



**A COMPILATION OF THE SYNOPSES OF
M.Phil. THESES**

92385

Guided by

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M.A., M.Sc., Ph.D. (Ohio State), D.Sc., (Madras)

**AVINASHILINGAM INSTITUTE FOR HOME SCIENCE
AND HIGHER EDUCATION FOR WOMEN**

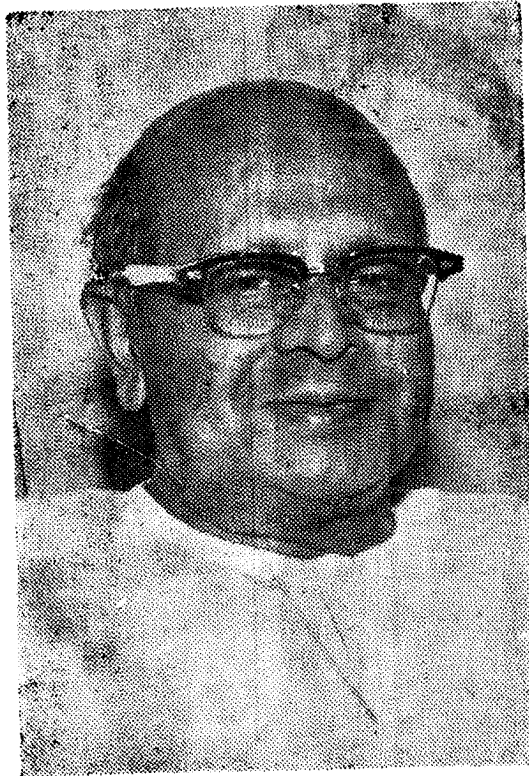
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Padmabhushan Dr. T.S. AVINASHILINGAM



Our Ayya Avargal, who inspired us

GUIDE



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FOREWORD

The Master of Philosophy Course was introduced in Sri Avinashilingam Home Science College in the year 1977. Around 52 scholars registered for this course under my guidance and almost all the scholars were experienced teachers from different universities. They belonged to all the six branches of Home Science. Each candidate undertook an area of current interest for her research work and all their topics had been application oriented and their findings have been useful to the policy makers, scientists, scholars, teachers and extension workers for the implementation of their programmes. Many of these topics, being thrust areas led to further research at the Ph.D. level. The individual research articles have been published in various national and international journals and presented in several scientific forums. I am happy to present this compilation of the abstracts of the theses submitted for the M.Phil Course and I hope that this would serve as a guide to the present and future scientists to direct their research in the proper useful direction and explore the science in every day life.



(Dr. Rajammal P. Devadas)

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DEVELOPING A BLUEPRINT FOR A LOW COST RURAL HOUSE

Dr. Raiammal P. Devadas

L.S. Sathyavathi

Adequate housing is an essential requirement for decent and meaningful human existence. The World Health Organisation defines housing or shelter as an enclosed environment in which man finds protection against natural elements, is safe and secure from hostile forces and can function with greater vigour and efficiency, with increase comfort and satisfaction and in which he can safeguard his possessions and be assured of privacy for himself and his family. Housing has always been a matter of great concern for all societies because it deals with one of the basic essentialities of man's early existence (Mishra, 1977).

Eventhough mankind has advanced so much in the field of housing, India has not kept pace with the advancement. Poverty and ignorance make Indian forego, one of the basic necessities namely shelter. India faces the tremendous problem of housing shortage because of population explosion, growth of cities, urbanisation, refugee influx, and absence of adequate repair and rebuilding of existing houses.

As a step towards wiping out the colossal shortage of housing in India the Union Government has taken up nine social housing schemes. Among these the village housing project scheme is the only scheme gear towards bringing up a better housing condition in the rural sector. But the anlysis done by Rangarajan (1977) show the performance under the village housing project scheme is far from satisfactory. He points out that building houses not in confirmty with the natural surrondings as one of the reasons for the down fall of this programmme. This emphatically points out that any house in the village premises must be designed to suit the cultural set up utilising the locally available resources.

A careful study of assessing the requirements, functions, physical, social and cultural from which the rural design should emerge has to be undertaken rather than attempt to apply what has been done elsewhere, say Devadas and Deshi (1976) and Knight (1978). The present study aims at suggesting a model plan for a rural house for Coimbatore District based on the needs of selected households.

A detailed survey was conducted in 150 rural households from six selected villages in Coimbatore district to understand about the existing situation in the rural area. A comprehensive schedule which called for information on the type and composition of families, house construction details, areas allotted for various activities carried in the house, provision for storage, sanitary facilities, inconvenience in the housing structure and their opinion about the rural house structures was developed. The findings indicated the existing housing condition of the selected rural areas.

Socio Economic Strata

An enquiry into the socio economic strata revealed that 83 per cent of them belonged to the nuclear type. Their income ranged from Rs. 100 to 400 per month. The sample belonged to varied occupational pattern such as agricultural, industrial and professional.

General Information about the House

Eighty three per cent of the households were located near the village streets whereas the remaining houses were situated in actual fields. Forty eight per cent of the houses were east facing while only 11 per cent were west facing. The east facing houses may be able to take full advance of the morning sun light. The survey facts revealed that 40 per cent of the households had three rooms inclusive of verandah indicates the common feature of the surveyed houses. Less than ten per cent of the houses had either one or five rooms. Table I shows the type of rooms available in selected households.

TABLE I
TYPE OF ROOMS AVAILABLE IN SELECTED HOUSES

| S.No. | Room | Number of households N : 150 | Percentage |
|-------|-------------------|---------------------------------|------------|
| 1. | Verandah | 104 | 59 |
| 2. | Multipurpose room | 141 | 94 |
| 3. | Kitchen | 102 | 68 |
| 4. | Bathroom | 78 | 52 |
| 5. | Bed room | 8 | 5 |
| 6. | Latrine | 6 | 4 |
| 7. | Store room | 2 | 1 |

The data reveals that a majority of 94 per cent of the houses had a multipurpose room in which many activities such as sleeping, studying, dining and even cooking may be carried out. Ninety six per cent of the families does not have latrine facilities and they use nearby fields for their nature's call. The average liveable space was assessed. Table II presents the distribution of households according to space available.

TABLE II
DISTRIBUTION OF HOUSEHOLDS ACCORDING TO SPACE AVAILABLE

| Area in sq. m. | Number of households N : 150 | Percentage |
|-------------------|------------------------------------|------------|
| Below 10 | 8 | 5 |
| 10 — 20 | 61 | 41 |
| 20 — 30 | 40 | 27 |
| 30 — 40 | 31 | 21 |
| 40 and above | 10 | 6 |

Only 8 per cent of the households had more than 40 sq.m. for various purposes. The minimum requirement of 24. sq.m. is not satisfied by 46 per cent of the households.

The cheap flooring materials namely mud and lime stone were used by 53 per cent of the families. Lime was the common plastering materials used by more than half of the sample. Secondary species of timber like venteak, pillamaruthu, neem wood, mango wood were the common materials used for construction of the doors and windows. A multipurpose room and a kitchen were the rooms possessed by majority of the families to carry out various activities. The facilities provided for storage was highly unsatisfactory. Planks on the wall was the only storage unit provided by 74 per cent of households to store things. The sanitary condition prevailed in the rural areas were not satisfactory. Only 4 per cent of the households had latrine of insanitary type. Waste water was utilised by 33 per cent in maintaining kitchen garden while the garbage was utilised by 69 per cent of the families for preparing compost.

More than 50 per cent of the sample expressed the following as their concept about the ideal rural house.

1. East facing entrance is preferable
2. Enclosed verandah is essential
3. Kitchen should face south east

4. Latrine should be away from the house
5. Bath room should form a part of the main building
6. Courtyard should be provided
7. Cowshed should be provided
8. Provision must be made for the compost pit and to store agricultural implements
9. Cupboard and attic in the kitchen must be provided
10. Sufficient number of windows are essential.

Based on their views a suitable plan was evolved.

Details of the developed plan

A suitable plan was evolved for a low cost house with an area of 8 m width and 13.7 m length. Figure 1 shows the developed blue print for a low cost rural home. Table III indicates the carpet area provided as against the requirements of National Building Code.

