected from at least three of the four food groups."
A check-list for both verbal and overt behaviours was developed.

Observations were not recorded in the presence of the participants. A disguised participant-observer design was used to document nutritional behaviours. A second observer assisted in cross-validating observations of both verbal and overt applications of nutritional knowledge.

Pelto (1981) stated that participant observation could be directed to include both process (formative) and product (outcome) evaluation.

2.3.1.3. Attitude: Attitude has been described as an underlying disposition which enters, along with other influences, into the determination of a variety of behaviours toward an object (Cook and Sellitz, 1964). Attitude includes a cognitive component that reflects some emotional feeling connected with these beliefs and an action tendency that indicates a readiness to respond in a particular way (Freedman et al., 1974 and Kelly, 1977). A useful attitude scale must possess the properties of reliability, validity, unidimensionality, equality of units and a zero point (Shaw and Wright, 1967). Curruth and Anderson (1977) suggested that without more rigorous methodology attitude measurement in nutrition education
will remain at the descriptive qualitative level of research.

O'Connel et al. (1981) stated that assessment of an individual's attitude toward an object is a complex task. Instruments designed for the purpose may take into consideration any or all the three attitude components. Cock and Sellitz (1964) suggested that researchers use various approaches for estimation of attitudes. Since different approaches may bring out different facets of the attitude component, researchers should not expect that data from these approaches will be perfectly correlated.

Eppright et al. (1970) developed a nutritional attitude test and validated it. It consisted of 11 items reflecting attitude toward nutrition and eating habits, 9 items about meal planning and 11 items about food preparation - a total of 30 items in all.

Sims (1976) adopted a Parental Attitude Research Instrument (PART) of Schaefer and Bell (1953). The extent of agreement or disagreement was scored on a Likert-type format using a 4-point continuum. Out of ten, only four variables were chosen which showed important relationship to nutritional knowledge. They were 'Nutrition is important', 'Equalitarian', 'Parents are
all wise' and 'Powerlessness'. In all, high reliability (ranging from 0.71 to 0.79) and validity were established.

Carruth and Anderson (1977) developed a scale to measure attitude toward food and nutrition. A pool of statements that fulfilled scaling criteria—validity, reliability, unidimensionality and rigidity—flexibility, were identified.

Content validity was established based on the 75 per cent or more of expert opinion. Through this process, sixty items were selected from the original pool of 128. The degree of rigidity and flexibility was judged by the experts using eleven-point continuum. Using median of distribution (S values) and interquartile range (Q values), finally 40 statements were chosen for the final version of the attitude instrument. Likert type format of 5-point continuum—Strongly Agree to Strongly Disagree, was found to be suitable. Unidimensionality was established using factor analysis. Reliability was established using test-retest method.

Few explorations have shown the value of applying the semantic differential to nutritional attitude assessment (Brinton, 1961; Shaw and Wright, 1967).

Carruth and Musgrave (1979) developed semantic differential instrument to assess attitude change towards
community nutrition. A semantic differential means pairs of adjectives rather than words in the context of a sentence or phrase, to which a person responds. It was designated to measure individual's reactions to semantic objects utilizing ratings of bipolar adjectives called scales. The adjective pairs included were such as flexible - rigid, good - bad, slow - fast etc. The semantic differential was utilized to measure the inter-relationships among four attitude variables in teacher evaluation and was found to be an effective method. The attitude variables measured were credibility, content, delivery and feedback (McDowell, 1975). The semantic differential has been recommended as a means of assessing students' affective behaviour because it possesses a great deal of flexibility, is easy to construct, and simple to score.

Rajyalakshmi et al. (1980) attempted to develop an attitude scale to measure attitudes of rural women toward food and nutrition. The method of scalogram analysis (Edward, 1957) was followed in constructing the instrument to measure the attitudes.

