Conventional and Convenience Foods-Comparison with Reference to Nutritive Value and Acceptability

BY

V. Jayanthi

A THESIS SUBMITTED TO AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY) COIMBATORE-641 043, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN FAMILY AND COMMUNITY SCIENCES

MAY 1990

Acknowledgement

A C K N O W L E D G E M E N T

The investigator expresses her deep sense of sincere gratitude and heartful thanks to Dr. (Tmt.) Vijayalakshmi Purushothaman, M.Sc., Ph.D., (Madras), Professor, and Head, Department of Family and Community Science, Avinashilingam Institute for Home Science and Higher Education For Women (Deemed University) Coimbatore, for her dynamic guidance, untiring patience and valuable suggestion offered throughout the course of the study.

The investigator is indebted to Dr.(Tmt.) Rajammal P. Devadas, M.A., M.Sc., Ph.D., (Ohio State) Vice Chancellor, Avinashilingam Institute for Home Science and Higher Education For Women (Deemed University), Coimbatore for all the facilities given in the course of the preparation of the study.

The investigator wishes her thanks to Dr.K.Kulandaivel, M.A.,M.A., (Ohio State), Ph.D., (Madras), Registrar of Avinashilingam Institute for Home Science and Higher Education For Women (Deemed University) Coimbatore and Dr.(Tmt.)Lakshmi Shantha Rajagopal, M.A., M.Sc., Ph.D., (Madras) Dean, Faculty of Home Science for making available all the amenities to carry out this study.

The investigator extends her thanks to the selected samples for their co operation throughout the study.

TABLE OF CONTENTS

CHAPTER

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Introduction

I. INTRODUCTION

Man's basic drive is for food to satisfy his hunger. Food is intimately woven into the physical, economic, psychological, intellectual and social life of man. According to Manay *et al* (1987) food is a part of man's culture and is filled with many different meanings and symbolisms for all individuals at various ages and stages of their maturity.

In early history of man, he spent almost all his time on searching for his food. But as civilization developed and man's need to satisfy himself with different kinds of needs in life, his time for the search of food, and its preparation became necessarily less and less. He began looking for ways and means of cutting time for the search of food and its preparation.

Until recently cooking was a hobby for many housewives. Cooking helped housewives to show their talents. Since the availability of time was there, they produced a variety of food preparations. They never had to bother about time and used natural food sources and methods without minding the time.

According to Peckham (1987) natural foods are those

do not contain synthetic or artificial ingredients and are only minimally processed. Minimal processing includes canning, bottling, freezing, baking, roasting, grinding and other techniques that can be done in the kitchen.

But this is no more true specially with working women who are on the increase. Working outside the home, leaves little time for chores such as marketing and elaborate cooking which includes cutting, shredding, peeling, shifting and such other minute details involved in cooking. According to Kapoor (1987) consumers today give high importance to foods which could be built-in.

World as a whole has become time conscious. Industrialization has brought about increased and rapid advances in science and technology. In more advanced countries due to accumulation of wealth and being able to simplify techniques, convenience foods have come to stay.

According to Rogers (1987) in the last 30 - 40 years greater affluence, more working wives and mothers, smaller families and an increasing percentage of one and two person households have resulted in more foods being eaten away from home, the use of more convenience foods and more casual

meals and snacking. Food industry has reacted to this providing relevant new products, but it also has a pro-active role in sustaining and enhancing social change.

In developing countries to make the standard of living higher, both the life partners take up jobs and convenience foods are a boon to them, since time and energy are saved.

As a result of applications of science and technology, our food supply has developed many new characteristics. Changing life styles and values are at the root of considerable changes in eating habits over the last few years. Baisya (1988) opines that with a strong demand for fast and take away foods, there has been a marked upturn in popularity for convenience foods in India.

As a result of such changes in the pattern of working, foods today can be purchased in a variety of forms, fresh, canned, frozen, dehydrated partially prepared, ready to serve and as a package of dry mixes. These foods are often called convenience foods (Baisya, 1988)

According to Aileen King (1975) foods which are prepared or packaged by the manufacturer, so that they need little or no preparation before eating, are generally termed "Convenience foods".

Traub and Odlund (1975) define convenience foods as "any full or partially prepared food in which significant preparation, culinary skills, or energy inputs have been transferred from the home makes kitchen to the food processor and distributor".

According to Baisya (1988) if a food is partially or completely prepared before the product is offered for sale, it becomes a convenience food.

One of the oldest of the convenience foods in South India is pickled lime and mango. Earliest of the convenience foods in reakity is in the form of preservation of fruits and vegetables of one particular season for use in the off-season. During the olden days, commercially prepared foods lacked much of the flavour and texture of home made foods, but today advances in food science have led to the development of products that may even be superior sometimes to those made at home.

In the past twenty years great changes have taken place in the kinds and varieties of foods available and in the way they are packaged.

Our supermarkets, display many thousands of items including a broad choice of frozen ready-prepared and semi-prepared foods and mixes not even dreamed of, a few years ago. In future we will have even more of theses kinds of foods.

A consumer today is totally confused with the variety of convenience foods available. Advertisements through radio, newspapers, magazines and television, regarding the superiority of different convenience foods and their changing costs and wild claims regarding their nutritive value, have really put the consumer in a tight corner. For such consumers, some kind of guideline with reference to the nutritive quality of the foods, convenience and their cost,picture, safety of the preservatives added and such other details will be boon. Before purchasing the convenience foods, answers should be given to the following questions formulated by West and Forbes (1980).

Do they contribute to the nutritive value of the days meals in a manner similar to a home made products ?

Do they really save time ?, because most of the convenience foods are considered to be time saving in nature. If the answers for these questions are satisfactory one should get to the next set of questions.

Are they liked by the family members ? This is an important question which should be answered.

The last few questions like "Is the cost reasonable when compared to other foods" , "Are they packaged in amounts, that can be used easily ? and whether convenience

foods are also free from adulterants and other contaminants ?

In the absence of a properly set up, consumer movement, the question of getting food material which is its money's worth and is safe for use is very important.

Having these facts and needs in mind the present study aims at answering these questions with respect to selected convenience foods available in the local markets in Coimbatore city.

The main objectives of the study are :

1. To find out the availability of convenience foods in the market.
2. Carryout acceptability studies on the selected convenience foods comparing them with traditional foods.
3. To compare the nutritive value of conventional foods with that of convenience foods.
4. To compare the cost and time factors involved in the preparation of conventional and convenience foods.
5. To compare the quality of conventional and convenience foods.

Review of Literature

II REVIEW OF LITERATURE

The review of literature pertaining to the study on Conventional and Convenience foods - Comparison with reference to Nutritive Value and Acceptability is discussed under the following headings.

A. Need for Convenience foods and their Emergence.
B. Advantages and Disadvantages of Convenience Foods.
C. Comparing the Nutritive Value and Acceptability of Convenience and Conventional Foods.
D. Economics of Conventional and Convenience Foods.
E. Adulteration in Conventional and Convenience Foods.

A. Need for Convenience Foods and Their Emergence:-

Baisya (1988) observed that changing life styles and values are at the root of considerable changes in eating habits over the last few years. Hand-in-hand with a strong demand for fast and take away foods, there has been a marked upturn in popularity for convenience foods in India.

The major reasons for the changing trends towards convenience foods are the decline of the family meal time and growth in disposal incomes (only in cases of City dwellers)

and the desire for more leisure time and demand for "foreign and spphisticated dishes inspired by the media and increased travel as indicated by Baisya (1988).

According to Chaudhri (1989) the breakup of joint family system has brought many women to work outside the house. This has increased the need for food to be processed, packed and ready to use. Thus packaged foods no longer mean just biscuits and bread, but really include everything in food needed by a household. Literacy levels increased across the board especially in urban India. This has spawned a great desire to know of latest food habits trends and desirable cuisine among increasingly large numbers of consumers. This has manifested itself in increasing exposure of our population to various mass media as T.V., magazines, dailies, and Radio. The concept of eating out, is another manufestation of changing consumer food habits.According to a survey as much as 69 percent of upper income and 50 per cent of upper middle income households had eaten a meal out of the home in the last month.

According to Robson (1981) the loss of traditional food technology are due to the reduction of household production concurent with continuing large family size the development of commercial production; and the introduction of commercial food processing to meet the demands of a growing population.

B. Advantages and disadvantages of Convenience Foods

According to Aileen King (1975) commercial mixes generally prove more expensive than a mixture made by conventional method. In contrast to the above, Metheny et al., (1987) feports that convenience food was less expensive than a similar one made in the traditional fashion and also they yield a more acceptable product than one made by the homemaker. Peckham (1987) also supports the above said point that convenience foods save money and convenience foods are simple that they taste good-not occassionally but consistently and also they are usually easy to prepare.

King (1975) also observed that commercial mixes are packed so that the contents are protected from contamination by dirt, microorganisms and insects as well as loss or gain of moisture and deterioration resulting from exposure to air, light or heat, prolonging their shelf life. In most cases they are conveniently packed for servings and instructions are clearly given on the pack regarding addition of any material and preparation details.

According to Inglett (1975) convenience foods require less labour in storing, handling and preparing.

Clements et al., (1973) convenience also have the advantage for the persons living alone, the working husband and

wife on the person unable to shop or cook because of the physical handicap these foods are useful.

Thomson (1971) cited the disadvantage of the use of processed food to be the skilled cooking staff who may easily become bored with the small amount of creative cooking required.

C. Comparing the Nutritive Value and Acceptability of Convenience and Conventional Foods:

a. Nutritive Value of Convenience Foods and Conventional Foods:

According to Gopalan et al., (1981) the nutritive value of any food stuff should, strictly speaking be assessed on the cooked material, the state in which it is consumed and not in its rawstate.

According to Elkin (1979) and Henriksen et al., (1985) the changes in mineral content of canned foods can occur immediately after canning because of exchange of nutrients between food and the canning medium as well as electrochemical reactions.

According to Chandrasekar et al., (1988) nutrient composition of malted foods and commercial formulated foods are as follows. The energy value of malted food was 351

K.Cals, whereas in the case of weaning foods it ranges from 366-420 K.Cals.

Malted food contains 13 g protein but weaning food contains 7.5 - 12g. of protein. The calcium content of malted food was 290 mg. in the case of weaning foods the value ranges from 275 - 750 mg.

Hein (1974) noted that Vitamin C was relatively unstable especially in the presence of occluded air and heat. Riboflavin was very sensitive to light and the rate of destruction increases as the p^H and temperature increased. In tomato juice and in many other canned products, the exclusion of O_2 and trace metals particularly copper was important to prevent extensive vitamin C loss.

According to Ravitscher et al., (1979) ready to eat foods have little to recommend them from the view point of nutrition, since they have lost much of their original vitamin content through over processing and are often high in empty sugar, calories as well as in saturated or hydrogenated fats and oils.

According to Fleck (1981) many of the convenience foods contain less high quality protein than foods prepared at home.

According to Puri and Sanghera (1987) ascorbic acid content in processed orange squash and pineapple juice were very low. This could be accounted to losses occuring during cooking and processing. Storage time and temperature for storage also affect ascorbic acid levels.

Suitor and Hunter (1980) found out that convenience foods are not neeessarily low in nutritional value. If made primarily from basic nutritious ingredients some convenience foods are equal in nutritive value to comparable products prepared at home or are higher than the latter. They viewed that in the winter, canned tomatoes may be higher in Vitamin content than are immature fresh tomatoes.

b. Acceptability of Convenience and Conventional Foods:

According to Charley (1982) when the quality of a food product is assessed by means of human sensory organs, the evaluation is said to be sensory or subjective.

Sensory Analysis:

According to Peckham et al., (1987) food is evaluated by the senses of sight, smell, taste touch and hearing. These senses help to determine whether or not a food is accepted or rejected.