TABLE III
PROVIDED CARPET AREA IN THE PLAN VERSUS REQUIREMENT OF
BUILDING CODE

| Part | Area provided in m ² | |
|-------------|---------------------------------|------------------------------|
| | Proposed Plan | Building Code specifications |
| Verandah | 3.6 | 3.6 |
| Living room | 10.5 | 10.5 |
| Kitchen | 5.7 | 5.5 |
| Bathroom | 1.0 | 1.3 |
| Latrine | 1.1 | 1.1 |

The data reveals that the proposed plan satisfies the National Building Code Specifications. The plan provides a verandah, living room, kitchen bath and water closet. The site area allows ample provision for kitchen garden, cowshed, compost pit, and cowdung gas plant. The plan provides a detached sanitary rural type latrine --1.2 m × 0.9 m. The total estimated cost of the building was Rs. 5,700/- and the details given in Appendix I. An addition of Rs. 126-40 has to be spent for wiring Appendix II. Figure 2 shows the electrical wiring system proposed for the plan.

Evaluation

Evaluation is an essential and final component in any scientific study. Hence the plan is evaluated by selected group of members

consisting of educated homemakers, housebuilders and engineers. Table IV present the evaluation done by the selected panel of judges.

TABLE IV
EVALUATION

| S.No. | Particulars | Percentage of judges mentioning |
|-------|--|---------------------------------|
| 1. | Suitability to the village set up | 95 |
| 2. | Convenient to accommodate four members | 90 |
| 3. | Sufficient to carry out household activities | 90 |
| 4. | Orientation of kitchen and other rooms | 95 |
| 5. | Sufficient space to dry things outside | 95 |
| 6. | Provision of privacy | 70 |
| 7. | Proper grouping | 85 |
| 8. | Location of doors in proper place | 75 |
| 9. | Correct location of windows | 95 |
| 10. | Provision of space in the front | 80 |
| 11. | Provision of sanitary latrine | 100 |
| 12. | Inclusion of a separate bathroom | 100 |
| 13. | Cowshed away from the main area | 100 |
| 14. | Sufficient space in the kitchen | 95 |
| 15. | Enough storage facilities | 90 |
| 16. | Sufficient courtyard space | 100 |

The values in Table indicates the proposed plan provided all necessary comforts expected in a rural household. Hence the investigator regards the proposed plan is an ideal one for the village set up.

Conclusion

The manual labour available in abundance in our rural areas may be effectively utilised for constructing such need based structures. Provision of such shelters may lead to the promotion of health and happiness of the rural population ensuring the nation's prosperity.

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APPENDIX I
ESTIMATED COST OF CONSTRUCTION

| S.No. | Particulars | Cost Unit | Quantity | Total cost |
|-------|---|-----------------------|---------------------|---------------------|
| 1. | Earth work excavation for foundation in all soil | 3.90/m ³ | 13 m ³ | 50 - 70 |
| 2. | Cement concrete 1:8:16 using 40mm hard broken stone filling for Foundation | 70.00/m ³ | 2 m ³ | 140 - 00 |
| 3. | Brick work in mud using country bricks for foundation basement and super structure | 80.00/m ² | 15 m ² | 1,200 - 00 |
| 4. | Supply and fixing country wood panned door | 100.00/m ² | 4.86 m ² | 486 - 00 |
| 5. | Supplying and fixing country wood panned window with 12 mm iron bars | 110.00/m ² | 2.16 m ² | 231 - 00 |
| 6. | Supplying and fixing country wood door with zinc sheet covering | 90.00/m ² | 1.35 m ² | 122 - 00 |
| 7. | Supplying and fixing country wood trellis for ends to front verandha | 80.00/m ² | 1.62 m ² | 130 - 00 |
| 8. | Plastering with cement mortar 1:5 20 mm thick | 7.40/m ² | 120 m ² | 888 - 00 |
| 9. | Filling in basement with excavated earth well rammed and consolidated | 10/m ³ | 1 m ³ | 10 - 00 |
| 10. | Flooring with brick filling lime concrete 8 cm thick and top plastered with cement mortar 1:5, 12 mm thick | 6.00/m ² | 30 m ² | 180 - 00 |
| 11. | Roofing with mangalore tiles using country wood rapters 12cmX5cm and country wood reaper 5cmX3cm including necessary screws rods etc. | 40/m ² | 33 m ² | 1,320 - 00 |
| 12. | Painting doors and windows 2 coats primer and one coat of synthetic enamel paint | 6./00m ² | 31 m ² | 186 - 00 |
| 13. | White washing two coats Labour supervision charges | 5.00/m ² | 120 m ² | 60 - 00 215 - 00 |
| | | | | 5,657 - 00 |

ANNEXURE II
ESTIMATION COST OF WIRING

| S.No. | Particulars | Rate Per Rs. Ps. | Cost item in | Quantity required | Total cost Rs. P. |
|-------|--|------------------------|-----------------|----------------------|-------------------------|
| 1. | Wooden reapers | | 0-60/m | 20m | 12-00 |
| 2. | 1/18 Findex P.V.C. Cable | Each | 78-60/m | 100 | 31-20 |
| 3. | Plastic wire | | 0-50/m | 2.4m | 1-20 |
| 4. | Junction box | | 0-75/ Each | 2 Nos. | 1-50 |
| 5. | Round wooden blocks | Each | 0-35 | 6 Nos. | 2-10 |
| 6. | Nails | Box | 0-60 | 1 box | 0-60 |
| 7. | Clips | Box | 0-60 | 1 box | 0-60 |
| 8. | 15 Amp 250 Volts main switch and wooden board | Each | 15-00 | 1 No | 15-00 |
| 9. | Switches ordinary | Each | 1-75 | 5 Nos. | 8-75 |
| 10. | 60 watts bulb | Each | 3-05 | 3 Nos. | 9-15 |
| 11. | 40 watts bulb | Each | 2-90 | 2 Nos. | 5-80 |
| 12. | Plastic Shade | Each | 2-00 | 5 Nos. | 10-00 |
| 13. | 16 Swg - G. I. Wire | Kg | 7-00 | $\frac{1}{2}$ kg | 3-50 |
| | Labour Charges | Point | 5-00 | 5 points | 25-00 |
| | | | | Total | 126-40 |

KNOWLEDGE, ATTITUDE AND USE OF LABOUR SAVING DEVICES BY SELECTED HOMEMAKERS IN COIMBATORE CITY

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Dr. (Mrs.) R. Rajalakshmi

Miss. P. Varalakshmi

Introduction

The home in the historic past has been a different home from what it is today. As human thought and experience evolved and technological development advanced, the concept of home has changed (Devadas, 1969). The socio-economic changes taking place in our society in recent decades, are giving rise to many changes in the family structure role of women, their values with regard to economic and work patterns in the home (Menon, 1969).

Today the homemaker is expected to fulfil many social and moral obligations, besides attending to her normal household chores of home management, child care and food preparation (Vashist and Doshi, 1976 and Craig, 1977). Moreover many women feel that in addition to home making responsibilities, they should contribute to the family income and take part in community and cultural activities (Johnston, 1965). In spite of her other obligations, the home-maker still spends 10 per cent of her working time in the kitchen or various activities connected with cooking (Nimkar and Jarnikar, 1975). In order to cope up with the dual responsibilities of managing the home and wage earning, the homemaker should manage her time and energy efficiently. One of the methods of achieving efficient management of time and energy in the home is by the use of labour saving devices (Vashist and Doshi, 1976).

The adoption of any scientific and technological innovation depends upon factors such as age, education, income, caste and social participation. This also applies to the adoption of labour saving devices by the home makers (Vashist and Doshi, 1976).

Although much research has been done on household equipment in India and abroad, very few studies have focussed on the use of household appliances by home makers. An attempt has been made in this study to throw light on knowledge, attitude and use of labour saving devices. The main objectives of this study are :

1. To conduct a market survey on labour saving equipment in Coimbatore City.

2. To study the socio-economic status of the selected urban middle and high income families.
3. To assess the knowledge and attitude of selected homemakers towards labour saving devices.
4. To find out the extent of use of household appliances by the homemakers and
5. To find out the impact of education, age and gainful employment on the knowledge and attitude and use of labour saving equipment.

Hypothesis :

1. The socio-economic status or the education of the home makers has no influence on her knowledge, attitude and use of labour saving devices.
2. The possession of labour saving appliances has no influence on the knowledge and attitude towards them.

Limitations :

The study was limited to middle and high income families of Coimbatore City. The commonly used electrical and non-electrical labour saving equipment were included in this study.

PROCEDURE

This investigation was carried out in two phases namely A. Market survey and B. Household survey.

A. Market survey : A market survey was done to find out the extent of availability of household appliances in Coimbatore city. Based on their popularity and ease of access to the investigator, twenty leading shops dealing with household appliances were selected for the purpose. Interview method was used to collect the necessary information. A structured interview schedule was designed and pretested to elicit information on household appliances regarding brand, size, cost, guarantee, servicing, transportation, price schemes and complimentary gifts offered.