Collection of items was done consulting various sources. An item pool containing 120 items was prepared. The items were edited by following the criteria suggested by Edward (1957). Thus a set of 55 items were classified according to their content under different relevant

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sub-concepts such as cereals and millets, legumes and oil seeds etc. The number of items under each concept ranged from 2 to 9.

The items were administered to 100 rural women of Telangana region, Andhra Pradesh. Five-point continuum ranging from Strongly Agree (4) to Strongly Disagree (0). For unfavourable attitude items, the scoring system was reversed i.e., 0 - 4.

Reliability and scalability of the instrument were tested using Coefficient of Reproducibility (C.R) and Minimum Marginal Coefficient of Reproducibility (M.M.C.R) respectively.

The following formulae were used to calculate C.R and M.M.C.R:

\[
C.R = 1 - \frac{\text{Total number of errors}}{\text{No. of respondents} \times \text{No. of items}}
\]

\[
M.M.C.R = \frac{\text{Sum of responses}}{\text{No. of items}}
\]

Modifications were made in each category by making different combinations of items. As a result, the number of items in the scale reduced from 55 to 44 and number of items under each sub-concept ranged from 2 to 7. Since the C.R values for all the categories were above 0.90, all the items were reliable. Whereas M.M.C.R values were
above 6.5, all the items were scalable. Validation of the instrument was established by the jury. Sample items were: 1. Hand pound rice is better than milled rice 2. Thorough washing of rice before cooking is good.

Sutnick (1981) examined the use of 'Q' sort technique in attitude assessment. It was reported that the food 'Q' sort consisted of sets of 25 cards with names of foods. These foods were divided into 4 categories based on their nutritive values: high, moderate, some what and least. Respondents were asked to sort the foods along 2 dimensions - preference and nutritive value. The accuracy of the nutritive value sequence was taken as a measure of the respondents' knowledge. It was assumed that attitudes toward good selection would truely reflect in their preference rankings. If the students would have been motivated to value nutrition more highly in making food choices, this would be observed as a more positive correlation between the two ratings. Thus, the method identifies nutritional attitudes. After testing the author stated that 'Q' sort technique can be of great value to the nutrition educators.

2.3.1.4. Beliefs: Bell et al. (1981) reported on a method used for documentation, quantification and analysis of food belief systems. It is based on a repertory grid instrument used in psychology to rationalize and predict
human behaviour. Factor analysis was used as a data reduction strategy and multiple regression was used to relate numerical measures of food belief to the frequency of food intake. In this method the complex food belief system could be reduced to a small number of factor dimensions. It was suggested that the position of a food on the primary factor dimension strongly predicts the intake frequency of that food. Authors concluded that the suggested method may serve nutrition educators' essential purpose.

Jones et al. (1975) and Munger and Jones (1975) developed field guides for evaluation in nutrition education. They intended these guides as evaluation tools for planners and implementors in nutrition education who are concerned with cost-effectiveness of specific nutrition education programmes.

Thus, guidelines are provided to develop precise and simple instruments of evaluation in the field of nutrition education. The use of such valid and reliable instruments of nutrition knowledge, attitudes, beliefs and behaviour helps to check the effectiveness of nutrition education. This in turn, leads to effective nutrition education.
2.4. Functional Strategies in Nutrition and Health Education

Owen (1980) stated that "there is no choice to be made whether or not to evaluate a programme and that evaluation occurs". Nutrition education researchers as well as nutrition educators need to refine their skills of evaluation and set themselves as well as their programmes in order. However, researchers have tended to concentrate only on the product evaluation i.e., evaluation of outcomes viz., knowledge, attitude and behaviour. As a result, there was little research on the process evaluation in nutrition education (Yarbrough, 1981).