According to Ranganna (1986) sensory quality parameter is of great importance to both the processor and consumer - to the processor, since it attracts consumers; to the consumer, since it satis-fies his aesthetic and gustatory sense. Sensory quality is a combination of different senses of perception coming into play in choosing and eating a food.

According to Birch et al., (1986) the most important sensory properties of food are:

(1) Flavour comprising (a) Taste (b) Odour or Aroma
(2) Temperature - Sensations of Heat and Cold.
(3) Appearance
(4) Texture or "Mouth Feel" - Affecting the sense of touch.

According to Rajalakshmi and Narasimhan (1989) sensory analysis has been defined as "A Scientific discipline used to evoke, measure, analysis and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell taste and touch.

(i) Colour:

According to Paul and Paulmer (1972) the colour of a food is derived from the wavelength of the light that strikes it (the incident light) the wavelength of the light reflected by the food thebackground conditions and the ability of eye and brain to detect it.

Ministry of Agriculture, Fisheries and Food (1979) explains that colour is an important property of many foods and drinks and it influences consumers when buying.

According to Birch et al., (1986) everyone concerned with food preparation realizes how important it is to make good food look attractive as well as ensuring that it must have good eating quality. Sales go down drastically when discoloured foods are offered for sale.

According to Rajalakshmi and Narasimhan(1989) the first sensory perception the colour and appearance is by the eye. Colour is associated with quality and safety through experience. The normal person can differentiate 10 million different colours which no instrument can.

(ii) Flavour:

According to Birch et al., (1986) flavour is a complex of sensations that we derive from food including particularly the sensations of taste and smell. The flavour of food is one of its most attractive, and also one of its most complex attributes.

According to Rajalakshmi and Narasimhan (1989) the second sensory perception is that of smell. The mechanism of perception of smell has not been fully understood till

to date. The normal person who is not anosmic can correctly identify 2000 different odours. If he is trained, he can differentiate and identify 10,000 odours at PPm or PP levels.

(iii) Texture:

According to Rajalakshmi and Narasimhan (1989) the next attribute in the sequence of perception is the texture which is due to a combination of physical properties and perceived by the senses of touch (including Kinesthesis and mouth feel), sight and hearing and have a sensory property.

(iv) Taste:

According to Rajalakshmi and Narasimhan (1989) taste, is last sensory attribute to be perceived but not the least, is the result of stimulation of gustatory nerves by taste buds. Totally about 2000 taste buds are present in adult human beings while infants are supposed to have10,000 taste buds. If the person is not ageusic, the basic tastes are quite easy to identify.

D. Economics of Conventional and Convenience Foods:

Peckham et al., (1987) reports that it is not always easy to make an exact cost comparison of ready, to serve and

home made products. To do this accurately, the amounts of the ingredients going into the prepared product must be known and their cost compared with the cost of the ingredients used in the home recipies. In general convenience foods do cost more than the unserviced products. The extra services that make the food easy to use must be paid for washing, combining, removing waste, standardizing andpackaging products add to the cost of the final product.

According to Chandrasekar et al., (1988) the processed foods are nearly 10 to 15 times costlier than the household processed low cost formulation.

According to Suitor and Hunter (1980) some convenience foods save time and cost no more to buy than the combined cost of their ingredients. Most baked products made from dry mixes cost about the same as products made at home from basic ingredients.

According to Fleck (1981) frozen orange juice concentrates is cheaper than fresh orange juice squeezed at home.

Traub and Odland (1975) conducted a study comparing 162 convenience foods with home prepared products and found that only 36 per cent had a cost lower than home prepared foods. Nearly all of the frozen, chilled or ready-to-serve baked

goods were more expensive than preparing them at home. About ½ of the complete mixes were cheaper than home prepared mixes. Frozen and chilled pizzas were about 60 per cent more expensive than home prepared. Scrambled eggs prepared from a "Cholesterol-free" egg product cost almost twice as much as those made from fresh eggs at home.

E. Adulteration in Conventional and Convenience Foods:

According to Malik (1976) adulteration is an antisocial activity and its causes are mostly economical. The practice of adulteration may grow under certain unfavourable situations such as the increasing gap between demand and supply, urban and rural, unemployment and sudden fluctuations in international trade. Most of the causes of food contamination however are due to ecological, social and institutional factors.

1. Colouring Substances

According to Newzealand Food and Drug regulation (1973) any substance which when added or applied to a food is capable of imparting colour to that food is known as colouring substance. These fall into 2 categories natural and synthetic.

In recent years, some sections of the community have questioned the use of food additives in general and especially colour additives (Fein Gold 1975 and Elliot 1980). As a

result, many consumers have demanded more naturally based products with the minimal use of chemical processed additives.

According to Ranganna (1986) quality is the ultimate criterion of the desirability of any food product to the consumer. Overall quality depends on quantity, nutrition and otherhidden attributes and sensory quality.

In a recent paper at the Third European conference on ingredients and additives peter-Kuhnnert a food chemist with the ministry of health in Bonn said of colouring agents "Both natural and synthetic groups of colours are equally subjected to toxicological tests. In this respect, the replacement of the artificial colours by a natural one affords no health - related advantage". He also said that "the problem of possible side effects or interactions is much more likely to affect food ingredients than additives which are subject to much more intensive testing.

According to subs by Noti No:243, dated 1-3-1980 no coal tar food colours or a mixture there of except the following shall be used in food.

Colour	Common Name	Colour Index	Chemical Class
1. Red	Ponceau 4 R	16255	AZO
	Carnigsine	14720	AZO
	Fast Red E	16045	"
	Amaranth	16185	"
	Erythrosine	45430	Xänthane
2. Yellow	Tantrazine	191410	Pyrazolone
	sunset yellow FCF	15985	AZO
3. Blue	Indigocarmine	73015	Indigoid
	Brilliant Blur FCF	42090	Triary/ Methane
4. Green	Green S.	44090	Triary/Methane
	Fast green FCF	42053	Triary/Methane

According to Santhanakrishnan (1981) in India in the prevention of Food Adulteration Act 1954, at first 8 food colours were permitted but now 3 more have been added. Simultaneously specifications were prepared by ISI for all the permitted synthetic/natural food colours and their preparations. Thus there are 24 Indian standards, 11 for synthetic food colours, 10 for natural food colours, 3 for testing common names and food colour boxes.

According to Beerch (1982), internationally accepted standards, tomato ketchup should be made from ripe red tomatoes with added condiments as seasoning agents. But many times this product is adulterated with pulps of other fruits and vegetables to increase the bulk of the product and reduce the cost of pure tomato ketchup. Such admixtures of other fruits and vegetables in pure foods adversely affects the quality of the pure product and is not permitted under the Indian fruit product order and prevention of food adulteration Act.

According to Wenck et al., (1983) food colouring of both natural and synthetic origin are used extensively in processed foods.

(ii) Micro organisms:

Food hygiene is the sanitary science which aims to produce food that is safe for the consumer and of good keeping quality (Hobbs, 1974). It has two main aspects, Prevention of microbial contamination of foods and reduction to a minimum of the growth in foods of undesirable microorganisms.

According to Wenck et al., (1983) because foods are naturally loaded with microorganisms yeast, molds and bacteria it could be argued that microorganisms are a form of natural toxicants in food rather than contaminants.

According to Frazier and Westhoff (1981) in most cases microorganisms use our food supply as a source of nutrients for their own growth. This of course, can result in a deterioration of the food. By increasing their numbers, utilising nutrients, producing enzymatic changes, contributing off-flavours by breakdown of a product or synthesis of new compounds they can "spoil" a food.

According to Christiaan (1979) factors affecting the microbiology of foods include the quality of the raw materials the process given, and the microbiological status of the food when finally retailed.

Methodology

III METHODOLOGY

The methodology for the study on 'Conventional and Convenience foods - Comparison with reference to nutritive value and acceptability' is discussed under the following headings:

1. Selection of the Venue and the Families
2. Market Survey of Convenience Foods
3. Use of Convenience Foods by Home Makers
4. Finding the Acceptability of Convenience Foods
5. Cost and Time Factors for Conventional and Convenience foods.
6. Nutrient content of Conventional and Convenience foods
7. Analysing the Samples for the Quality
8. Consolidation and Analysis of the Data

1. Selection of the Venue and the Families

The areas selected for the present study included the rural and urban areas in an around Coimbatore City. The urban areas selected were Gandhipuram, Saibaba Colony, Ramanathapuram, Kurichi Housing Unit, and the rural areas were Kallappalayam, Chettipalayam, Pappampatti and Chinthamani

Pudur. These areas were selected because of its close proximity and anticipated co-operation. Totally 500 families were selected, out of which 250 families were from rural and 250 from urban areas. Among the 250 families in both the areas 113 women in the urban families and another 127 women in the rural families were working outside their homes while the rest were just homemakers. This selection was purposely done to find out the impact of working outside the home on the choice and preference for convenience foods. Care was taken to see that the families selected were distributed in the three income groups namely high, middle and low. In the rural areas 111 families belonged to low income, and 79 were middle income and 60 belonged to high income. While in the urban area 55 were low income, 82 were middle income and 113 were high income.

2. Market Survey of Convenience Foods.

One of the objectives of this study was to find out the availability of convenience foods in the market in Coimbatore city. For this purpose a questionnaire was formulated and information regarding the availability of convenience foods were collected. The questionnaire included questions on the variety of convenience foods available in the shop and their rate of take. The detailed questionnaire

is given in Appendix 1. About 25 shops in rural areas and 25 shops in urban areas were selected. The convenience foods available in the market were categorised and tabulated to get an idea of convenience foods which were most commonly purchased.

After categorising, the products which were most popular, were taken into consideration and certain samples were selected at random for analysis of nutrients, acceptability tests and cost comparison purposes.

Convenience foods so selected were jamoon mix, Halwa mix Bhadusha mix, Vadai mix, Bhaji mix, Sambar podi, Rasam Podi, Iddli podi, Iddli mix, Dosai mix, Rava iddli mix, Bisebelebhath mix, Orange juice, Pineapple juice, Tomato juice, Apple juice, and Frooti.

3. Use of Convenience Foods by the Homemakers

Each household in the selected population in rural and urban areas were visited by the investigator personally. The housewives in the households were met and after establishing a good rapport with them the investigator explained about the purpose of the study and requested for correct data on the subject. A brief introduction about the convenience

foods was given to the respondents before proceeding with the actual questionnaire. The questionnaire consists questions regarding family background, and the family expenditure pattern and details regarding the usage of convenience foods and the members who like the convenience foods most and the frequency of usage and the reasons for their liking and problems arised due to the usage of convenience foods and details regarding the infant food mixes used were all asked. The questions were repeated and asked in different forms till an appropriate and correct answer was obtained. The proforma used is given in Appendix II.

4. Finding the Acceptability of Convenience Foods

After selecting the convenience foods at random the recipes for convenience foods as well as the traditional recipies for these products were standardized and foods prepared to find out acceptability of the products. According to Stewart and Amerine (1982), though many food preparation procedures are traditional, scientific methods are being developed through research and investigation and acceptable procedures are becoming standardized to create products off consistently high quality. These procedures are expressed as recipies which are in fact formulae giving the preparations of ingredients to be used, the method of

combining them, and the cooking processes involved. The convenience foods were prepared by following the procedures given on the packet and standardizing same.

Once the foods were prepared by both the conventional (using the raw ingredients) and convenience method (using the convenience food) a group of five panel members scored the products for their acceptability.

Foods are submitted to sensory examination and acceptability tests to provide information that can lead to produce imporvement, quality maintenance and acceptance of new products. The practical requirements for sensory tests are:

1. Panel members

A taste panel group of 5 panel members were selected for scoring. They were given adequate training in the methods of scoring. Apart from this the investigator made sure that they had average sensitivity, high degree of personal integrity, intellectual curiosity and interest in sensory evaluation work, and willingness to spend time in evaluation and ability to concentrate and judge correctly.