B. Household survey : A household survey was conducted to collect information on the knowledge, attitude and use of labour saving devices by the selected families. Fifty households, each belonging to middle and high income group were interviewed. A structured interview schedule was formulated and pretested to obtain information on the socio-economic status, knowledge, attitude, selection, ownership, use and care of labour saving devices by the selected families.

After a careful review of literature on labour saving appliances, the investigator formulated a set of one hundred and twenty five statements in order to assess the knowledge of homemakers towards labour saving devices. These statements were given to three judges to scrutinise their validity. An attitude scale consisting of 64 statements were designed and scrutinised by three judges to measure the attitudes of homemakers towards labour saving devices. Responses were obtained with the help of a five-point Likert format.

RESULTS AND DISCUSSION

1. Market survey :

The results of the market survey on household appliances revealed that among the non-electrical equipment pressure cooker was available in numerous brands. Appliances like carafe, hot case, percoflex gas lighter, gas tandoor and gas stove were available only in one variety and in five per cent of the shops. Of the electrical appliances mixer, wet grinder and oven were obtainable in numerous brands. Equipment such as water heater, dessert cooler, deep freezer, food warmer, vaccum cleaner and coffe percolator were available in limited variety. All small electrical appliances were given one year guarantee whereas large equipment like refrigerator, dessert cooler and deep freezer were assured with five years guarantee.

In almost all the shops, spare parts were available and servicing facilities for household appliances were offered. Cash purchase system was the chief mode of transaction. Very few shops offered complimentary gifts or price schemes on purchase of equipment.

2. Household survey :

The socio-economic background of the selected families revealed that a majority of the middle and high income families were Hindus. Irrespective of the income group, a higher percentage of families were of medium size. A majority of the high income homemakers were in the late middle age group (41 to 50 years). In the middle income category, a majority of respondents belonged to the age group of 21 to 30 years. It was heartening to note that the level of literacy among the selected homemakers was found to be high compared to the National Women's literacy level. Though most of the homemakers were educated, only some of them were gainfully employed.

Advertisements in magazines and newspapers were the chief sources of information to the majority of the families. Family members and friends ranked as the next best.

Irrespective of the income group, a higher proportion of the homemakers had sound and adequate knowledge on pressure cooker and mixer. Homemakers in the age group of 21 to 30 years had a sound knowledge on pressure cooker, mixer and wet grinder. Homemakers in the older age group had fair knowledge on pressure cooker and refrigerator. Statistical analysis indicates that education had an effect on the homemakers, 'knowledge on labour saving devices'. Employed homemakers were better informed about equipment like pressure cooker, gas stove, refrigerator and wet grinder compared to the full time homemakers. This is probably due to greater social participation, consultation with friends and colleagues.

TABLE I
POSSESSION OF EQUIPMENT AND KNOWLEDGE OF HOMEMAKERS ON
LABOUR SAVING DEVICES

| S.No. | Equipment | POSSESSION OF EQUIPMENT | | | | | |
|-------|-----------------|-------------------------|---------------|--------------------|------------------|---------------|--------------------|
| | | Having | | | Not having | | |
| | | Well in formed | Neutral | Poorly informed | Well informed | Neutral | Poorly informed |
| 1. | Pressure Cooker | 55 (67.07) | 26 (31.71) | 1 (1.22) | 10 (55.56) | 8 (44.44) | — (14.29) |
| 2. | Iron box | 3 (3.23) | 57 (61.29) | 33 (35.48) | — | 6 (85.71) | 1 (14.29) |
| 3. | Gas Stove | 6 (10.00) | 25 (41.67) | 29 (48.33) | 1 (2.5) | 20 (50) | 19 (47.5) |
| 4. | Mixer | 47 (73.44) | 17 (26.56) | — | 9 (25) | 13 (36.11) | 14 (38.89) |
| 5. | Refrigerator | 21 (72.41) | 8 (27.59) | — | 13 (18.31) | 27 (38.03) | 31 (43.66) |
| 6. | Wet Grinder | 23 (60.53) | 14 (36.84) | 1 (2.63) | 29 (46.77) | 20 (32.26) | 13 (20.97) |

Note : The numbers in bracket indicate percentage.

Data in the above table indicate that most of the homemakers in both the income groups had a good knowledge about pressure cooker. Most of the homemakers having mixer, refrigerator and wet grinder were well informed of those equipment as against those who were not having them. In general the homemakers, knowledge on iron box and gas stove was meagre. Statistical analysis indicates that possession of

household equipment had a positive effect on the knowledge of homemakers on the domestic labour saving devices (χ^2 Table value - 11.07; value - 32.13).

Irrespective of the income group, house maintenance and care of family members were the most liked tasks. Tasks like clothing the family and meeting the educational needs of children were the next preferred activities. Maintaining accounts on family expenditure was disliked by 30 to 40 per cent of the homemakers because of its tedious nature.

Most of the homemakers opined that household equipment save time and energy. Other attributes given by them were reduction in the quantum of work, economy, helpful during emergency, work simplification serve the purpose, ease of care and operation.

The age wise distribution of homemakers revealed that 80 to 84 per cent of them homemakers in the age group of 21 to 30 years expressed favourable attitude towards pressure cooker as against 67 per cent of those above 50 years of age. A good percentage of housewives in 41 to 50 age group held favourable view on mixer and gas stove. Irrespective of the educational status, a majority of the homemakers expressed a favourable attitude towards pressure cooker, iron box, gas stove and refrigerator. The percentage of full time gainfully employed homemakers having positive attitude on pressure cooker and gas stove was high compared to the full time homemakers.

TABLE II
FAMILY INCOME AND ATTITUDE OF HOUSEMAKERS TOWARDS
LABOUR SAVING DEVICES

| Sl.No. | Equipment | Middle income | | | High income | | |
|--------|-----------------|---------------|------------|--------------|-------------|------------|--------------|
| | | Favourable | Neutral | Unfavourable | Favourable | Neutral | Unfavourable |
| 1. | Pressure cooker | 42 (84) | 8 (16) | — | 38 (76) | 12 (24) | — |
| 2. | Iron box | 20 (40) | 30 (60) | — | 28 (56) | 22 (44) | — |
| 3. | Gas stove | 34 (68) | 16 (32) | — | 38 (76) | 12 (24) | — |
| 4. | Mixer | 40 (80) | 10 (20) | — | 40 (80) | 10 (20) | — |
| 5. | Refrigerator | 15 (30) | 35 (70) | — | 24 (48) | 26 (52) | — |
| 6. | Wet grinder | 15 (30) | 34 (68) | 1 (2) | 12 (24) | 38 (76) | — |

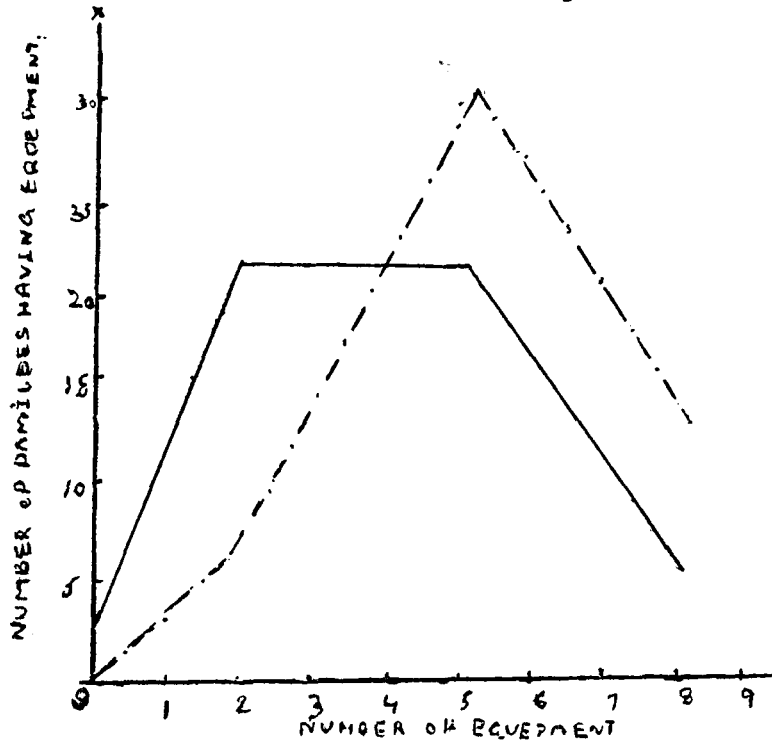
Table-II reveals that irrespective of the income group, a high percentage of homemakers had a positive attitude towards pressure cooker, mixer and gas stove. The house wives expressing good opinion on refrigerator and iron box were more in the high income bracket compared to the middle income category. Only a negligible percentage (2 per cent) of the middle class house wives expressed negative views on wet grinder. Statistical analysis reveals that family income had an influence on the homemakers, attitude towards labour saving appliances.