This situation led to the routine use of the available methods without any discretion by the nutrition educators. More research is needed to identify the strategies that work with what groups and why? By perfecting the techniques of assessment, it is possible to provide the right kind of information to those who need. It is also possible to persuade the people with unfavourable attitudes toward nutrition to recognize the need for dietary change. For those who had the information they needed and favourable attitudes toward the need for dietary change, one could easily provide skills and reinforce actual behaviours. These views were also expressed by a few researchers (Sims, 1981; Olson and Gillespie, 1981 and Brun, 1985).
Jelliffe (1970) stated that until recently, nutrition was taught in a style of "Do this, I tell you it is good". Hence, it was neither suited to local conditions nor carried out in a manner relating to the communities' existing food beliefs. It is clear that this approach starts with an assumption viz., complete lack of knowledge of nutrition on the part of the group and they are merely waiting for the facts in order to act upon them.

Whitehead (1973) extensively reviewed literature on nutrition education research. He revealed that methods used have been directed more toward dissemination of nutrition information than improving dietary practices. There is little evidence that nutrition education which purports to improve dietary practices can be expected to do so within limitation.

Raw (1977) stated that changing food habits is a main expectation of and challenge to nutrition education. However, there is no substantial evidence that this goal has been achieved.

In a report on Assessment of Education Progress (1978) a few major conclusions were drawn as follows:

Nutrition and Health Education 1. rarely exist in a planned, organized and sequential way, 2. reflect too much fact-giving and not enough experiential learning, and
3. focus more on formation than on changing the attitude behaviour.

The existing status of nutrition education warranted nutrition educationists and socio-psychologists to evolve functional strategies for nutrition and health education. As a result, most of them suggested theoretical propositions and a few of them made attempts for effective nutrition and health education.

2.4.1. Theoretical Propositions

Lewin (1943) the pioneer of the Discussion/Decision method suggested that it might be possible to bring about, in a relatively shorter time, definite changes in food attitudes and practices. The change might occur even for foods which would be expected to show greater resistance to change. Age and interest level of the learners were as important as considerations of time. Further, his ideas were supported by his associates in their subsequent studies (Radke and Klisurich, 1947; Radke and Case, 1948; Johnson, 1981 and Johnson and Johnson, 1983).

Benson's (1944) early work in rural schools in the United States indicated that children would improve their food practices when they discover for themselves what changes they had to make; are strongly motivated to learn about foods and practice. What they learn, and have access to the right kinds and amounts of foods.
W.H.O (1969) emphasised the peoples' orientation about health education "the focus of health education is on people and action. In general, its aims are to persuade people to adopt and sustain health services available to them, and to take their own decisions, but individually and collectively to improve their health status and environment".

McClintock (1972) reported on the learning activities of three different approaches aiming at attitude change i.e., consistency, functional theory and information processing.

In consistency approach, a critical condition is created for the change in attitude by sensitizing the individual to realise to be aware of the discrepancy between his own and the expected behaviour. No new information is provided. Person is asked to engage in the expected behaviour so that the person in order to justify his actions, may alter his attitudes to the expected behaviour.

In information processing approach, attitude change is acquired by involving a person in successive series of steps in learning process. This approach emphasizes the use of persuasive techniques. The functional theory assumes that the origin of attitudes and their change lie
in the satisfactions provided for the person's basic needs.

Rogers and Shoemaker (1971) stated that there are four stages in the adoption or rejection of an innovation: knowledge, persuasion, decision and confirmation. The rate of adoption of an innovation by a social group is usually measured by the length of time required for certain percentage of the group to adopt innovation. The important concept in communication of innovations theory is that of opinion leadership. In any social group certain members function as opinion leaders. They provide information and advice on innovation to many others in the system. These leaders are able to influence other peoples' attitudes or behaviour with relative frequency due to their social respectability.

Festinger (1971) pointed out that forced compliance is frequently followed by a change of personal attitudes in an attempt to reduce cognitive dissonance. Individual or optional decisions are adopted more quickly than collective ones. Nutrition and health education is usually most concerned with optional decisions.

Whitehead (1973) drew the following conclusions from research on nutrition education:

1. Problem-solving is an effective way to influence what to do about their food intake and their food supply.
The challenge for nutrition educators is to create learning situations where people will recognise their own nutrition problems, then guide them step by step through the active process of problem-solving.