2. Test room:

A separate room with facilities for individual judging was provided for flavour profile analysis. The panel members did the analysis individually and recorded the results, care was taken to see that the room was kept free from odour and noise.

3. Sample preparation and presentation :

Methods of preparing samples and the most appropriate means of presenting them were determined before the start of experiment. The quantity and temperature of the test products were standardized and kept constant, through out the study.

4. Testing time and fatigue :

Care was taken to select the correct time for conducting sensory tests. The morning time between 10 to 11 A.M. is considered by many as the most suitable for conducting sensory tests, when the panel members are fresh and can do a good jobof judgement.

Scoring tests are widely used for quality evaluation in research and industry. In the present study the procedure of scoring methods was used because of the fact that

the method is fast, simple and can be carried out at the same time by many members.

According to Piggett (1984) scoring is a form of rating using a numerical scale where the numbers form an interval or ratior scale, ie., the different scores have a defined and demonstrated mathematical relationship to each other the term scoring is frequently used erroneously where the scores have not been shown to have such a defined relationship. The table No: I gives the scores sheet used ine the present study.

TABLE I

SCORE SHEET FOR SCORING TEST

Qualities	Scores
Excellent	5
Very good	4
Good	3
Fair	2
Poor	1

5. Cost and Time Factors for Conventional and Convenience Foods

The total costs of the conventional products were calculated by totalling the individaual costs of the ingredients used and it was compared with the cost of the convenience foods, the quantity per number being the same in both the cases. The total cost was calculated for the 100 g of the raw ingredients.

Carol et al., (1980) point out that the main purpose of convenience foods is to save time and or work in food preparation. The preparation time required for both conventional and convenience foods was noted and the extent of time saved with the use of convenience foods was analysed.

6. Nutrient Content of Conventional and Convenience Foods

The convenience foods were taken before cooking for purposes of nutrient analysis. The nutrients analysed were energy, protein, calcium, iron, β carotene and vitamin C.

a. Estimation of Energy:

According to Williams and Mary (1984) energy is defined as the ability to do work. The body requires energy for

synthesis of chemical substances for muscle contractions, to transport nutrients across all cell membranes, to produce glandular secretions and to transport nerve impulses.

One gram each of the sample convenience foods was used to determine the energy content using the bomb calorimeter and adopting the procedure suggested by Swaminathan, (1974) The procedure is based on the fact that the amount of energy locked within the chemical bonds of carbohydrates, fat or protein in foods can be determined in the laboratory by burning a sample in a bomb calorimeter (Williams and Mary alice Cliendo, 1984).

The detail procedure is given in Appendix III.

b. Estimation of Protein:

Two grams of the sample was measured accurately and was digested in the macro-kjeldhal and the nitrogen content was estimated using which the protein content was calculated adopting the method suggested in the Laboratory manual of National Institute of Nutrition (NIN)

The detail procedure is given in Appendix IV.

c. Estimation of Calcium:

Five grams of the sample was ashed and made upto 100ml

and 10 ml of the ash solution was used to estimate the calcium which was done using the titrimetric method given in Laboratory manual of NIN.

The detail procedure is given in Appendix V.

d. Estimation of iron :

Two milli litre of the ash solution was taken for the experiment and the concentration of unknown solution was measured against known concentrations in the calorimeter using the method suggested in Laboratory Manual of NIN.

The detail procedure is given in Appendix VI.

e. Estimation of Vitamin C :

According to William and Mary (1984) Vitamins are defined as organic compounds that are required in the diet of animals in small amounts for normal growth, maintenance and development of the body,

Since fruit juices are rich in vitamin C only the fruit juices were selected for the estimation of C by titrimetric method suggested in Laboratory Manual of NIN.

The detail procedure is given in Appendix VII.

f. Estimation of β-carotene :

According to Murthy (1973), carotenoids derived from plant foods are the chief sources of vitamin A in the diet of many population groups in India. Simpson (1983) opines carotenoids are thus important for the prophyletic treatment of xerophthalmia.

β carotene was estimated in the fruit juices especially, Tomato juice, Orange juice and Frooti by using the method suggested by Rodriguez et al., (1976)

For the conventional foods, the nutritive value of the raw ingredients were calculated by using the values given in the 'Nutritive value of Indian Foods' suggested by Gopalan et al., (1984)

The detail procedure is given in Appendix VIII.

7. Analysing the Convenience Foods For the Quality

According to Food Adulteration Act (1976) "an article of food shall be deemed to be adulterated if the article sold by a vendor is not of the quality, nature, substance or demanded by the purchaser and is to his prejudice or is not of the nature, substance or quality which it purports

or is represented to be."

The convenience foods were examined under the microscope to find out the presence of starch granules which were claimed to be present on the convenience food packet.

In our country under the prevention of Food Adulteration Act 1954, at first 8 food colours were permitted but today 3 more have been added. Simultaneously specifications were prepared by ISI for all the permitted synthetic natural food colours and their preparations. Thus there are 24 Indian standards: 11 for synthetic food colours, 10 for natural food colours 3 for testing common names and food colour boxes.

So the presence of colours in the convenience foods were tested as to whether they were permitted colours or non permitted colours by using paper chromotography method suggested by Pearson (1973).

The microbial count of fruit juices were carried out by adopting the violet red bile agar in pour plate counts. The fruit juices were selected for the estimation for the simple reason that the micro organisms favour liquid medium rather than other solid and dry mediums.

8. Consolidation and Analysis of the Data

Collected datas were analysed for the details regarding the convenience foods available in the market and the working and not working status of the women, and their income levels, usage of convenience foods, reasons for using and acceptabiltiy of convenience foods.

Results and Discussion

IV. RESULTS AND DISCUSSION

The results and discussion pertaining to the study on "Conventional and Convenience foods - Comparison with reference to nutritive value and acceptability" is discussed under the following headings:

1. Results Of The Market Survey Of Convenience Foods
2. Background Information Regarding the Families
3. Use of Convenience Foods By the Homemakers
4. Acceptability of Convenience Foods
5. Nutrient Content of Conventional and Convenience Foods
6. Cost, Time Factors, and Score Card for Conventional and Convenience Foods
7. Results on the Quality of Selected Convenience Foods

1. Results Of The Market Survey Of Convenience Foods

One of the objectives of the study was to find out the availability of the convenience foods in the rural and urban markets in Coimbatore City. The results obtained regarding the availability of convenience foods have been tabulated and given in Table II.

TABLE II

CONVENIENCE FOODS AVAILABLE IN SELECTED SHOPS IN COIMBATORE CITY

	URBAN	RURAL
Sweet Mixes	Jamoon Mix, Halwa Mix, Jilebi Mix, Bhadusha Mix, Payasam Mix, Adapiratham, Rasagollas, Icecream Powder	Jamoon Mix
Savouries	Vadai Mix, Bhaji Mix	Nil
Powders and Masala	Sambar Powder, Rasam Powder, Tamarind Powder, Chholeka Masala Pav Bhaji Masala, Tandoori Chicken Masala, Gmam Masala, Chat Masala, Panpuri Masala, Chick Mass, Meat Masala, Tea Masala, Cury Masala, Rasam Masala, Biryani Pulavu Masala, Kasmirmethi, Fish Masala, Puliyogare Mix, Vegetable pulavu mix, Pulap vegetable, Biriyani Pulav Masala, Iddli Powder, Dhal mix powder, Garlic mix powder, Kuruma masala, chicken masala, chilli chicken masala, Egg masala.	Sambar Powder Iddli Powder

	URBAN	RURAL
Soups	Mixed vegetable soup, Hot and sour chicken soup, Chicken soup, Green pea soup, Sweet corn and vegetable soup, Mutton soup, Spinach soup, Onion Soup,	NIL
Breakfast foods	Iddli mix, Kharabhath, Bisibelabhath, Rapi sevai, Noodles, Rice Sevai, Dosai mix, Ravaiddli mix, Rava Dosai Mix	NIL
Beverages	Badam beverage, Real badam mix, Ragi instant, Ragi vita, Ragotine, Horlicks, Bournivita, Boost, Complan	Horlicks Bournivita Boost Ragimalt Complan
Infant Mixes	Cerelac, Nestum, Farex, Amulspray, Lactogen, Glaxo	Cerelac Nestum

	URBAN	RURAL
Sauces and Ketchup	Tomato sauce, Tomato Ketchup, Tomato chilli sauce, Garlic chilli sauce	NIL
Soft Drinks	Orange juice, pineapple juice, Apple juice, Tomato juice, Frooti, Tree top, Rasana, Top tree	NIL
Others	Instant Rasam Mix, Pine apple slices in syrup, Falooda mix, Dal makhani, Keema mutter, Mutton Rogan Josh, Beaf strong woff	NIL

It is obvious from Table II that a large variety of convenience foods were available in the market, and specially so in the urban shops. Notable among the convenience foods available were the powders and masalas, soft drinks,

breakfast cereals, beverages and sweet mixes. However the availability of these foods in the rural areas were limited to very few foods like jamoon mix, sambar and iddli powders and certain beverages. This may probably be due to the fact that anything new catches up fast in the urban areas than in the rural areas.

2. Background Information Regarding The Families

On the whole 500 families were surveyed out of which 250 families were from rural and another 250 families were urban.

Table III gives the details regarding the working status of women in the selected families.

TABLE III

DETAILS REGARDING THE WORKING STATUS OF WOMEN

Particulars	Rural		Urban	
	N	P	N	P
1. Number of Women working	123	49.2	137	54.8
2. Number of women not working	127	50.8	113	45.2
3. Number of families surveyed	250	100	250	100

N = Number P = Percentage

Out of the 250 housewives in the rural families surveyed 49.2 per cent worked outside their house while 50.8 per cent of women did not work outside their homes. In the urban areas surveyed 54.8 per cent of women worked outside their home, while 45.2 per cent women never worked outside their home.

As is obvious from Table III, the percentage of women working outside was more in the urban families than in the rural families.

Table IV presents the mean family size of the families surveyed both in the rural and the urban areas.

Table IV

MEAN FAMILY SIZE

Family Size	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
0 - 4	42	34.1	35	27.6	43	38.1	34	24.8
4 - 8	81	65.9	87	68.5	66	58.4	98	71.5
8 & above	NIL	NIL	5	3.9	4	3.5	5	3.7
Total	123	100	127	100	113	100	137	100

W - families where women were working

NW - families where women were not working

In the rural areas 34.1 and 65.9 per cent in the working group and 27.6, 68.5 and 3.9 per cent of families in the non working group had a family size ranging from 0-4, 4-8 and above 8 respectively.

In the urban area 38.1, 58.4 and 3.5 per cent in the working group had a family size ranging from 0 - 4 , 4 - 8 and 8 and above respectively. It is obvious from the

distribution of family size that both in urban and rural areas, the number of family members were less among the families where the mothers were working outside. This may probably be due to the fact, that the working mothers plan better for their parenthood than mothers who are not working.

Table V presents the monthly income pattern of the families surveyed.

TABLE V

MONTHLY INCOME

Income (in Rs)	Rural		Urban	
	N	P	N	P
1. Below 1,500	111	44.4	55	22
2. 1500 - 2500	79	31.6	82	32.8
3. 2500 & above	60	24	113	45.2
Total	250	100	250	100

N = Number P = Percentage

As per the details presented in Table V only 22 per cent of the families were in the income group of less than Rs. 1,500 per month in the urban area while double the number of families in the rural area (44.4. per cent) were getting an income of less than Rs. 1,500/- per month. An income

between Rs. 1500 - 2000 per month was earned by 32.8 per cent and 31.6 per cent of the families in the urban and rural area respectively and there were 45.2 per cent who earned a higher income of Rs. 2500 and above in the urban area against only 24 per cent in the rural area. Thus it is obvious that the purchasing power of the families in the urban area is far superior to these in the rural areas.

Table VI A and B presents the food expenditure pattern of the families surveyed.