The number of household equipment possessed by the families increased with increase in the family income such as Pressure cooker and gas stove were possessed by most of the high and middle income households. A majority of the homemakers (84 to 87 per cent) having pressure cooker, mixer and gas stove held a favourable attitude towards them. Only 22 per cent of the homemakers having wet grinder expressed a positive attitude about it.

FIGURE 1
NUMBER OF EQUIPMENT POSSESSED BY THE FAMILIES

X - 1.5 c.m. = 1 Equipment
Y - 2 c.m. = 5 Families

KEY
— Middle Income
- - High Income



A higher percentage of middle income families maintained family budget. Of the families who planned their budget, about 38 and 58 per cent of the middle and high income families, respectively allocated money every month to purchase household equipment. Most of the high income families purchased equipment as and when the need arose whereas the middle income families purchased them when they had enough money. Cash payment was the chief mode of purchase by a majority of the families of both the income groups. The needs of the family members were given importance in the selection of household equipment. Type of brand, durability and availability of spare parts were the other factors considered in the selection of equipment.

It is interesting to note that most of the high and middle income homemakers felt the need for labour saving equipment in Indian homes, as they save time and energy of the homemakers. A list of labour saving equipment suggested by the homemakers is given in Table - III.

TABLE III
EQUIPMENT NEEDED FOR INDIAN HOMES

| Sl.No. | Equipment | N = 49 | | N = 43 | |
|--------|----------------|---------------|-------|-------------|-------|
| | | Middle income | | High income | |
| | | No. | % | No. | % |
| 1. | Gas stove | 17 | 34.69 | 16 | 37.21 |
| 2. | Pressurecooker | 15 | 30.62 | 12 | 27.90 |
| 3. | Mixer | 11 | 22.45 | 8 | 18.61 |
| 4. | Wet grinder | 5 | 10.20 | 6 | 13.95 |
| 5. | Iron box | 1 | 2.04 | 1 | 2.33 |

From the table it is obvious that gas stove was considered as an essential equipment by 35 per cent of the middle and 37 per cent of the high income families. Pressure cooker ranked next. A considerable percentage of the middle (22 per cent) and high (19 per cent) class housewives stressed the need for mixie. Iron box was not preferred by most of the families.

Equipment like gas stove, kerogas stove, refrigerator, water filter and washing machine were used daily by all the families possessing them. Milk heater was not used by 2 per cent of the high income families although they had it. Among the families having water heater 14 to 33 per cent of the families, irrespective of the income group, were not using it consumed more electricity. Iron box was not used by

a few families since they felt it cheap to get the clothes ironed from outside agencies. A minority of the families possession pressure cooker were not using it because the quality of food cooked in it was not good.

Most of the high and middle class families having equipment like pressure cooker, milk cooker, rice cooker, gas stove, kero gas stove, wet grinder and mixer cleaned them daily after use. Refrigerator was cleaned once a week.

Some of the selected homemakers suggested improvements to household equipment. A few housewives preferred to have a gas meter for gas stove. Better quality of safety valve was designed for the pressure cooker. Some of them felt the need to control the noise produced by Mixer and Wet grinder.

CONCLUSION

It is encouraging to note that a majority of the homemakers had sound knowledge and favourable attitude towards labour saving equipment covered in the study. They desired household appliances with more labour saving qualities, durability, safety and those which are within the reach of common man. This shows the need for the production of household appliances made of indigenous materials.

Suggestions for further research :

1. Comparing the expenditure pattern of time, energy and money by the homemakers using traditional and modern labour saving devices.
2. Evaluating the performance of labour saving devices introduced in selected households.
3. Designing equipment based on the current fuel pattern for the conservation of energy.
4. Assessing the energy cost of household activities carried out by using various labour saving equipment.

Application of the findings :

It will be helpful in designing household equipment which will really meet the needs and expectations of the ultimate consumers.

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ASSESSING THE PERFORMANCE OF A SELECTED SOLAR DEVICE FOR HOUSEHOLD PURPOSES

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Introduction

Man's efforts for wellbeing have been centred around the production and utilisation of various forms of energy. The falling water, the blowing wind, the surging tide and the radiating sun are store-houses of energy in nature. Among them the sun drives the flows of energy and energy is the main spring that keeps life going.

The world's consumption of fuel energy is increasing at a faster rate with technological developments. The use of fuel in the 19th century alone amounted to almost half the total used during all the previous 18 centuries. It is an alarming fact that oil reserves of the world cannot last for ever. With continuous deforestation, the energy resources of the world are fast dwindling (Science Services Inc, U.S.A., 1978).

The outbreak of the first oil crisis in 1973, has led to attempts to conserve the use of fossil fuel. Even the increasing price of petroleum fuel offered by Oil Producing and Exporting Countries could not restrain the upward trend of demands of energy. The fuel crisis has focussed world attention sharply due to the war between oil producing countries. At this juncture faced with the alarming prospect of exhausting the energy capital stored underground, technological man is turning to sun, the perennial source of all power.

Sun, the great world of light and heat has opened a new vista for mankind. As Devadas (1980) has pointed out, solar energy may offer a practical solution for the energy problem which is clouding the prospects of mankind. India being a tropical country gets, 3,000 hrs. of sunshine a year, most of which is high grade in term of energy content. This should be exploited beneficially

Realising the potential of harnessing solar energy, an integrated large scale national programme was initiated in 1975 through the Department of Science and Technology in India. The Committee set

up to coordinate the research and development programme in Energy Section of the Government in 1977, urged that top priority should be given to solar energy research at micro and macro levels. Although solar energy meets only one to two per cent of the total energy consumption at present, it is bound to be the fuel of the day at the turn of the century (Khan. 1978).

Use of solar energy for household, agricultural and industrial purposes has just started. At the household level solar cooking, drying and water heating are the areas where research work is in progress. Since the energy consumption in the household accounts for 20 to 40 per cent of the total primary energy needs, the need for research in this area is a dire necessity.

This study on assessing the performance of a solar device for various household purposes was undertaken with the following objectives, To :

1. Determine the efficiency of solar device (basket) for cooking selected items.
2. Utilise the solar basket for drying vegetables
3. Design a water heating mechanism suitable for the solar basket and
4. Assess the efficiency of the fabricated water heating mechanism.

Limitations

The limitations of the study are.

1. **Time factor** : The solar energy devices cannot be used at all times since they depend on the direct sun.
2. **Unpredictable nature of sun's radiation** : The performance of solar device is affected by the unpredictable nature of the sun's radiation received on earth.
3. **Cooking in the open** : The conduct of cooking experiments is restricted to selected cooking methods since solar energy device necessitated cooking in the open.

Experimental Design

The experimental design of the investigation included the following aspects :

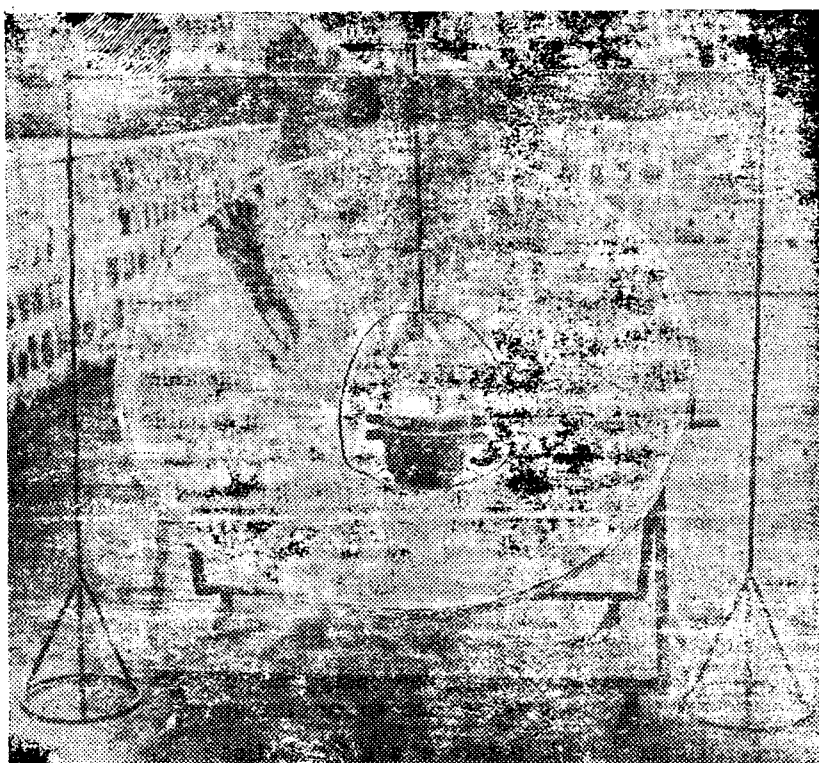
- A. Conducting experiments utilising the solar basket.
- B. Designing and evaluating a water heating mechanism suitable for the solar basket.