2. Discussion/decision is more effective than the admonition by lecture as a method of influencing what people do about dietary habits and nutrition problems. This method has been used successfully to stimulate people to try new foods, to select better ways of preparing foods and to make better food choices. This method may be a first step in certain situations to get people recognise their own nutritional problems and provide the stimulation needed to seek solutions to such problems.

3. Effective nutrition education, based on recognized needs, is cooperatively planned, conducted and evaluated and supervised by adequately prepared nutrition educators. This implies that there is a great need for teachers to understand the fundamentals of nutrition.

Fletcher (1973) stated that communication must be matched to the knowledge, social background, interests, purposes and needs of the receiver. Thus it is vital to consider fully audience characteristics. Audience variables include age, sex, intelligence, self-esteem, interests, personality as well as previous relevant knowledge and attitudes.
Fishbein and Ajzen (1975) suggested that discrepancy is an important variable. That is, the greater the initial gap between the view of the communicator and the view of the receiver, the less chance there is of the acceptance of the message. The amount of discrepancy can be reduced by the facilitating factors like high credibility of the communicator.

Shortbridge (1976) recommended three proven principles of learner success oriented education. They were:
1. people learn best when supplied with relevant facts and information; 2. they learn best when given the opportunity to practice the skills which are to be learnt. This practice should be appropriate, frequent enough and permit individual performance; 3. they learn faster when supplied with feedback on their progress.

Reddy et al. (1974) and Devadas and Rao (1977) stated that nutrition education programme can be made functional by preparing the message based on four essential criteria: receptivity of the people, relevancy to the people, needs of the people and feasibility to adopt quickly.

Greaves and Donosa (1976) stated that nutrition and health education should be relevant to the context in which it was given. For instance, in slum areas of Indian
cities, education should be emphasized on aspects such as breast-feeding, hygiene, rehydration in diarrhoea, immunization, and maternal nutrition during pregnancy.

Within the U.S., there was evidence that having information about the nutrients contained in foods do not lessen the need for effective nutrition education programmes (Bettman and Kakkar, 1977; Jacoby et al., 1977; McDougall et al., 1981). Brun (1985) stated that small packets of information should be developed in order to make it effective. Positive results were accomplished due to rigorous editing of the messages using the suggested criteria.

Evans and Hall (1978) expressed the view that research was needed in the field of social psychology to offer a strong base for nutritionists. Some of the areas suggested were development of communication models, fear as a motivator and factors in information processing. Researches of this nature assist nutrition educators to change/improve the food behaviour of people.

Machoey and Caggiula (1978) stated the process of behavioural approach and its application to nutritional counselling. In the process of behavioural approach, first, a motive for change must be provided by presenting the clean description of the danger or potential problem
associated with the existing behaviour. This can be accomplished in a variety of ways. In the second instance the threat or danger must be made personal to the individual. Thirdly, only after the clear perception and acceptance of the need for change, can one facilitate change by structuring the action. This action includes exact specifications as to how when, and where. How this could be accomplished is vague. This is due to inadequate understanding of the three environments, viz., physical, social, and personal, which dictate human behaviour. If that is taken care of desirable changes can be brought about in the three environments, so as to reach the expected behaviour. The authors also proposed collaborative efforts in behavioural sciences and nutrition education.

Barlow and Tillotson (1978) reviewed the incorporation of behavioural science principles into nutritional practice which was demonstrated in several programmes sponsored by the National Heart Lung and Blood Institute (NHLEI). They also stated the limitation of purely instructional approach, referred to by Evans and Hall (1978) as the 'myth' of simply providing information which would result in behaviour change. Knowledge of the principles of food behaviour has increased dramatically in the past few years. However, this knowledge is not adequate. The
authors reported about the emphasis on the application of principles of behavioural science to specific conditions such as Obesity, Diabetes etc. Their application to normal situations placing emphasis on preventive education was not thought of.