Table VI presents the food expenditure pattern among the families surveyed with reference to cereals, pulses, leafy and other vegetables and fruits.

TABLE VI A

EXPENDITURE ON FOOD

Foods and percentage of expenditure	Rural				Urban			
	W		N.W		W		N.W	
	N	P	N	P	N	P	N	P
Cereals								
0 - 20	66	54	75	59	81	72	115	84
21 - 40	45	37	45	35	17	15	18	13
41 - 60	9	7	7	6	15	13	4	3
61 and above	3	2	NIL	NIL	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100
Pulses								
0 - 5	110	89	119	94	86	76	NIL	NIL
6 - 10	11	9	6	4	15	13	130	95
11 - 15	2	2	1	1	12	11	7	5
16 and above	NIL	NIL	1	1	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100

Foods and Percentage of expenditure	Rural				Urban			
	W		N.W		W		N.W	
	N	P	N	P	N	P	N	P
Leafy vegetables. Other vegetables & Tubers								
0 - 5	121	98	126	99	96	85	131	96
6 - 10	2	2	1	1	17	15	6	4
11 - 15	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
16 & above	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100
Fruits								
0 - 5	120	98	121	95	90	80	122	89
6 - 10	3	2	5	4	20	18	13	10
11 - 15	NIL	NIL	1	1	3	2	2	1
16 & above	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100

The humber and percentage of families in the rural and urban areas who spent more than 40 per cent of their total food expenditure on cereals was meagre. About 35 to 59 per cent of the families in the rural areas spent upto 40 per cent of their income on cereals against 13 - 84 per cent of the families who were spending within 40 per cent of their expenditure on cereals :n the urban area.

The general pattern of expenditure on pulses, green leafy vegetables, other vegetables tubers and fruits were much lower. A majority of the families spent only 0 - 5 per cent on pulses, leafy and other vegetables and fruits. The fact that by and large people still spend a good amount of money on cereals in performance to the protective foods like vegetables fruits and others is obvious from the above details and this was true irrespective of the fact as to whether they are living in the urban or rural areas.

TABLE VI B

EXPENDITURE ON FOOD

	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
* Other Foods								
0 - 5	78	63	79	62	75	66	87	64
6 - 10	32	26	33	26	23	20	32	23
11 - 15	9	8	9	7	12	11	14	10
16 & above	4	3	6	5	3	3	4	3
Total	123	100	127	100	113	100	137	100
Beverages								
0 - 5	116	94	108	85	100	89	124	91
6 - 10	6	5	15	12	6	5	7	5
11 - 15	1	1	4	3	7	6	6	4
16 & above	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100
Convenience Foods								
NIL	80	65	70	55	35	31	57	42
0 - 5	41	33	54	43	75	66	80	58
6 - 10	2	2	3	2	3	3	NIL	NIL
11 - 15	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
16 & above	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total	123	100	127	100	113	100	137	100

*Other foods include nuts and oils, sugar and jaggery fleshy foods and milk and its products

The number and percentage of families in the rural and urban areas who spent more than 11 per cent of their food expenditure on other foods were meagre. About 26 to 63 and 5 to 94 per cent in the rural area spent upto 11 per cent of their income on other foods and beverages against 23 to 64 and 5 to 91 per cent of the families who were spending with in 11 per cent of their expenditure on other foods and beverages.

The number and percentage of families in the rural and urban areas, who spent more than 6 per cent of their food expenditure on convenience food was meagre. Thirty three and 43 per cent of working and non working group of rural families spent upto 5 per cent of their income on convenience foods. The maximum per centage of the families ie 65 and 66 per cent of working and non working group in urban area were not spending anything on convenience foods.

3. Use of Convenience Foods By The Home Makers:

Table VII gives the details regarding the use of convenience foods by the rural and urban families.

TABLE VII

DETAILS OF FAMILIES USING/NOT USING CONVENIENCE FOODS

Particulars	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
Families using conveneicee Foods	55	44.7	64	50.4	83	73.5	90	65.7
Families not using Convenien ce foods	68	55.3	63	49.6	30	26.5	47	34.3
Total	123	100	127	100	113	100	137	100

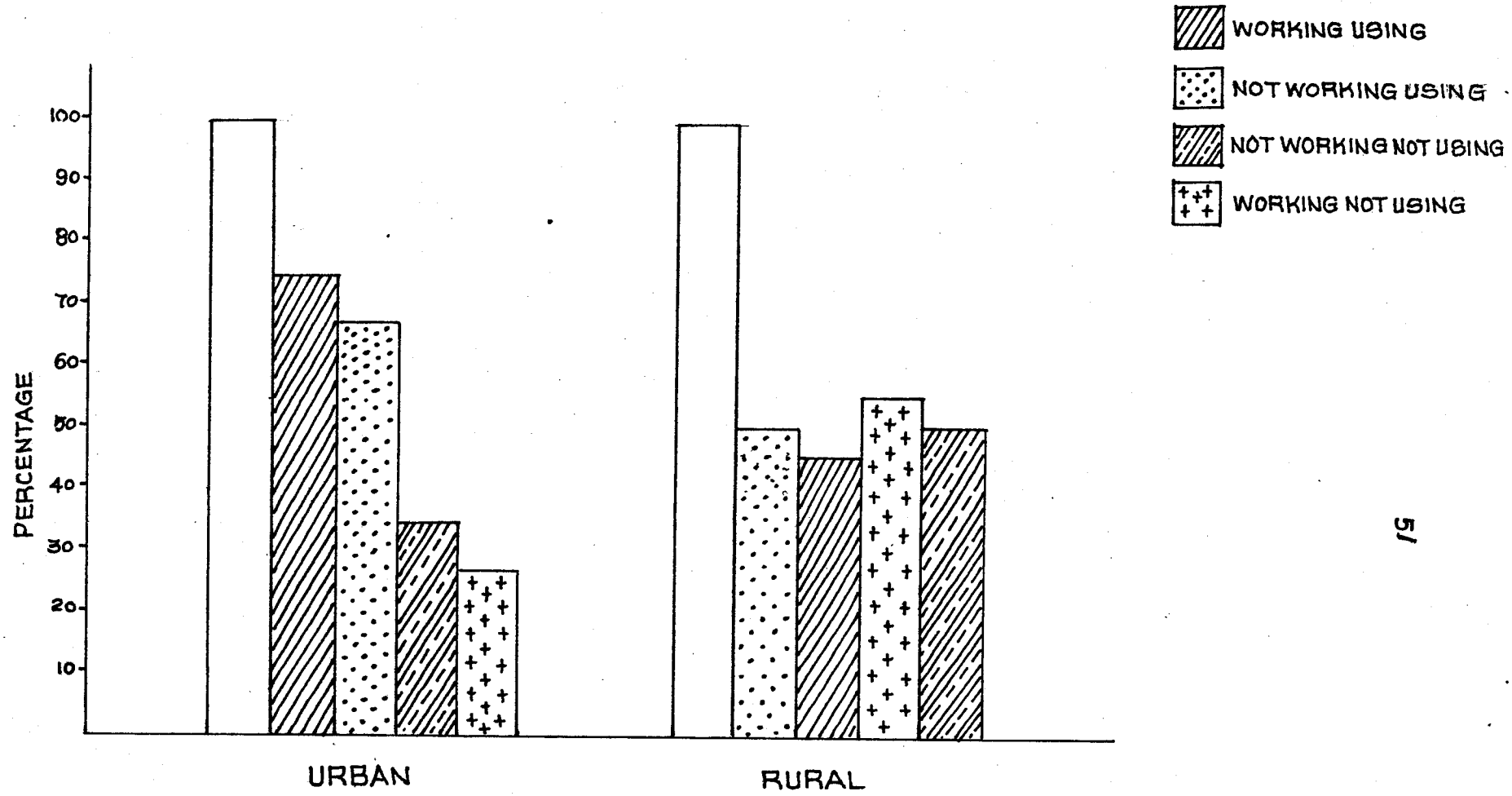
In the rural areas, 44.7 per 50.4 per cent of the families were aware of and used conveneince foods in both the working and not working groups respectively. While 55.3 and 49.6 per cent of the families in both the groups never used convenience foods in their meals, eventhough they were aware that such foods existed in the market.

In the urban area 73.5 and 65.7 per cent families used convenience foods, while 26.5 and 34.3 per cent of the families never used convenience foods in both the working and not working groups.. The awareness as well as the use of convenience foods was more among the urban families than among rural families. There was not much difference in the usuage of conveneicne foods among the working and not working group in the rural areas surveyed.

Figure I presents the details of families using and not using convenience foods in both working and not working groups.

A question on the specific family members who like the convenience foods best brought home the fact that it was children who liked the convenience foods most in a majority of families irrespective of whether their mothers were employed or not employed. Next it was the women in the families who liked the convenience foods and it was the husbands who preferred it least.

Table VIII presents the convenience foods which are most liked by the members.



FAMILIES USING AND NOT USING CONVENIENCE FOODS

Figure. I

TABLE VIII

CONVENIENCE FOODS THAT MOST LIKED

Convenience Foods	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
Jamoon Mix	50	90.9	55	85.9	70	84.3	64	71.1
Halwa Mix	NIL	NIL	1	1.6	3	3.6	1	1.1
Sambar Podi	2	3.6	1	1.6	15	18.1	4	4.4
Bhaji Mix	2	3.6	NIL	NIL	15	18.1	1	1.1
Noodles	1	1.8	9	14.1	8	9.6	5	5.6
Others	3	5.5	5	7.8	9	10.8	7	7.8

It is evident from Table VIII that irrespective of working or not working group or residing in rural or urban areas jamoon mix was the food, most liked by the family members. Next to Jamoon mix, sambar podi, bhaji mix, and noodles were popular among the working urban population. In the rural areas also sambar podi, bhaji mix, and noodles were most liked by 3.6 per cent, 3.6 per cent and 1.8 per cent of the working group surveyed.

Table IX presents the opinion of housekife regarding the reasons for liking convenience foods.

TABLE IX

REASONS FOR LIKING CONVENIENCE FOODS

Particulars	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
Time Saving	50	90.9	10	15.6	70	84.3	17	18.9
Convenient	6	10.9	25	39	30	36	53	58.9
Taste	55	100	64	100	75	90.4	76	84.4
Cost	1	1.8	1	1.6	1	1.2	1	1.1
Others	NIL	NIL	NIL	NIL	1	1.2	NIL	NIL

Time saving was the important reason expressed by the housewives both in the rural and urban working groups surveyed. In the rural families surveyed 10.9 per cent of working group and 39 per cent of not working group liked these for its convenience. The noval taste of the convenience foods was one of the repeated reasons for liking the use of convenience foods by cent per cent working group and non working group.

In the urban families surveyed 70 to 75 per cent of the working and not working groups liked the convenience food for its taste, 36 per cent of working group and 58.9 per cent not working group liked them for their convenience in the urban working group. Only 1.2 per cent liked conveniences foods for reasons like, 'to improve health'.

Those who mentioned that they liked the convenience foods for their cost was less than 2 per cent in both working and not working groups, belonging to urban as well as rural families.

Table X presents the frequency of usage of convenience foods with special to sweets namely Jamoon mix and Halwa mix and savouries such as vadai mix, and bhaji mix, breakfast foods such as Rava idli mix, dosai mix, and ready mix powders such as sambar podi, rasam podi, curry masala podi, iddli podi and other powders.