A. Conducting Experiments Utilising the Selected Solar Basket

This phase of the study included the following aspects.

Description of the solar device

Solar basket of a parabola shape was selected to conduct experiments. Figure 1 illustrates the selected solar basket with a reflective surface of metalised Polyester film in silver shade and having a focal point of 20 cms above vertex of the paraboloid basket where it converged the reflected sun's heat.



BAKING CAKE IN THE SOLAR BASKET

FIGURE 1

Conduct of experiments

Trial tests utilising the solar basket helped to study the positioning of the basket according to the orientation of the sun at different times of the day and also to standardise the procedure for cooking.

Experiments were conducted to assess the performance of solar basket for heating water,

- cooking rice, dhal and vegetables
- roasting groundnuts
- baking cake and
- drying selected vegetables.

Assessing the efficiency of the basket

The performance of solar basket in conducting the experiment was assessed covering a period between July to December, 1980. The experiments were conducted in an orderly manner so that the timing could be uniform on all days starting from 11 a.m.

The efficiency of the basket was judged based on the criteria: temperature obtained, doneness of the product, time taken and loss of moisture as the case may be.

B. Designing and Evaluating a Water Heating Mechanism suitable for the Solar Basket

The possibility of utilising the solar basket for heating 80 litres of water with a permanent mechanism was explored. This phase of study included:

Selection of the design

It was studied that the principle of thermosiphon effect of circulation of heated water could be applied for designing a water heating mechanism suitable for a solar basket. The basic design needed a storage tank for water, pipes for circulation of water and a water holder to get the converged heat falling at the focal point. Figure 2 illustrates the design model selected for water heating.

Conduct of the study

The study was conducted for a selected period of ten days b heating water.

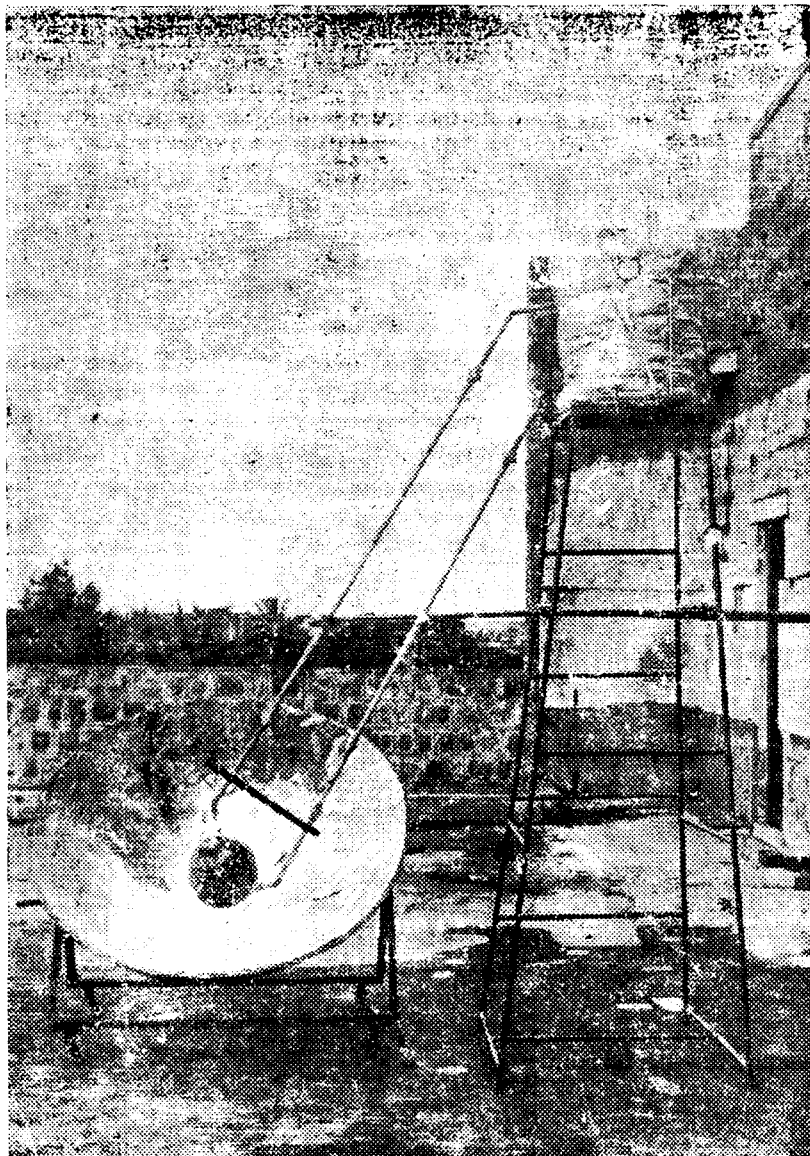
Assessing the performance

The performance of the water heating design was assessed by the gain in temperature of water at constant intervals, the time required for heating the known quantity of water and heat retention power of insulation.

Findings

The study has brought forth the following results.

A. Performance of Solar Basket in Heating Water, Cooking Selected items and Drying Vegetables



HEATING WATER UTILISING SOLAR BASKET

FIGURE 2

1. Heating water

- a) A rise of temperature upto 90°C with a minimum of 45°C was obtained after heating one litre of water for an hour between 11-30 a.m. and 12-30 p.m. as presented in Table I.

It indicates positive correlation between the temperature obtained and solar intensity.

TABLE I
TEMPERATURE OBTAINED WHILE HEATING WATER BETWEEN
11-30 A.M. AND 12-30 P.M.

| Week/day | | Average solar radiation Cal/cm ² /day | Temperature obtained in °C |
|----------|---|---|-------------------------------|
| I | a | 305 | 58 |
| | b | 500 | 79 |
| | c | 478 | 62 |
| II | a | 516 | 90 |
| | b | 292 | 46 |
| | c | 384 | 65 |
| III | a | 420 | 73 |
| | b | 411 | 72 |
| | c | 328 | 49 |
| IV | a | 403 | 53 |
| | b | 257 | 45 |
| | c | 512 | 82 |

- b) The temperature obtained while heating one litre of water between 10 am and 5 pm continuously showed the possibility of obtaining a maximum temperature of 82°C at 1 p. m. Fluctuation of temperature was seen during different times of the day due to variation in solar intensity as seen in Figure 3.

2. Cooking rice

Time taken to cook 50 gms of parboiled rice by the absorption method with standardised quantity of 200 ml of water was noted as seen in Table II.

TABLE II
TIME TAKEN TO COOK RICE

| S.No. | Average solar radiation Intensity. Cal/cm ² /day | Time taken Hrs. | to cook Mts |
|-------|--|--------------------|----------------|
| 1. | 470 | 1 | 15 |
| 2. | 268 | 3 | 00 |
| 3. | 398 | 1 | 35 |
| 4. | 408 | 1 | 30 |
| 5. | 370 | 1 | 45 |
| 6. | 365 | 2 | 15 |

On an average the time needed for cooking rice was two hours with the solar radiation ranging between 365 and 470 cal/cm²/day. In contrast, with the solar intensity at 268 cal/cm²/day even after a maximum of three hours, rice was partially cooked.

3. Cooking of redgram dhal :

Cooking of red gram dhal (30 gms) required 3 hours with an average solar intensity of 350 cal/cm²/day. When the solar intensity was higher as 414 cal/cm²/day the dhal was over cooked and rendered powdery within 90 minutes. This may be due to inadequate water caused by quick evaporation of water and hastened cooking due to intense heat.