Mckenzie (1979) found that amongst issues of concern, were included 'wholesomeness' or 'naturalness' of food, balance in the diet, specific links between food and disease and achievement of an 'ideal' diet variety in the diet was associated with healthy eating and together with modification, this could be a key point in nutrition education.

Glanz (1981) proposed the following in view of the current focus in nutrition education on behavioural science theory and its application to nutrition education viz., setting the development of sound methodologies for evaluation of educational approaches and motivational approaches for nutritional behaviour change.

Lennon and Fieldhouse (1982) described the health belief model illustrated in Fig. 6. In order to progress from intention (a stage next to attitude) to behaviour, certain enabling factors must be present. These may include a favourable and supportive environment and the possession of appropriate knowledge and skills. For example, the mother must be confident in her own ability and skills in breast-feeding. She should be in a
BREAST FEEDING IS THE
NATURAL METHOD.
IT IS SAFE, SIMPLE AND
QUICK.
IT IS THE BEST FOOD
FOR BABY.
IT GIVES IMMUNITY TO
INFECTIONS, AND
IT CREATES AN EMOTIONAL
BOND.

POSITIVE
ATTITUDE
TOWARDS
BREAST
FEEDING

INTENSION
TO
BREAST FEED

PEOPLE
IMPORTANT
TO ME THINK
I SHOULD
BREAST FEED.

MY HUSBAND, FAMILY
AND FRIENDS WANT ME
TO BREAST FEED.

BREAST
FEEDING

Figure 6. Health Belief Model (Breast Feeding)
nonstressful environment where she receives practical support and encouragement so that certain physiological events can occur successfully.

They also commented participative learning as informal, where the learner and the teacher work together to reinforce facts previously given. It is more practically oriented, learning through tasks performed, and not being restricted to facts alone.

Lennon and Fieldhouse (1982) suggested that an innovation must possess the five characteristics viz., relative advantage, compatibility, complexity, triability and observability.

Johnson and Johnson (1982) stated that individuals accept a new system of attitudes and behaviour patterns when they accept membership in a new group. If a group decides to adopt new norms, its members' attitudes and behaviour patterns change. For change in nutrition attitudes and behaviour to be permanent both the person and the social environment have to change. It is easier to promote learning, attitude acquisition and behavioural change by changing the norms and values of the groups to which individuals belong than such individual separately.

Brun (1985) suggested the essential factors related to social context and interpersonal communication for a
successful effort to change nutrition knowledge, attitudes and behaviour as:

1. adopting and confronting to the norms of the reference groups to which one belongs;
2. exposure to visible and credible social models;
3. confrontation with vivid and personalized nutrition information;
4. discussion of nutrition information with peers to ways that promote active learning and
5. teaching nutrition information that one has learnt, to others.

(Vickery and Hodges (1986) stated that successful nutrition counselling culminates when a client develops a sound working knowledge and adoption of good health practices, compatible with his/her own capabilities and environment. To attain this, the cooperative and active participation of both the nutrition counsellor and the client is required. Client-centered, transactional analysis and integrated approaches were some of the approaches found suitable for nutritional counselling. However, suitability of these approaches was tested only in certain specific diseased conditions but not in preventive education.)
Nikahetiya and Wickramasinghe (1996) reported that communication for health was not automatically achieved by transmission of information. They suggested that understanding the mothers' conception of immunization was the first step; with this as the base, one could design educational, informational and motivational messages that have meaning to mothers. So the behaviour change strategy was to identify the constraints and facilitators for use of immunization by mothers. The authors pointed that this is the most effective way to motivate parents to accept and put into action the immunization.