TABLE X

FREQUENCY AND USAGE OF CONVENIENCE FOODS

Frequency of usuage	Rural				Urban			
	W		NW		W		NW	
	N	p	N	P	N	P	N	P
Sweet Mixes								
Weekly	NIL	NIL	NIL	NIL	8	10	1	1
Monthly	13	24	13	20	14	16	17	19
Occasionaly	18	33	21	33	37	45	32	35
Not using	24	43	30	47	24	29	40	45
Savouries								
Weekly	NIL	NIL	NIL	NIL	3	4	1	1
Monthly	2	4	1	2	9	11	1	1
Occasionaly	2	4	4	6	11	13	1	1
Not Using	51	92	59	92	60	72	87	97
Breakfast foods								
Weekly	2	4	1	2	5	6	1	1
Monthly	5	9	2	3	9	11	2	2
Occasionally	4	7	1	2	9	11	4	4
Not using	44	80	60	93	60	72	83	93
Ready mix powders								
Weekly	9	16	4	6	17	20	8	9
Monthly	3	5	1	2	6	7	2	2
Occasionally	2	4	1	2	8	10	5	6
Not using	41	75	58	90	52	63	75	83

Table X presents the data regarding the frequency and usage of convenience foods by the families in the rural and urban areas. Forty three and forty seven per cent in the rural areas, and 29 and 45 per cent in the urban areas were not using sweet mixes jamoon and halwa mix. But it was used occasionally in 33 per cent of the families in rural areas in both the working and not working group while 45 and 35 per cent of the families in the urban areas used occasionally.

Majority of the families surveyed did not use savourie at definite weekly intervals irrespective of whether they hailed from the urban areas or the rural areas. Working outside the home or not did not change the pictures. In the urban areas 4 to 13 per cent of the families where the mothers were working used either monthly or occasionally.

In the urban areas 6 - 11 per cent of the families where the mothers were working used breakfast foods either weekly, monthly or occasionally where only one per cent of the families where the mothers were not working used either monthly or occasionally. On the whole it is obvious that the usage of convenience breakfast foods is more in the urban areas than the rural areas.

In the urban areas the usage of the powders was comparitively higher than rural areas. The frequency of usage of the powders was weekly in 9 and 4 per cent of the families in rural areas and 20 and 9 per cent of the families in urban area, both in the working and non working groups respectively.

It was interesting to note that in the usage of all the powders the percentage of using them either weekly, or monthly or occassionally, were more in the families where the mothers were working rather than in families where the mothers were not working. This may be due to the fact that working women prefer such convenience foods for saving time as well as energy.

Beverage and Infant Foods

The most commonly used beverage drinks were Horlicks, Bournvita, Ragi malt, Boost and Ragotine. The families which used these beverages (1.6 - 52.7 per cent) used them daily. However there were families ranging from 1.8 to 18.1 per cent used these beverages occasionally when visitors come to the family or during speical occasions.

In the same manner the infant foods were used by 1.1 - 9.1 per cent of the families daily, while it was not used otherwise in week or monthly intervals.

4. Acceptability of Convenience Foods

Table XI presents the data regarding the acceptability of convenience foods.

TABLE XI

ACCEPTABILITY OF CONVENIENCE FOODS

	Rural				Urban			
	Acceptable		Not Acceptable		Acceptable		Not Acceptable	
	N	P	N	P	N	P	N	P
1. Sweets	112	94	7	6	156	90	17	10
2. Savouries	16	13	103	87	34	20	139	80
3. Soups	5	4	114	96	19	11	154	89
4. Breakfast foods	23	19	96	81	42	24	131	76
5 Powders	35	29	84	71	70	40	103	60
6. Beverages	55	46	64	54	113	65	60	35
7. Infant mixes	14	12	105	88	32	18	141	82

Among the convenience foods, sweets were most acceptable both in rural and urban areas, the percentage of acceptance

ranging from 90 - 94 per cent. The convenience foods that ranked second in acceptability among the families was beverages with a percentage range of 64 - 65. Soups, infant food mixes and even breakfast cereal mixes were not acceptable to a very high per centage of the families though many of whom used it for emergency.

Table XII presents the health problems associated with the use of convenience foods.

TABLE XII

HEALTH PROBLEMS ASSOCIATED WITH USING CONVENIENCE FOODS

Particulars	Rural		Urban	
	N	P	N	P
Diarrhoea				
Yes	NIL	NIL	1	1
No	119	100	172	99
Vomiting				
Yes	NIL	NIL	NIL	NIL
No	119	100	173	100
Constipation				
Yes	1	1	NIL	NIL
No	118	99	173	100
Indigestion				
Yes	1	1	2	1
No	118	99	171	99
Skinallergy				
Yes	NIL	NIL	NIL	NIL
No	119	100	173	100
Others				
Yes	NIL	NIL	2	1
No	119	100	171	99

Housewives residing both in the rural and urban areas expressed their opinion that there were no problems like diarrhoea, vomitting, constipation, indigestion, skin allergy and any other ailments due to the usage of convenience foods. Only a minority of one to two per cent housewives expressed that there were some problems like diarrhoea or indigestion.

Table XIII presents the data regarding the usage of infant foods to the children, and the reasons for the same.

TABLE XIII

DETAILS REGARDING THE USAGE OF INFANT FOODS

Particulars	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
Yes	25	20.3	35	27.6	68	60.2	55	40.1
No	98	79.7	92	72.4	45	39.8	82	59.9
If Yes, reasons								
To improve health	24	96	30	85.7	20	29.4	39	28.5
Lack of breast milk	3	12	6	17.1	28	41.2	19	13.9
Lack of Cow's milk	NIL	NIL	NIL	NIL	20	29.4	7	5.1
If No, Reasons								
No infants at present	19	15.4	55	59.8	38	84.4	30	76.9
Sufficient breast milk	30	24.4	19	20.7	10	22.2	44	54
Home made products	78	63.4	44	47.8	30	66.7	41	50

In the rural families surveyed a majority of 79.7 and 72.4 per cent of them never gave infant foods to their children in both working and not working group. In urban areas 60.2 per cent of the working group introduced infant foods at the weaning period while 59.9 per cent of the not working group did not give these infant foods to their children.

To improve health was one of the reasons expressed by a large majority of the mothers in the rural area, while in the working group residing in urban area expressed the reason that due to lack of breast milk their children were given infant foods.

The reasons expressed by the mothers who never gave infant foods were that there were no children in their household, or they prepared infant foods at home or they had sufficient breast milk to feed the baby.

Table XIV PRESENTS ThE DATA regarding the type of infant foods given to the children and at the age when weaning was started.

TABLE XIV

TYPE OF INFANT FOODS AND AGE AT WHICH GIVEN

Particulars	Rural				Urban			
	W		NW		W		NW	
	N	P	N	P	N	P	N	P
Cerelac	13	52	17	48.6	30	44.1	16	29.1
Nestum	7	28	7	20	10	14.7	8	14.5
Farex	6	24	14	46	4	5.9	18	32.7
Others	11	44	20	57.1	10	14.7	10	18.2
0 - 3 months	3	12	2	5.8	10	14.7	7	12.7
3 - 6 months	15	60	20	57.1	40	58.8	33	60
6 and above	7	28	13	37.1	18	26.5	15	27.3

In the rural area a maximum of 52 and 48.6 per cent used cerelac, followed by Nestum 28 and 20 per cent and Farex 24 and 40 per cent of the working and not working groups respectively. Forty four and 57.1 per cent of the working and not working groups respectively used the other foods such as Amulspray, Glaxo, Bonymix, and lactogen.

In the urban area among the working group the most popular weaning food was cerelac which was used by 44.1 per cent while farex was popular among 32.7 per cent of the not working group.

About 60 and 57.1 per cent in the rural area both the working and not working groups started giving weaning foods at the age of 3 - 6 months itself. In the urban areas 58.8 per cent of working group and 60 per cent of the not working group started giving weaning foods at the age 3 - 6 months itself.

Table XV presents the data regarding the problems while giving infant foods to the children.

TABLE XV

PROBLEMS WHILE GIVING INFANT FOODS

Particulars	Rural		Urban	
	N	P	N	P
Diarrhoea				
Yes	6	10	1	1
No	54	90	122	99
Vomitting				
Yes	1	2	1	1
No	59	98	122	99
Constipation				
Yes	NIL	NIL	1	1
No	60	100	122	99
Indigestion				
Yes	1	2	1	1
No	59	98	122	99
Skin allergy				
Yes	Nil	NIL	NIL	NIL
No	60	100	123	100
Others				
Yes	NIL	NIL	NIL	NIL
No	60	100	123	100

The families who used infant foods expressed that problems like diarrhoea, vomitting, constipation or any other ailments never existed in their children due to the intake of infant foods. But a minority of 12 and 8.6 per cent in the rural areas expressed that their children suffered from diarrhoea due to these infant foods. It is encourgging to note that very few ailments are caused due to the convenience foods.

Table XVI presents the data regarding the opinion about cost of convenience foods.

TABLE XVI

COST OF CONVENIENCE FOODS

Particulars	Rural		Urban	
	N	P	N	P
Not reasonable	69	28	126	50
Reasonable	30	12	50	20
No idea	151	60	74	30
Total	250	100	25	100

Sixty percent of the families residing in the rural area against 30 per cent of the urban area expressed that they had no idea about the cost of the convenience foods. Fifty per cent of the urban and 28 per cent of the rural families felt that the cost of the convenience foods were not reasonable. Only 12 and 20 per cent of the rural and urban people said that the cost was reasonable.

5. Nutrient Content of Conventional and Convenience Foods

Table XVII presents the nutrients present in the conventional and convenience foods-sweets and savouries - The nutrient content is for 100 g of the raw ingredients which went into the preparation.

TABLE XVII

NUTRIENTS PRESENT IN SELECTED CONVENIENCE AND CONVENTIONAL FOODS - FOODS AND SAVOURIES

Food	Energy		Protein (g)		Calcium (mg)		Iron (mg)	
	Convenience	Conventional	Convenience	Conventional	Convenience	Conventional	Convenience	Conventional
Gulab Jamoon	389	491	15	17	113	656	2	6.3
Halwa	305	346	2	12	38	41	6	4.9
Bhadusha	234	348	12	12	38	60	6	3
Vadai	119	299	16	18	42	111	13	7
Bhaji	174	365	16	17	50	54	7	7

The energy, protein, calcium and iron content of convenience foods and conventional foods were analysed, the quantities being kept the same in both the cases. The results of the analysis showed that in general the nutrient content of the conventional food preparations were more than the convenience foods with respect to all the nutrients. The differences were remarkable in the case of energy and calcium. This may be due to the fact that the conventional foods were prepared from original good quality raw material, while the convenience foods may have an element of filling up with low cost raw food material.

Table XVIII presents the nutrients present in conventional and convenience foods - powders and breakfast foods.

TABLE XVIII

NUTRIENTS PRESENT IN SELECTED CONVENIENCE AND CONVENTIONAL FOOD - POWDERS AND BREAKFAST FOODS

Foods	Energy (K.cal)		Protein (g)		Calcium (mg)		Iron (mg)	
	Convenience	Conventional	Convenience	Conventional	Convenience	Conventional	Convenience	Conventional
Sambar Podi	209	297	7	16	451*	503*	16	7
Rasam podi	198	300	12	15	472*	613*	16	11.3
Iddlipodi	236	335	42	20	110	84	16	6.5
Mixed vegetable soup	20	86	0.2	3	100	55	8	2
Iddli	229	346	13	10	30	38	3	5
Dosai	255	346	14	10	33	38	8	5
Rava Idli	278	348	9	10	41	16	1	2
Bisebela bath	363	367	9	12	338	93	14	5.3

* The high amount of calcium was due to the coriander seeds present in sambar podi and rasam podi.

Analysis of the conventional and convenience foods for different nutrients showed that all the values recorded for conventional foods were definitely higher than those recorded for convenience foods when the quantities remained the same. The above findings were similar to the results obtained by Henrietta and Fleck (1981).

The analysis of these powders and breakfast foods thus reveal the foods prepared by conventional methods are nutritionally superior than the foods prepared with convenience foods.

Table XIX presents the nutrients present in ready to drink juices.