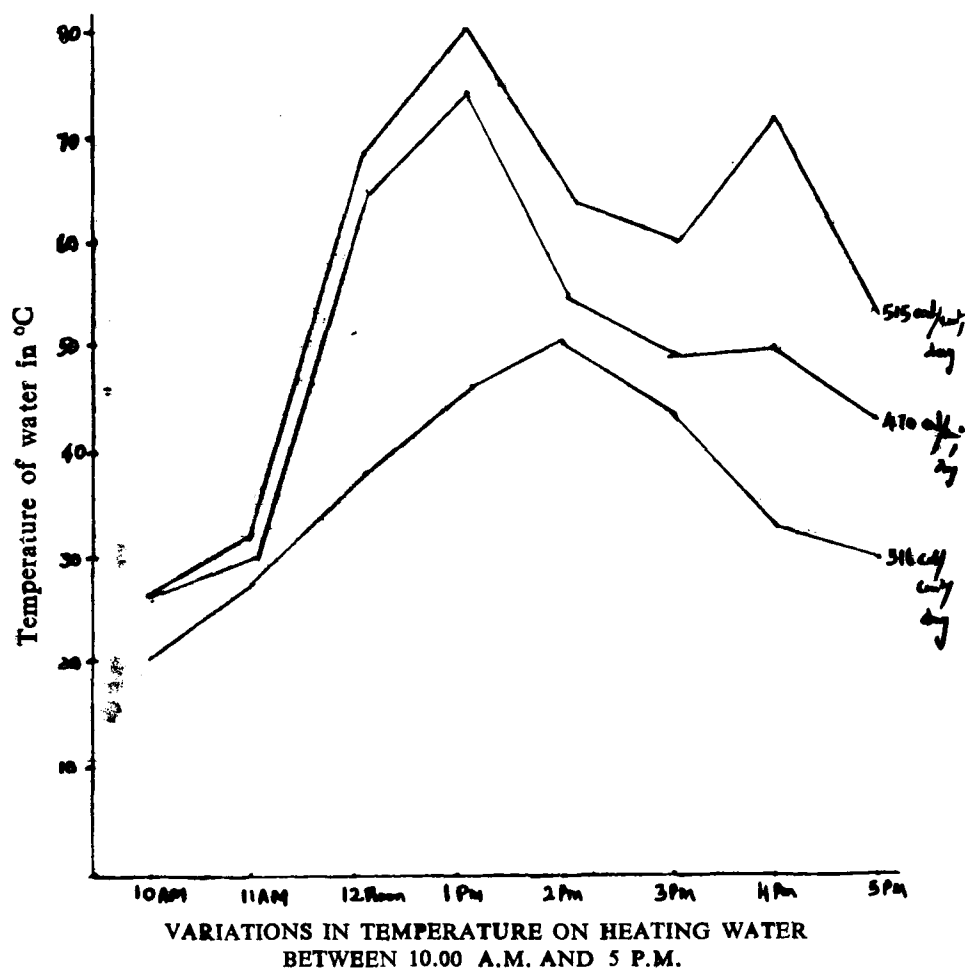


FIGURE 3

4. Cooking of vegetables :

Beans and potatoes weighing 50 gms were cooked within an average of 45 minutes. The minimum time to cook the vegetables was with a higher solar intensity of 414 cal/cm²/day.

5. Baking cake :

Fifty grams of dough was baked. The time taken varied from 30 minutes to 45 minutes on days when the solar intensity was more than 300 cal/cm²/day. It was not possible to have a uniformly baked cake when the intensity was lower as 250 cal/cm²/day.

6. Roasting groundnuts :

The groundnuts were effectively roasted within 30 minutes on the three days of conducting experiments when the solar radiation was around 300 cal/cm²/day.

7. Drying vegetables :

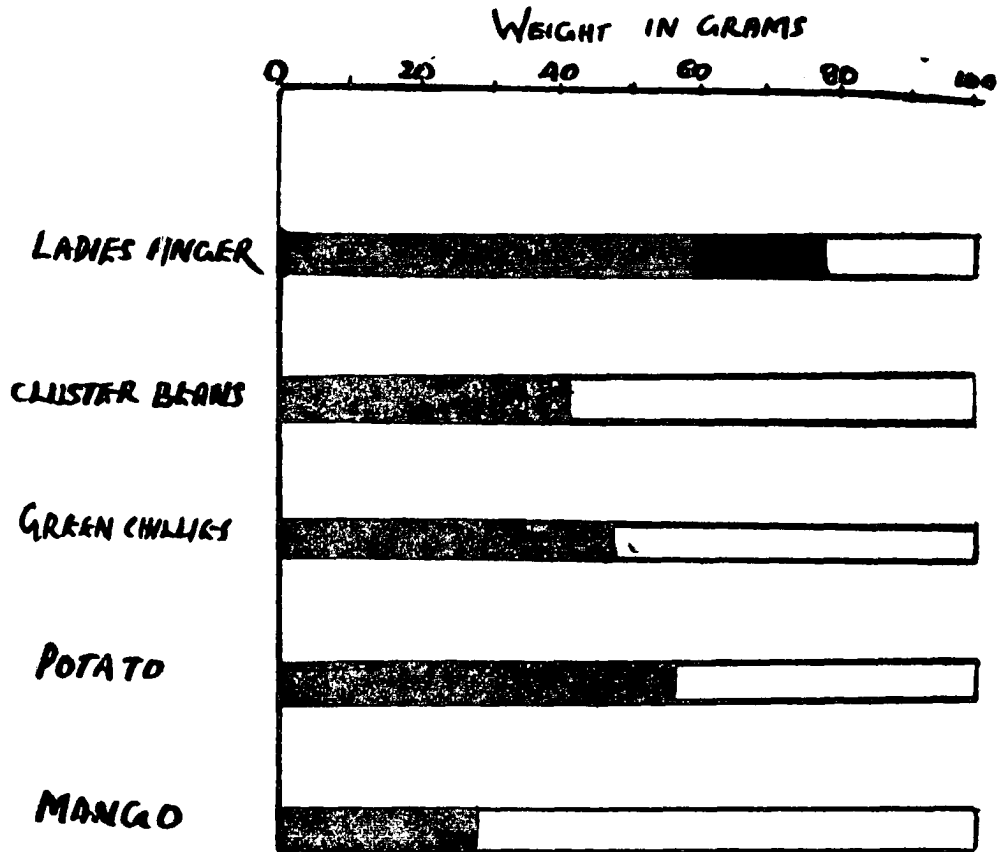
Drying vegetables for one hour with solar basket produced satisfactorily dried products in the case of ladies finger, beans and green chillies. Potato showed browning and mango slices were not uniformly dried within an hour.

A comparison of solar drying using solar basket with traditional sundrying is presented in Table III.

TABLE III
COMPARISON OF SOLAR DRYING WITH TRADITIONAL SUNDRYING

| Items | Initial weight (g) | Weight of Dried vegetables (g) | | | |
|----------------|--------------------|--------------------------------|------|------------------------|--------|
| | | Solar basket After 1 hr. | 1 hr | Sun drying After 3 hrs | 5 hrs. |
| Ladies finger | 50 | 11 | 38 | 32 | 36 |
| Cluster beans | 50 | 30 | 45 | 43 | 40 |
| Mango slices | 50 | 36 | 48 | 45 | 43 |
| Green chillies | 50 | 27 | 49 | 47 | 46 |
| Potato | 50 | 22 | 39 | 33 | 31 |

The comparison showed that the reduction in moisture content after a day's drying outside, was much less than an hour's drying utilising the solar basket.



PERCENTAGE OF MOISTURE LOSS ON DRYING VEGETABLES

FIGURE 4

Figure 4 indicates the percentage of moisture loss on drying vegetables for one hour. The dried weight was lower in the case of ladies finger and more in the case of mango slices. This was due to the juicy nature of mango.

B. Evaluation of the Efficiency of the Fabricated Solar Water Heating Mechanism :

1. The cost of water heater design amounted to Rs. 360-00
2. Temperature obtained while heating water :
The temperature of water in the storage tank at the upper and lower levels is indicated in Table IV.

TABLE IV
THE TEMPERATURE OF WATER AT LOWER AND UPPER LEVELS

| Solar Intensity Cal/cm ² /day | Temperature in °C at | | | | | | | | | |
|---|----------------------|-------|----------|-------|----------|-------|---------|-------|---------|--|
| | 9-30 am | | 10-30 am | | 12-30 am | | 2-30 pm | | 4-30 pm | |
| | Initial | Lower | Upper | Lower | Upper | Lower | Upper | Lower | Upper | |
| 372 | 26 | 31 | 32 | 34 | 39 | 39 | 47 | 42 | 48 | |
| 360 | 27 | 30 | 31 | 33 | 38 | 39 | 44 | 39 | 45 | |
| 348 | 26 | 28 | 29 | 32 | 37 | 37 | 40 | 37 | 44 | |
| 355 | 26 | 26 | 27 | 31 | 33 | 32 | 36 | 36 | 40 | |
| 327 | 27 | 26 | 29 | 33 | 36 | 35 | 42 | 36 | 41 | |
| 353 | 26 | 26 | 32 | 39 | 45 | 49 | 47 | 45 | 50 | |
| 395 | 26 | 27 | 26 | 30 | 37 | 38 | 42 | 40 | 44 | |
| Mean | | 28.3 | 29.7 | 33.1 | 38.0 | 37.1 | 42.6 | 39.4 | 44.6 | |