2.4.2. Empirical Evidence

Penick et al. (1971) stated that behavioural techniques cured 33 per cent of obese patients, whereas the traditional psychotherapy cured only 25 per cent of the patients. Cure was observed by way of reduction in body weight by 20 lb. in both the cases. Procedural details followed under behaviour modification were: active participation of the patient, establishment of mutual relationship, keeping the daily record of eating behaviour, positive reinforcement, slowing down the speed of change and analysis of problems using discussion/decision method.

Zimmerman and Munro (1972) reported that behaviour modification techniques are effective tools for altering
the behaviour of mothers if head-start children in Missoula. Positive changes were observed in both attitudes and home practices which resulted in improvement of the nutritional status of the children.

The principle "operant conditioning" was applied to the modification of behaviour by rewarding the children for the desired behaviour and eliminating it for undesirable behaviour. Punishment was avoided.

Levitz (1973) reported that behaviour modification therapy offers relatively new avenue for the treatment of obesity. The procedures adopted were: functional analysis of the clients' eating pattern, alteration of the antecedent stimulus control of eating, programming in compatible behavioural positive reinforcement awarded soon after the appropriate behaviour.

Dwivedi (1974) studied the role of reinforcement in school children. The study was based on three types of reinforcement conditions viz., reward vs. neutral, neutral vs. punishment and reward vs. punishment. He found that the reward associated stimulus was perceived as more valid in the case of children.

Cormier and Mariella (1977) suggested the use of behaviour modification and instructional programme with obese patients in a weight reduction programme. They
concluded that behaviour modification method was superior to instructional programme in reducing weight on a short time basis.

Anthony et al. (1978) used behaviour modification in implementing programmes such as prevention of weight problems among children, programmes directed toward changing the families' eating and activity patterns. The procedural details followed in this strategy were: "Self-monitoring" system that focusses on actual eating behaviour as opposed to weight; provision of nutritional adequacy; 'stimulus control' as a method to restrict food intake and the training of family members which acts as a social reinforcement to sustain improved behaviour in people.

Glanz (1979) studied five types of counselling strategies used by 44 practising dietitians in providing nutritional care. The five types of counselling strategies compared were instructional, motivational, behavioural, educational, diagnosis and assessing patient's compliance. These strategies were attempted to influence knowledge, attitudes and behaviours of patients. The dietitians were drawn from three different organisations in U.S.A. Effectiveness of these strategies was assessed following the criteria viz., usage, perceived barriers, attribution of positive value and nontraditional.
The results indicated that there was greater use of all the strategies except behavioural strategy. Perceived barriers were observed as high in the case of behavioural strategies than others. Attribution of positive value was also low in the case of behavioural when compared with others. Instructional and motivational strategies were rated as traditional and the remaining viz., behavioural, educational diagnosis and assessing patient's compliance as innovative. However, when the three groups were compared, all strategies were found to be effective. But behavioural strategy was found to be more so with regard to the criteria selected. The author suggested that there is a need to train the dietitians in innovative strategies which, in turn, might improve the effective use of these strategies.

Paulsen et al. (1976), Brightwell and Sloan (1977), Kingsley and Wilson (1977), Jeffery et al. (1978) and Gotestam (1979) all of them proved behaviour modification to be the most suitable approach to control the weight of obese patients. Paulsen et al. (1981) also studied the application of behaviour modification to obese patients' for their weight control. They supported the findings of the earlier researchers. Further, they indicated that continuous use of modification techniques was beneficial to maintenance but was not sufficient to produce continued loss of weight.
Thus, the research on behaviour modification techniques illustrates the extensive use of these techniques to special diseased conditions such as obesity. Research is sparse in the application of such techniques to healthy persons in the normal living environment for preventive education.

Janis and Festbach (1963) reported that fear appeal was used with the assumption that when emotional tension is aroused, the audience will become more highly motivated to accept the practices advocated. However, this approach has several disadvantages, and it may not be appropriate to nutrition education.