TABLE XIX

NUTRIENT PRESENT IN SELECTED JUICES

Name of the juices	Energy (k.cal)		Protein (g)		Vitamin C (mg)		β Carotene (µg)	
	Convenience foods	Conventional	Convenience	Conventional	Convenience	Conventional	Convenience	Conventional
Orange Juice	30	48	0.1	0.7	7.2	30	295	1104
Pine apple juice	27	46	0.4	0.4	3.6	39	-	18
Tomato Juice	15	20	0.6	0.9	10.8	27	266	351
Apple juice	35	59	0.8	0.2	3.6	1	0	0
Frooti	40	-	0.4	-	108	-	265	-

Energy values ranged from 20 - 59 calories for the juices prepared out of raw ingredients. The protein content of the juices was negligible. Vitamin C and β carotene content were higher in the juices prepared out of raw ingredients when compared to the convenience drinks and this may be due to the loss of vitamin C during the process of preparation and storage. The above findings were similar to the results obtained by Puri and Sanghera (1989)

6. Cost, Time Factors and Score Card For Conventional And Convenience Foods

Table XX presents the data regarding the cost of foods for 100 g both for the convenience and conventional foods.

TABLE XX

COST OF CONVENIENCE FOODS AND CONVENTIONAL FOODS

Food	Cost of Convenience Foods Rs.	* Cost of Additional Ingredients Rs.	Total Cost Rs.	Cost of Conventional Food Rs.
Jamoon Mix	5.40	3.04	8.44	7.10
Halwa Mix	4.45	4.88	9.33	5.43
Bhadusha Mix	4.45	2.02	6.47	5.04
Vadai Mix	3.50	2.80	6.30	3.86
Bhaji Mix	2.90	3.50	6.40	5.00
Iddli Mix	3.00	NIL	3.00	1.00
Dosai Mix	3.00	NIL	3.00	1.42
Rava Iddli Mix	3.75	NIL	3.75	3.25
Bisebelabhath Mix	3.50	NIL	3.00	1.10
Sambarpodi	3.75	NIL	3.00	2.46
Rasam Podi	4.00	NIL	4.00	1.25
Iddli Podi	3.00	NIL	3.00	1.20
Orange Juice	2.42	NIL	2.42	1.00
Pineapple Juice	2.39	NIL	2.39	0.50
Tomato Juice	1.83	NIL	1.83	1.00
Apple Juice	2.62	NIL	2.62	1.50
Frooti	3.50	NIL	3.50	**
Soup	1.00	NIL	1.00	2.00

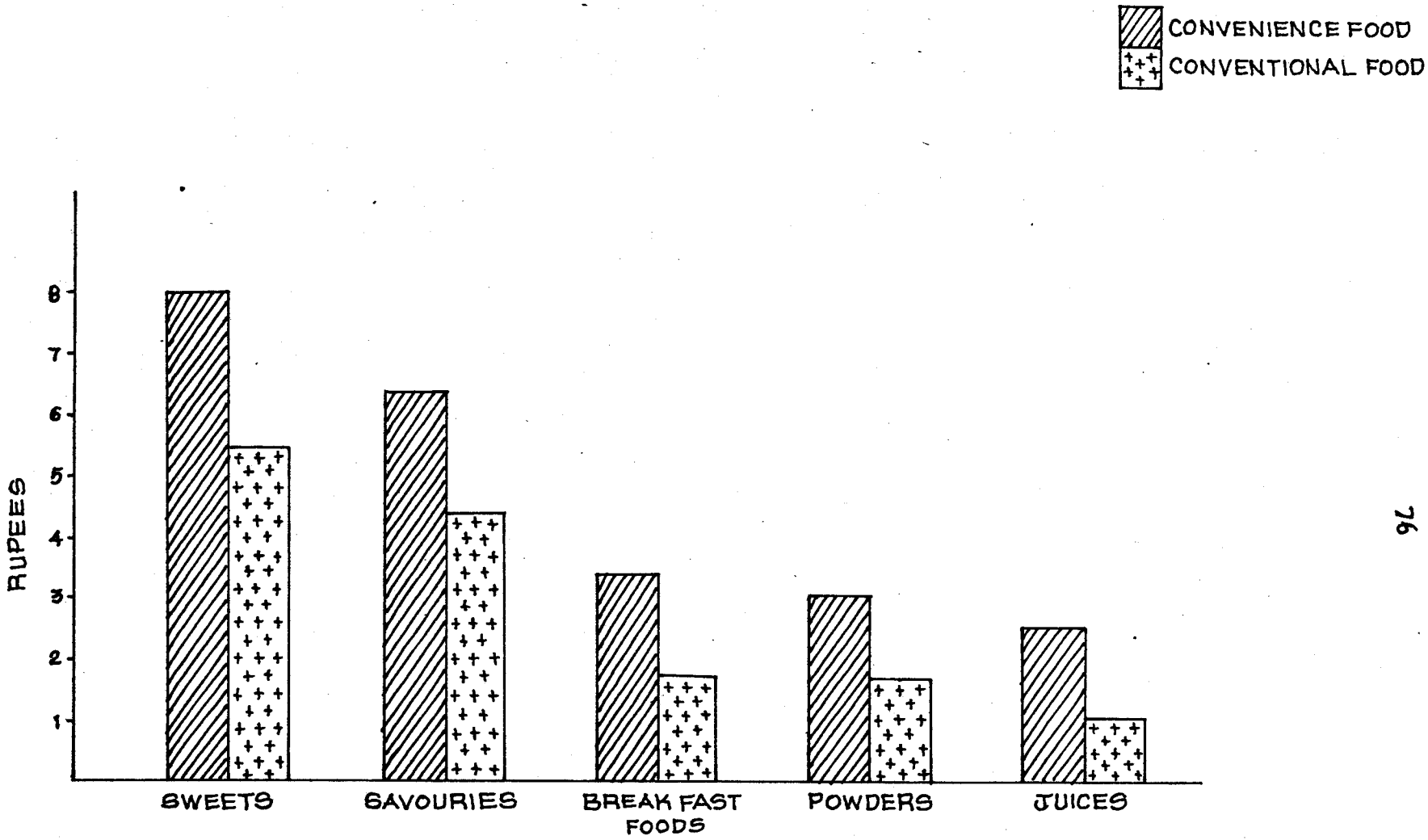
* Sugar and fat for frying were additionally used and cost calculated

** Conventional method for preparing frooti was not available and thus the cost was not available.

The cost of almost all the convenience foods were comparitively higher than the conventional foods. The cost of convenience foods like halwa mix, vadai mix, Iddli mix, dosai mix, bisebelabath, all masala powders, orange and pine apple juices were almost double the cost of similar quantity of conventional foods prepared with raw ingredients. However the difference in cost was not much with reference to gulab jamoon, sambar podi, and Rava iddli mix.

A comparison of the cost of convenience and conventional foods is presented in Figure II. The cost of these foods were arrived at by taking the mean cost of sweets, savouries, breakfast foods, powders and juices.

Table XXI presents the score card for conventional and convenience foods.



A COMPARISON OF THE COST OF CONVENIENCE AND CONVENTIONAL FOODS

Figure.II

TABLE XXI

SCORE CARD - CONVENIENCE AND CONVENTIONAL FOODS

Particulars	Convenience Foods Max. Scores - 25	Conventional Foods Max. Scores . 25
Sweets		
Gulab Jamoon	17	18
Halwa	13	19
Bhadusha	16	21
Savories		
Vadai	13	19
Bhaji	19	19
Powders		
Sambar Podi	16	19
Iddli Podi	16	17
Rasam Podi	17	17
Mixed Vegetable soup powder	9	19
Breakfast cereals		
Iddli	9	21
Dosai	13	16
Rava Iddli	17	14
Bisebelebhath	14	16

Maximum scores were given to all most all the products prepared out of raw ingredients rather than products made out of convenience foods. The score values ranged from 9 - 19 in the case of convenience foods while for the conventional foods the values ranged from 14 - 21.

From the Table XXI it is obvious that the conventional foods are more acceptable than convenience foods.

Table XXII present the data regarding the time taken for preparing the recipes by conventional and convenience method.

TABLE XXII

PREPARATION TIME FOR CONVENTIONAL AND CONVENIENCE FOODS

Particulars	Convenience Foods in minutes	Conventional Foods in minutes	Remarks
Sweets			
Gulab Jamoon	30	35	Nil
Halwa	20	45	Excluding Soaking time
Bhodhusha	20	25	
Savouries			
Vadai	40	90	
Bhaji	15	45	
Powders			
Sambar Podi	Nil	10	
Rasam Podi	Nil	15	
Iddli Podi	Nil	10	
Mixed Vegetable Soup powder	10	90	
Breakfast Cereals			
Iddli	15	3 hrs	Excluding Fermentation period
Dosai	15	3 hrs	
Rava Iddli	25	45	
Bisebelabhath	25	45	

From the Table XXII it is evident that the time required for cooking of convenicne foods was less when compared to the conventional method and this explains the reason for the popularity of these foods among the women who work outside their house.

In the preparation of sweets there was not much difference between conventional and convenience methods while there was a maximum difference of 30 - 120 minutes in the preparation of the breakfast foods.

7. Results on the Quality of Selected Convenience Foods

Table XXIII presents the data regarding the quality of selected convenience foods.

TABLE XXIII

QUALITY OF SELECTED CONVENIENCE FOODS

Convenience Foods	Colour	Permitted/Not permitted colours
Halwa Mix	Sunset yellow and carmoisine (slightly)	Permitted colour
Bhaji Mix	Nil	
Sambar Podi	NIL	
Rasam Podi	NIL	
Iddli Podi	NIL	
Frooti	Sunset yellow	Permitted colour

From the Table XXIII it is evident that only halwa mix, and frooti had permitted artificial colour added to it, and none of the other mixes had any artificial colour added to it.

The fruit juices analysed were pineapple, orange, apple, tomato, and frooti and their P^Hs were 4,4,3, 3.5 and 2.5_3 respectively. Since the PH of all the fruit extracts were very low (ie) acidic and because bacteria will survive in substrate of neutral P^H, no colony was observed.

Under microscopic examinations it was proved that the starch granules which were claimed to be present on the packet was present and there was no adulteration in the product.

Summary and Conclusion

. V. SUMMARY AND CONCLUSION

The present study was undertaken with the aim of comparing the conventional and convenience foods with regard to Nutritive value, acceptability, cost and preparation time.

For this purpose a market survey was done in 25 shops in and around the Coimbatore City. Based on the market survey, the most commonly used convenience foods were found.

The study included 500 families out of whom 250 families were from rural and another 250 families were from urban areas. Out of the 250 families in the rural and another 250 families in the urban area surveyed 49 and 55 per cent of women worked outside their houses.

The acceptability of selected convenience foods were found out with the help of a taste panel. The cost and time factor involved in the preparation of these foods were compared against the traditional methods of preparations of the same product. The nutrient content of the fodds were calculated and analysed. The samples were also analysed for their quality.

From the survey it was clear that 44 and 22 per cent

of the families rural and in the urban areas were in low income groups. Thrity two and thirty three per cent of the families in rural and urban areas, respectively were in middle income and the rest were in high income group.

About 35 to 59 per cent of the families in the rural areas spent upto 40 per cent of their income on cereals against 13-84 per cent of the families who were spending within 40 per cent of their expenditure on cereals in the urban areas.

Based on the results obtained by conducting the survey, 45 and 50 per cent of the working and non-working group in rural areas were using convenience foods, while in the urban areas 74 and 66 per cent of the working and non working groups were using convenience foods and the rest did not prefer the convenience foods.

It is evident from the survey that irrespective of working or non working or residing in rural or urban areas Jamoon mix was the food, most liked by the family members followed by Sampar podi and bhagi mix. The fact

that it is time saving and has a novel taste of the convenience foods was one of the repeated reasons for liking the convenience foods.

In the urban areas the usage of the convenience foods were higher than rural areas which may be due to a liberal availability of the convenience foods.

Among the convenience foods sweets were most acceptable both in rural and urban areas the percentage of acceptance ranging from 90 - 94 per cent. The convenience food that ranked second in acceptablity among the families was beverages with a percentage range of 64 - 65.