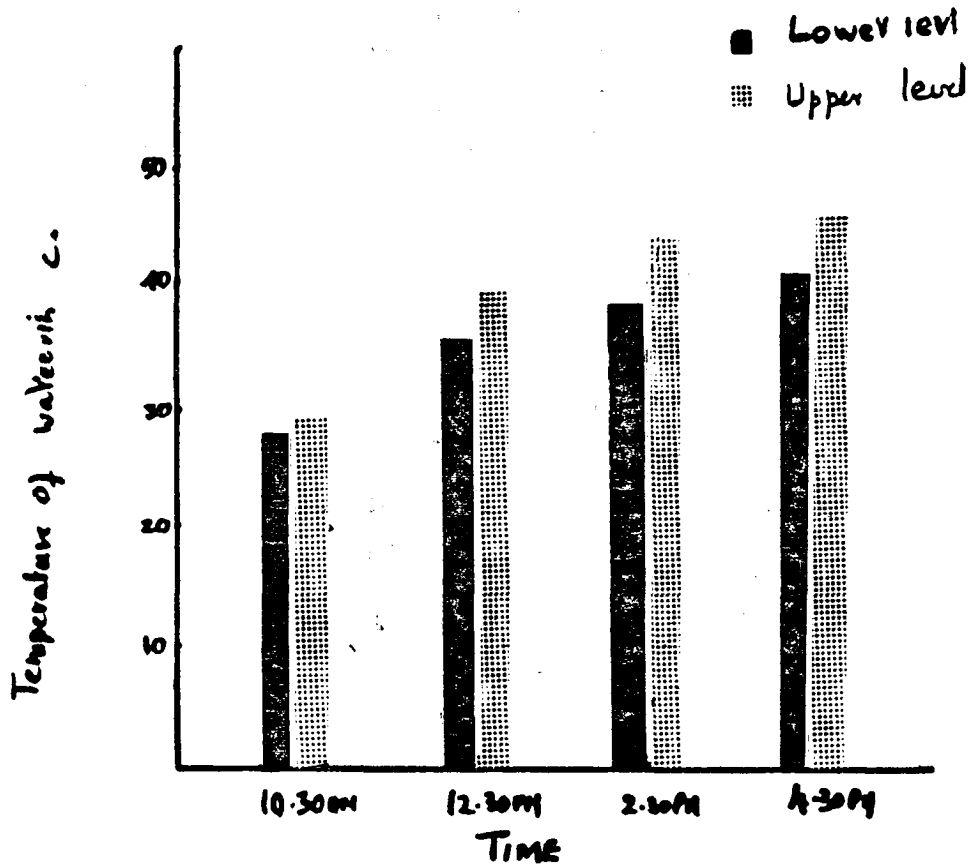
The rise of temperature of 80 litres of water on heating continuously was gradual and reached a maximum of 40°C to 50°C only at the upper level, with the temperature showing a difference of 36°C to 45°C at the lower level on different days. Figure 5 illustrates the mean temperature of water at different times of the day.

During the month of October in which the experiment was done continuously for a week, the solar intensity was only within 395 cal/cm²/day with a mean of 357 cal/cm²/day.

3. The heat retention power : The heat retention power of the glass wool insulation showed that there was only a loss of 9°C on the succeeding day after an interval of 15 hours.

The physical features and mechanism of the water heater were thus found to be satisfactory.

While the advantages of using a solar basket were novelty in cooking, and making use of the abundant resource available free of cost, the disadvantages included difficulty in predicting the uniformity of solar heat, orienting the solar basket towards sun's position, inability to practice various methods of cooking, standing in the open while cooking and impossibility of knowing the accurate time taken for cooking due to unpredictable nature of sun's heat. Fluctuations in the weather also may not produce desired results.



MEAN TEMPERATURE OF WATER AT DIFFERENT TIME OF THE DAY

Figure. 5.

Conclusion

The study has thus shown the possibilities and limitations in the performance of solar basket for heating water, cooking selected items-boiling of rice, dhal and vegetables, baking cake and roasting ground-nuts. Heating a large quantity of water for household purpose was possible with the designed solar water heating mechanism. During cloudy, cold and rainy seasons, the solar basket is not effective for household purposes of cooking since heat is not intense and uniform.

Further research needs to be conducted to

- i. Evaluate the performance of solar basket at different seasons
- ii. Device auxiliary equipment suitable for use in solar cookery
- iii. Find protective measures for personal safety while cooking in the sun
- iv. Determine the effect of solar cooking on nutrient content of cooked products
- v. Identify the factors affecting acceptance of solar energy devices and
- vi. Design indigenous solar devices suitable for households.

At a point when fuel crisis is hovering large over the world, homemakers may need to depend upon the abundant energy source of the sun. A well knit research programme can bring out feasible solar energy devices.

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EFFICIENCY OF A MOBILE BIOGAS PLANT FOR HOUSEHOLD USE

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Energy is essential for all forms of life and it is a basic need for development of science and technology and modernization. In India, more than 50 per cent of the total energy consumption is in the rural areas, where renewable non-commercial sources of energy such as firewood, animal and vegetable wastes and animal power are mostly utilised.

In South India, 70 - 75 per cent of the energy requirements are being provided by non-commercial sources of fuel, namely cowdung bits and pieces of timber, because coal is expensive while crude oil is not readily available in sufficient quantity. Today the whole world, particularly India is facing an energy crisis. The immediate need is to search for newer sources of energy to meet the future requirements of energetics.

The International Workshop on Biogas Technology and utilization under the auspices of Economic and Social Commission for Asia and Pacific (1975) has endorsed biogas as an alternate yet cheap source of energy. The urgent problems of the rural communities namely, sanitation, fuel and manure can be solved by installing gobar gas plants (Mulmule, 1980).

With a view to extend the activities of biogas plants and to minimize the cost of the plant, Tamil Nadu Agricultural University has designed a Mobile Biogas Plant. Since sufficient information on the efficiency of the plant not available, this investigation was undertaken to evaluate in detail with the following objectives :

1. To gather information regarding the utilization of mobile biogas plant from the plant owners.
2. To study the efficiency of mobile biogas plant in terms of general features, time required for operation, volume of gas generated daily, adequacy of gas for cooking for an average family of four members, time taken to prepare a day's menu and economics of the plant.
3. To assess the possibility of utilizing selected household wastes, along with, cowdung as feed stock for biogas generation and
4. To evaluate the benefits and problems involved.

Methodology :

The Mobile Biogas Plant designed by Tamil Nadu Agricultural University, Coimbatore and fabricated by Agro Industrial Engineering Combine, Udumalpet was selected for the study on the "Efficiency of a Mobile Biogas Plant for Household use".

It consisted of the following aspects :

A. Household survey on the Utilization of Mobile Biogas Plant :

The three households located at Kalyanipuram, Kilambadi and Velelampalayam to whom the portable biogas plants were supplied by Agro Industrial Engineering Combine, Udumalpet in Periyar District were selected for gathering information on the use of the biogas plants. An interview method was selected to obtain information.

B. Evaluating the Efficiency of the Mobile Biogas Plant for Household Use :

In order to find out the efficiency of the mobile biogas plants the following aspects were studied.

1. Setting up of the plant for operation : Cowdung (875 kg) was mixed with water (1055 litre) to load 2/3 capacity of the digester which required seven days for feeding. After 23 days, the gas was let out through the gas pipe line to the Bunsen burner and was tested for methane gas. The produced gas showed the contents of carbon-di-oxide and other inflammable gases.

Cowdung (30 kg) and water (37.5 litre) in the proportion of 4:5 was mixed well and this was fed into the plant daily and the daily generated gas was used for domestic cooking (Figure).

2. General features : The general features of the plant were evaluated in terms of availability and cost, space requirement and convenience in operation.

3. Time required for operation : The time required to collect and transport cowdung to prepare slurry and to feed the plant daily were noted for one month.

4. Volume of gas generated daily : The volume of gas generated daily was measured using a Gas Flow Meter INSREF IRO 8 Wet type which was fixed at the outlet gas pipe line. The gas meter reading was taken both in the morning and in the evening for one month, during the period of October and November in 1980.

5. Sufficiency of gas for cooking for an average family :

One whole day's menu was prepared following the standardizing procedure. The volume of gas required and the time taken for cooking the selected dishes were recorded.

6. Economics of the plant : The initial investment of 70 cu.f.t. mobile biogas plant, annual expenditure, annual income using biogas and the cost of manure were calculated to find out the economics of the plant.

C. Possibilities of Utilizing Household Waste Materials for Biogas Generation :

Twelve garbage samples such as banana, beet root, cabbage, grain wash water, groundnut husk, hay, keera, knool-khol, onion, orange, tomato and white pumpkin were selected for the experiment.