Larson et al. (1974) studied the efficacy of discovery method in the training of nutrition aides who, in turn, educated the Mexican migrant workers. Five new aides were asked to study their own dietary habits and try out ways of increasing their expenditures for foods. Through this activity they discovered the basic principles of a well balanced diet. They translated their insights into pictures, which were later used to educate migrant workers. Being convinced of this information themselves, they had the motivation necessary to convince others.

In a CARE - India Nutrition Mass Communication Project, the relative effectiveness of positive and negative
approaches used for teaching nutrition were compared. It was found that the negative approach worked better, especially in relation to the nutritional aspects of pregnancy and weaning. The shock treatment worked better than the gentle approach (Devadas, 1977).

In an attempt to modify existing food preferences using social modelling, Birch (1980) investigated the influence of peer models' food selections and eating behaviours on preschoolers' food preferences, food choices and eating behaviours in a natural setting. Based on assessed preferences for vegetables, a 'target' child who preferred vegetable 'A' to vegetable 'B' was seated at lunch with three or four peers who had the opposite preference pattern. The children were then presented with their preferred and non-preferred vegetable pairs and asked to choose one. Choices were made in a specified order. On the first day, the target child chose first, while on days 2, 3 and 4 of the procedures, the peers made their selections first. Seventeen situations of this type were arranged.

The target children showed a significant shift from choosing their preferred vegetable on day 1 to choosing their nonpreferred vegetable on day 4. The target children's preferences were reassessed at intervals up to several weeks. They still showed a significant positive shift in preference for their initially nonpreferred vegetable. Consumption
data also indicated a significant increase in the amount of the nonpreferred food that the target children consumed over days. Thus it was proved that exposing children to peers with different preferences was sufficient to change both preference and consumption pattern. Age difference appeared in the data, with more younger children showing positive preference shifts than older children. The success in social modelling was also proved by Eppright et al. (1970).

Reddy and Chandralekha (1978) studied the relative efficacy of four teaching approaches viz., behaviour modification, functional, consistency and information-processing in nutrition education. The study was conducted in four different villages. Ten mothers of preschool children were selected for each one of the approaches. Impact of each approach was studied in terms of variables of knowledge, attitude and practices related to nutrition.

Contrived and real experiences were provided in behaviour modification, functional and consistency approaches. Lecture, chart and flannel graph were used in the case of information-processing approach. Field experiments were conducted following pre and post test procedures.
The results indicated that behaviour modification and functional approaches were found to be significantly effective in bringing changes about knowledge, attitude and practices related to nutrition. The information-processing and consistency approaches were found to be least effective.

Amalakumari (1979) conducted a similar investigation adopting the approaches mentioned earlier (Reddy and Chandralekha, 1979) but for urban setting. Similar observations were found in the present study with reference to the relative efficiency of the four selected approaches in nutrition education.

From the 'BRAC' story from Bangladesh (1983), an exercise in crisis management reported about 'woman-to-woman' sharing of knowledge, skill and confidence. Basic principles in this approach were 1. messages were based on mis-conceptions of the target group and 2. message delivery was through a dialogue approach but not through information giving. This approach was found to be beneficial in sharing the knowledge, skill and confidence related to the treatment of diarrhoea among the key women and the other woman.

Further, this woman-to-woman approach was evaluated in a rural setting by Mythili (1986). In this study the
messages were related to the dietary care of preschooler. The variables considered were knowledge, reasoning power and practices. Significant positive impact was seen in the target group of mothers through the key women.

An overview of the past research on nutrition intervention strategies reveals that it is impossible to arrive at which strategy is the most effective in changing knowledge, attitudes, beliefs and behaviour. This situation is due to very few comparative studies and confounding interactions created among the various methods. Further, evaluation of the methods was done only with specific groups of people. Hence the most important area for future research is to determine the relative efficacy of each educational method appropriate for nutrition and health education in the larger context. This area suggested for future research was given as third priority in the workshop on nutrition education research conducted in 1980 at Cornell University, New York. Brun's analysis of the State of Nutrition Education Programmes and Research (1985) supports this view.