Housewives residing both in the rural and urban areas expressed their opinion that there were no problems like diarrhoea, vomitting, constipation, indigestion, skin allergy or any other ailments due to the usage of convenience foods.

In the rural families surveyed 80 and 72 per cent of them never gave infant foods to their children in both working and not working group. In urban areas 60 per cent of the working group introduced infant foods at the weaning period.

In both the rural and urban areas the infant food mostly used were Cerelac, Nestum and Farex. The families who used infant foods expressed that no health problems existed in their children due to the intake of infant foods.

Sixty per cent and 30 per cent of the families residing in the rural and urban areas suggested that they had no idea about the cost of convenience foods. While 28 and 50 per cent of the rural and urban areas suggested that the cost of convenience foods were rather high.

The nutrient content of the conventional and convenience foods showed that in general the nutrients of the convention food preparations were more than that found in convenience foods with respect to all the nutrients.

The cost of the convenience foods were higher when compared to the conventional foods. This may be due to the cost of packaging, transporting and the demand for convenience foods.

The conventional foods got better scores, for acceptability than the convenience foods. From this it is clear that the conventional foods were more acceptable

than the convenience foods. These results indicate that the manufacturers should aim at improving the quality of the product further.

The time required for preparing the convenience foods was less when compared to the time required for conventional foods. This is due to the processing procedures carried out for the convenience foods.

The quality of convenience foods were acceptable since they were free from microorganisms and also these foods had not been adulterated.

It is apparent from this study that convenience foods are more acceptable with regard to time saving, labour saving and quality when compared with conventional foods and while conventional foods were more acceptable on the basis of taste and nutrient content. Therefore, the usuage of convenience foods should be encouraged with the precaution that good quality raw ingredients alone should be used in the preparation. It is essential that further research in this area should be continued to ascertain that quality goods are available to the consumer.

Bibliography

BIBLIOGRAPHY

Baisya,R.K., 1988 — "Some aspects of Instant Food Mixes" Indian Food Packer, Vol:XXXXII, No:2, P. 30-34

Beerch,O.P., 1982 — "Detection of Adulteration in Tomato ketchup by histological characteristics and staining Techniques, Indian Food Packer, Vol:XXXIII, No:2, P. 28-33.

Birch,G.G., Cameron,A.G., Spencer,M. — "Food Science", III Edition Pergamon Press, P. 123-139.

Christian,J.H.B., 1979 — "Take-away Foods-Microbiological Aspects" CSIRO Food Research Quarterly, Vol:40, No:2, P. 10-12.

Chaudhri,S., 1989 — "The Market For Processed Foods in India", Indian Food Industry Vol:8, No:3, P. 10-12.

Chandrasekhar,U., Bhooma,N., Reddy 1988 — Evaluation of a malted weaning food based on low cost locally available foods. The Indian Journal of Nutrition and Dietitics, Vol:25, No:2, P. 27-28.

Clements,J.W., Josephine,F.R., 1973 — The significance of Convenience foods A.H. and A.W. Reed Food and Diet for Family Health in Australia,London, New Zealand, P. 23-25.

Elkin,E.R., 1979 — "Nutrient Content of raw and canned green beans, peaches and sweet Potatoes". Food Technology. Vol:33, P.66.

Fein Gold., 1975, Elliot., 1980 — "Method to detect synthetic carotene derivatives in Food and drink and to distinguish these from natural carotenoids and xanthophylls" Food Technology, Vol:20, No:4, P. 47-49.

Fleck,H., 1981 — "Introduction to Nutrition" 4th Edition, Mac Millan Publishing Company, New York, P. 126-127

Frazier.,W.C., Westhoff,D.C., 1981 — "Food Microbiology" III Edition McGraw Hill Publishing Company, P. 3-5.

George,I.E., 1975 — Need for convenience foods Fabricated Foods, P. 61-62.

Gopalan,C., Ramasastri,B.V., Balasubramanian,S.C., 1984 — "Nutritive value of Indian Foods" ICMR - New Delhi, P. 4-14.

Hein,R.E., Hutchings,I.J., 1974 — Influence of Processing on vitamin-mineral content and biological availability in Processed foods" - Nutriens in processed foods, P. 59.

Heriksen,L.K., Mahallo,J.R., Johnson,L.K., 1985 — Canned Foods - Appropriate in Trace element studies" Journal of American Dietitic Association,Vol:85, No:5, P.563-567.

Hobbs,B.C., 1974 "Problems and solutions in Food Microbiology" Food Technology, Vol:31, No:1, P. 90-92.

Jarvis,B., Patel,M., 1980 "The occurance and control of Cl.Botulinum in Foods","Food And Health Science and Technology Applied Science Publisher Ltd., P.112.

King,A., 1975 "Better Cookery" M and B Limited London, P. 483-484

Mahindru,S.N., 1987 Hand Book of Food Analysis" Swan Publishers, P. 499-507.

Malik,R.K., 1976 Food Quality and Control Food And Nutrition, Vol:2, No:4, P. 15-17.

Manay,N.S., Shadaksharaswamy,M., 1987 "Foods Facts And Principles" Wiley Eastern Limited, P 1-4.

Murthy,N.K., Josephy,A., Saroja,S., 1973 "Availability of β-Carotene from carrots in human feeding trial", Indian Journal of Nutrition and Dietitics, Vol:10, P. 65.

Passmore,S., 1979 "Bacterial Food Poisoning" Nutrition and Food Science, No: 56, P. 7.

Paul,P.C., Palmer,H., 1972 "Food Theory And Application" John Wiley and Sons, P. 739-777

Pearson,D., 1975 Laboratory Techniques in Food Analysis, London- Butter worth P. 114.

Peckham,G.C., Hinion,J., Graves,F., Foundations of Food Preparation V Edition, Macmillan Publishing Cp., New York, P.114-117.

Piggott,J.R., 1984 "Sensory Analysis of Foods" Elsevier Applied Science Publishers, P.143.

Raghuramulu,N., Madhavan Nair,K., Kalyanasundaram,S., 1983 — 'A manual of Laboratory Techniques' NIN Hyderabad, P.32, 136-137, 142

Rajalakshmi,D., Narasimhan,S., 1989 — "Sensory Analysis" Indian Food Industry" Vol:8, No:2, CFTRI Mysore, P. 14-16.

Ramachandran,S., 1982 — Canned Foods - A boon to the housewife, Indian Food Packer, Vol:XXXVI No:4, P. 6

Ranganna,S., 1986 — Handbook of food Analysis and Quality Control for fruit and vegetable products, Second Edition, New Delhi, P.594-646

Ravitscher,M., Mayer,J., 1979 — Energy Use in Convenience Foods Food Policy, Vol:4, No:4, P.236.

Rodriguez,D.B., Raymundo,L.C., Lee,T.C., — Carotenoid Pigment Changes in ripening". Annotamy of Botany- P. 615-624

Simpson,K.,
Chchster.,
1976

Simpson,K.L.,
1983
Relative value of Carotenoids as precursor of vitamin A, Nutrition Society, Vol:42, P.7.

Stewart,G.F.,
Amexine,M.A.,
1982
Introduction to Food Science and Technology II Edition Academic Press, P.56-62

Suitor,C.W.,
Hunter,M.F.,
Nutrition Principles And Applications in Health Promotion P. 247-250

Swaminathan,M.,
1974
Essentials of Food and Nutrition Volume-II Ganesh and Co., P. 164-173

Thompson,E.S.,
1972
"How many Convenience Food should we use". Food and Nutrition. Common Wealth Depattment of Health Notes and Reviews Vol:29, No:5, and 6 P.72-73.

William,E.R., Calñendo,M.A., 1984 Nutrition-Principles,issues and Application. McGraw Hill Book Company, P. 253-258.

Appendix

APPENDIX I

INTERVIEW SCHEDULE FOR MARKET SURVEY TO ELICIT INFORMATION REGARDING CONVENIENCE FOODS

1. Name of the Respondent :

2- Name and Address of the Shop:

3. Name of the Pre-mix foods available at the shop:

Name of the Product	Brand Name	Weight of the Food/packet	Cost/Package in Rs.
I. Sweets			
a.			
b.			
c.			
d.			
e.			
f.			
II. Savories			
a.			
b.			
c.			
d.			
e.			
III. Powders			
a.			
b.			
c.			
d.			

Name of the Product	Brand Name	Weight of the Food/packet	Cost/Package in Rs.
IV. Soups			
a.			
b.			
c.			
d.			
e.			
V. Breakfast Cereals			
a.			
b.			
c.			
d.			
e,			
VI. Beverages			
a.			
b.			
c.			
d.			
e.			
VII. Infant Mixes			
a.			
b.			
c.			
d.			
e.			

Name of the Product	Brand Name	Weight of the Food/packet	Cost/Package in Rs.
VIII. Sauces and Ketchup			
a.			
b.			
c.			
d.			
e.			
IX. Any Others			
a.			
b.			
c.			
d.			
e.			

5. Convenience foods that are most liked by the consumers:

Name of the product	Brand Name	Weight of packet	Cost/ packet

APPENDIX II

CONVENTIONAL AND CONVENIENCE FOODS - COMPARISON WITH REFERENCE TO NUTRITIVE VALUE AND ACCEPTABILITY (SOCIO ECONOMIC BACKGROUND AND THE USAGE OF CONVENIENCE FOODS)

I GENERAL BACKGROUND

1. Name of the Investigator :
2. Name of the Interviewee :
3. Name and Address of the Head of the family :
4. Occupational Status of the Woman :
5. Monthly income of the family :
6. Type of the family :
7. Religion and caste of the family :
8. Vegetarian/Non vegetarian :
9. Vegetarian but takes eggs :

II FAMILY BACKGROUND

1. INCOME BASIS

(i) Low Income : Rs. Below 1,500
(ii) Middle Income : Rs. 1500-2500
(iii) High Income : Rs. 2500 & above

2. COMPOSITION OF THE FAMILY :

S. No.	Name of Member	Relation to the head of family	Marital Status	Age in Years	Education	Occupation	Income/ Month

3. Details of Expenditure on foods :

Food	Quantity Purchased per month	Cost in Rs.	Percentage of food expenditure
1. Cereals			
2. Pulses			
3. Roots & Tubers			
4. Leafy vegetables			
5. Other vegetables			
6. Fruits			
7. Nuts & Oils			
8. Fleshy foods			
9. Milk & its products			
10. Sugar & Jaggery			
11. Pre-mix foods or Ready to eat foods			
12. Beverages			
13. Infant foods			

3. Names of the Convenience foods used at home and frequency of use

Foods Name	Frequency of use			
	Daily	Weekly	Monthly	Occa-sion-ally

4. Pre-mix foods that are most liked by the family Members :

5. REASONS FOR THEIR LIKING:

(a) Time Saving

(b) Taste

(c) Any other reasons

(c) Convenient

(d) Cost

6. ACCEPTABILITY OF CONVENIENCE FOODS

Foods	ACCEPTABLE		
	Very much Acceptable	Acceptable	Not Acceptable
a. Sweets			
b. Savories			
c. Soups			
d. Breakfast cereals			
e. Powders			
f. Beverages			
g. Infant mixes			

7. Do you have any problems while using the Convenience foods among adults

	YES	NO
(i) Diarrhoea		
(ii) Vomiting		
(iii) Constipation		
(iv) Indigestion		
(v) Skinallergy		
(vi) Others		

IV DETAILS REGARDING INFANT FOOD MIXES

(Tick in appropriate column)

1. Do you give pre-mix foods to the infants

YES	NO

a) If YES

i) What kind of food have you given?

ii) At what age have you started giving the pre-mix foods?

iii) While giving the pre-mix foods to the infants do you find any health problems like

	YES	NO
a) Diarrhoea		
b) Constipation		
c) Vomiting		
d) Indigestion		
e) Any others		

b) IF NOT giving give the reasons

V Do you think the cost of the convenience foods is reasonable?

APPENDIX III

DETERMINATION OF ENERGY VALUE USING BOMB CALORIMETER.

AIM:-

To determine the energy value of food stuff using para oxygen bomb calorimeter.

PRINCIPLE:-

The principle behind the working of bomb calorimeter is based on the fact that a known weight of the sample is completely burnt in the apparatus per minutes the heat developed by a definite weight of water. By determining the rise in temperature it is possible to calculate within close limits the number of heat units liberated.

PROCEDURE:-

One gram of the food was weighed and taken in a capsule- 10 cm of fused wire was attached to it and the capsule was placed in tube electrodes. The bomb was assembled and oxygen was filled with 15 atmosphere. Two litres of distilled water which was cooled at $2^{o}F$, below the room temperature was taken in the calorimeter bucket. The calorimeter was inserted and stirring mechanism was started while the terminals

were attached to the bomb - It was allowed to run for two minutes before taking the temperature. The temperature readings were recorded at one minute interval for an initial period of 5 minutes. Exactly at the fifth minute the wire was ignited and the button was held for 15 seconds. The temperature readings exactly the minute after ignition were recorded. There after until two minutes have elapsed when the readings were taken at one minute interval. After maximum temperature was noted every one minute for 5 minutes. The calorimeter was opened bucket and bomb were removed, then the bomb calorimeter cover was taken out. The combusted pieces were removed from the electrodes. They were strengthened and the length of all the pieces combine to make fuse wire correction.

CALCULATION:-

Weight of food taken	= g
Weight of water with outside vessel	= g
Water equivalent of the calorimeter	= g
Initial temperature of water	= c
Final temperature of water	= c
Rise in temperature	= c
Heat gained by water and calorimeter	= Wt. of water with outside vessel + water equivalent of Calorimeter x Wt.of

food taken.

. . g of food produce : ----------Cal.

1 g of food produce : ----------Cal

. . 100 g of food produce : ----------Cal

APPENDIX IVI

ESTIMATION OF PROTEIN

Principle:-

The estimation of nitrogen is done by Kjeldhal method which depends upon the fact that organic nitrogen when digested with sulphuric acid in the presence of a catalyst (Selenium oxide, mercury or copper sulphate) is converted into ammonium sulphate. Ammonia liberated by making the solution alkaline is distilled into a known volume of a standard acid which is then back titrated. The protein content is obtained by multiplying the nitrogen value with 6.25.

Reagents:-

1. Digestion mixture : 98 parts K_2SO_4 + 2 parts of $CuSO_4$
2. 40% NaOH
3. N/10 NaOH
4. N/10 H_2SO_4
5. Methyl red indicator : 0.1 g.of the indicator dissolved in 50ml of alcohol and water added to make it to 100 ml.

Prodedure:-

The sample (0.5-2.0g) is weighed into a kjeldhal flask.

About 5 g.of digestion mixture and 20 ml of pure H_2SO_4 are added to the same sample and the mixture digested by heating for 4 to 5 hours. Glass beads are added to prevent bumping. After the contents of the flask become clear, the digestion is continued for 1 hour . The contents of the kjeldhal flask are cooled, diluted with distilled water and the mixure made alkaline by adding excess of 40% NaOH (about 75ml). A small quantity of purmice powder is added to prevent bumping during distillation. The ammonia liberated is distilled into a receiver containing 25 ml of N/10 H_2SO_4. The excess of acid in the receiver is back titrated against N/10 NaOH using 3 drops of methyl red indicator.

A reagent blank is similarly digested and distilled. This titre value is substracted from the value obtained for the sample to get the true titre value "b".

Calculation:-

If 'a' g of the sample are taken and if 'b' and 'c' ml of alkali of normality 'd' are required for back titration and to neutralise 25ml of N/10 H_2SO_4 respectively then the protein content in g/100 g sample is $\frac{(c-b)x14dx6.25}{a \times 1000} \times 100$

APPENDIX IV

ESTIMATION OF CALCIUM

Principle:-

Calcium is precipitated as oxalate and is titrated with standard potassium permanganate.

Reagents:-

1. 4% ammonium oxalate solution
2. Dilute ammonia solution (2ml of liquor ammonia + 98 ml water)
3. 1 N H_2SO_4
4. 0.01 N potassium permanaganate solution
5. 0.01 N oxalic acid : Sodium Oxalate is dried in an oven at 100-105°C for 12 hours, Exactly 0.67 g is dissolved in redistilled water, 5 ml concentrated H_2SO_4 is added and solution made supto 11 after it has cooled down.

Standardisation of potassium permanganate solution 25 ml of 0.01 N oxalic acid is transfered to an Erlenmeyer flask. One ml of concentrated H_2SO_4 is added, warmed to about 70°C and titrated against $KMnO_4$ solution, till the faint pink colour remains.

Prodedure:-

Two ml of sample is taken into a 15 ml centriguge tube.

Add 2 ml of distilled water and 1 ml of 4% ammonium oxalate solution and mix thoruoghly and leave overnight. Again the contents are mixed and centrifuged for 5 min. at 1500rpm. The supernatent liquid is poured off and the centrifuge tube drained by inverting the tube for 5 min. on a rack (care should be taken not to disturb the precipitate). The mouth of the centrifuge tube is wiped with a piece of filter paper. The precipitate is stirred and the sides of the tubes are washed with 3 ml of dilute ammonia. It is centrifuged again and drained as before. The precipitate is washed once more with dilute ammonia to ensure the complete removal of ammonium oxalate. The precipitate is dissolved in 2 ml of 1 N H_2SO_4 . The tube is heated by placing it in a boiling water bath for 1 min, and titrated against 0.01 N $KMNO_4$ solution to a definite pink colour persisting for at least 1 minute.

Calculations:

1 ml of 0.01 N $KMnO_4$ is equivalent to 0.2004 mg of calcium

mg of calcium/100 ml sample = $(x-b) \times 0.2004 \times \frac{100}{2}$ where

x = number of ml of 0.01 N $KMnO_4$ required to titrate the sample

b = number of ml of 0.01 N $KMnO_4$ required to titrate 2 ml of H_2SO_4 (Blank)

If the normality of $KMnO_4$ is N, the value obtained in the above formula should be multiplied bh the factor, N/0.01.

Note:-

Potassium permanganate solution needs to be frequently standardised.

APPENDIX VI

ESTIMATION OF IRON

Iron is determined calorimetrically making use of the fact that ferric iron gives a blood-red colour with potassium thiocyanate.

Reagents:-

1. 30% of sulphuric acid (30ml Conc.H_2SO_4 diluted to 100 ml with distilled water.)
2. Saturated potassium persulphate solution - 7g potassium persulphate are dissolved in glass distilled water and the solution made upto 100 ml.
3. Potassium thiocyanate40% solution, 40g. KCNS are dissolved in 90 ml glass distilled water, 4 ml acetone added an d the volume made upto 100 ml.
4. Standard iron solution : 0.7022 g. of ferrous ammonium sulphate is dissolved in 100 ml distilled water, and after addition of 5 ml of 1:1 Hcl, the solution is made upto 1 litre and mixed thoroughly (1 ml = 0.1 mg Fe). The standard solution is prepared fresh once in six months.

Working standard solution (0.01 mg Fe/ml) is prepared by diluting the above solution ten-fold.

(Note:- For iron estimation all the reagents used should be free iron, use of glass distilled water is preferred. If use of reagents containing trace of iron cannot be avoided, it should be seen that the final solutions of standard and rest contain identical quantities of those reagents containing iron as impurity).

Prodadure:-

To an aliquot (6.5ml or less) of the mineral solution enough water is added (if necessary) to make upto a volume of 6.5ml followed by 1.0 ml of 30% H_2SO_4, 1.0 ml potassium per sulphate solution and 1.5ml 40% KCNS solution. The red colour that develops in measured within 20 minute at 540 nm.

APPENDIX VII

ESTIMATION OF VITAMIN C

Principle:-

The blue colour produced bythe reduction of 2,6 - dichlorophenol indophenol by ascorbic acid is estimated calorimetrically.

Reagent:-

1. Acetate buffer, $p^H 4$: 300 g of anhydrous sodium acetate, 700 ml of water and 1 liter of glacial acetic acid are mixed.
2. Dye solution : 25mg of the sodium salt of 2,6 dichlorophenol indophenol is dissolved in distilled water and made upto 200 ml.
3. 6% Metaphosphoric acid (HPO_3)
4. Ascorbic acid standard (1mg per ml) : 100mg of pure ascorbic acid dissolved in 100ml of 6% HPO_3.

Procedure:-

A weighed quantity of the material is blended with a convenient volume of 6% HPO_3 and the slurry diluted to obtain a final mixture containing approximately 20 µg of ascorbic

acid per ml (for example in case of leaves, 5g of the sample can be blended with 6% HPO_3 to make 50 ml and 5 ml of the slurry further diluted to 50 ml).

The mixture is then filteered and 2.5 ml of the filtrate placed in a 50 ml separating funnel (A). The same amount of the extractant (6% HPO_3) is tanken in two more separating funnels, B and C. Funnel B serves as the dye bàank, and to funnel C which serves as a standard is added 0.1 ml (equivalent to 0.1 mg ascorbic acid) of the ascorbic acid standard solution. An amount of acetate buffer equal to the volume of the extract taken is then added to all the three funnels followed by 2 ml of the dye solution. Xylene 10 ml is then added quickly and the contents shaken for 6-10 sec. After the layers separate, the lower water layer is removed and the colour in the xylene extract measured in a Photoelectric colorimeter at 500 nm.

Calculation:- The calculation for the ascorbic acid content is based on the reduction in the OD of the dye solution on reaction with ascorbic acid. If the ODs of the extracts from funnels A, B and C are a, b and c, then the ascorbic acid contained in the amount of the extract taken for reaction with the dye is equal to $\frac{0.1(b-a)}{b-c}$ mg. The ascorbic acid content of the material can then be calculated by applying the necessary dilution factors.

Note:-

It has been found that certain batches of meta-phosphoric acid have impurities that reduce the dye. Hence the reagents used should be checked to guard against this possibility. Besides a reagent blank with the addition of the dye should always be run along with the sample.

APPENDIX VIII

ESTIMATION OF β - CAROTENE

The main problems associated with work on carotenoids arise from the inherant instability of the pigments. They are especially sensitive to light, heat, O_2 acids and alkalies.

Extraction:-

The material is cut into small peices and homogenized with acetone (or Meott or EtOH) for 1-2 mint in a suitable electric blendor. 2 g. at least.

The initial homogenate is filtered. This procedure is repeated until all the pigment is extracted usually 2 or 3 times.

The total volume of the extracts can be minimised by using diethyl ether.

The acetone extract is added to an equal volume of freshly distilled peroxide free diethyl ether in a separate funnel mixed & then diluted with H_2O or NaCl solution until 2 layers are found. The lipid soluble pigment being in the upper (ether) phase.

Light petroleum or hexane is most commonly used as solvent in the determination of carotenes.

If x g of a carotenoid in 'y' ml solution gives an extinction of E at the given wavelength then

$$x = \frac{Ey}{E^{1y}_{1\ cm} \times 100}$$

β - Carotene 4 53 nm is light petroleum hexane

Ethanol

$E^{1\%}_{1\ cn} = 2592$

(Using i cm cell and assuming a value for the $E^{1\%}_{1cm}$ of 2592 at 450 nm, a iup/ml solution in light petroleum wd given an extinction of 0.25)

lycophane absorption 503 nm

$E^{1\ mol}_{1\ cm}$ of lycophene at 503 nm = 17.2 x 109

3-1206 up in pet-ether (40-60) of lycophene/ml - 1 Absorbance value

Ranganna,S., Manual of analysis of fruits, vegetables & Pdts., (1976) Mc Graw Hill, New Delhi P. 77.