The test cans were filled with household waste, cowdung and water in the proportion of 2:2:5, to fill 2/3rd of the cans. The experimental cans were connected to the Gas Flow Meter and the volume of gas was recorded in the meter.

The initial and final pH of the influent and effluent slurry, C/N ratio, electrical conductivity (EC), moisture content and plant nutrients were found out in the laboratory.

Findings :

The results of the study on the 'Efficiency of the Selected Mobile Biogas Plant' are dealt under the following aspects :

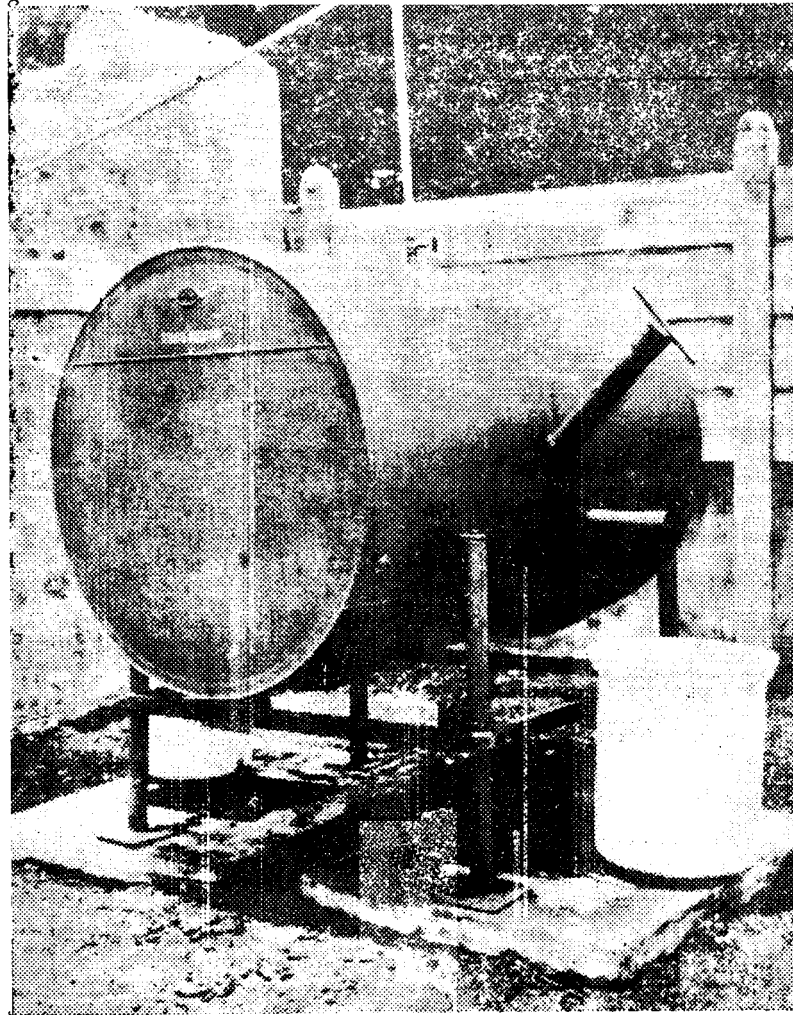
A Results of the household survey

The plant had a capacity of 210 cu.ft. costing Rs. 5,000/- each. The biogas produced by the mobile biogas plants was sufficient to burn for around 3½ hours daily for cooking. By using the biogas, the fuel cost was minimised and the maintenance of clean and neat kitchen was possible. Effluent slurry was effectively utilised in preparation of compost.

B. Assessing the Efficiency of Mobile Biogas Plant for Household use

General features ; An area of 2.21 sq.m. (1.83m×1.21m) was required to install 2 cu.m. mobile biogas plant. For convenient and easy operation of the plant, an area of 7.04sq.m. was required.

Volume of gas generated daily : A total volume of 28,858.1 of biogas was produced for a period of four weeks. The average volume of gas produced per day was 10,301.



SIDE VIEW OF THE SELECTED MOBILE BIOGAS PLANT
FIGURE 1

Sufficiency of gas for cooking : The quantum of gas required to prepare the selected items for a day for an average family is shown in Table I.

To prepare a day's menu for an average family of five members, a volume of 786.2 l. of biogas was required. A maximum volume of 337.3 l. of biogas was required to prepare menu for lunch followed by 718 l. for dinner, 128.6 l. for breakfast, 120.3 l. for tea and 13 l. for coffee. The quantum of biogas for cooking might vary according to the type of menu and method of preparation and experience of the homemaker.

TABLE I
VOLUME OF GAS REQUIRED TO PREPARE THE SELECTED ITEMS

| Items | Volume of gas required in litres | | | Average volume of gas in litres | Total volume of gas in litres |
|----------------------------|----------------------------------|-------------|-----|---------------------------------|-------------------------------|
| | I | II Trial | III | | |
| Morning | | | | | |
| Coffee | 14 | 12 | 13 | 13.0 | 13.0 |
| Break fast | | | | | |
| Idli | 116 | 124 | 120 | 120.0 | 128.6 |
| Coconut chutney | 10 | 8 | 8 | 8.6 | |
| Lunch | | | | | |
| Plain rice | 188 | 196 | 180 | 188.0 | 337.3 |
| Drumstick sambar | 30 | 32 | 32 | 31.3 | |
| Rasam | 20 | 18 | 22 | 20.0 | |
| Potato fry | 35 | 30 | 34 | 33.0 | |
| Amaranth pugath | 68 | 65 | 62 | 65.0 | |
| Tea | | | | | |
| Bengal gram dhal sundal | 105 | 110 | 100 | 105.0 | 120.3 |
| Tea | 17 | 14 | 15 | 15.3 | |
| Dinner | | | | | |
| Chappathi | 130 | 132 | 134 | 132.0 | 187.0 |
| Tomato curry | 55 | 57 | 53 | 55.0 | |
| | | | | Total | 786.2 |

Time taken to prepare the selected items :

The time taken to prepare the selected items are exhibited in Table II.

Two hours and 13 minutes were needed for cooking the selected menu. The time required varies with the type and number of items prepared. The pressure of the biogas used for cooking and the time taken for cooking were universally proportional to each other.

Economics of the plant : The cost per hour of using gobar gas was found to be 54 paise, whereas 75 paise was required for Indane gas. Hence there was a saving of 21 paise per hour.

TABLE II
TIME TAKEN TO PREPARE THE SELECTED ITEMS

| Items | Time required in minutes | | | Average time in | | Total time in | |
|----------------------------|-----------------------------|----|-----|--------------------|-----|------------------|------|
| | Trial | | | mts. | sec | mts. | sec. |
| | I | II | III | | | | |
| Morning | | | | | | | |
| Coffee | 4 | 3 | 3 | 3 | 20 | 3 | 20 |
| Breakfast | | | | | | | |
| Idli | 15 | 14 | 14 | 14 | 20 | 16 | 20 |
| Coconut chutney | 2 | 2 | 2 | 2 | 00 | | |
| Lunch | | | | | | | |
| Plain rice | 28 | 24 | 30 | 27 | 20 | 53 | 20 |
| Drumstick sambar | 7 | 7 | 7 | 7 | 00 | | |
| Rasam | 4 | 5 | 3 | 4 | 00 | | |
| Potato fry | 5 | 5 | 5 | 5 | 00 | | |
| Amaranth pugath | 9 | 10 | 11 | 10 | 00 | | |
| Tea | | | | | | | |
| Bengal gram dhal sundal | 20 | 21 | 24 | 21 | 40 | 24 | 40 |
| Tea | 3 | 3 | 3 | 3 | 00 | | |
| Dinner | | | | | | | |
| Chappathi | 27 | 26 | 25 | 26 | 00 | 36 | 00 |
| Tomato Curry | 10 | 8 | 12 | 10 | 00 | | |
| | | | | Total | ... | 133 | 40 |

C. Possibilities of Utilizing the Household Wastes for Biogas Generation :

Regarding the volume of gas, the maximum gas production was obtained for the period of six weeks from the cowdung (Control 34,760 l.) followed by cabbage (32,045 l), Keerai (38,605 l), Onion (25,327 l.) and hay (25,064 l.) whereas the minimum gas production was observed from the samples of knool khol (2,087 l.), banana (2,589 l.) and white pumpkin (2,733 l.).

Analysing the chemical properties of the influent and effluent slurry : The manurial value of the household waste materials was satisfactory. The gas production was favoured at pH. level between 7 and 8. The electrical conductivity was higher in cabbage, hay and tomato and lower in cowdung, grain wash water, keerai and onion.

Benefits of the plant : The mobile biogas plant occupied a minimum of 24 sq.ft. space. It could be shifted easily from one place to another. The biogas is stored at variable pressure at a constant volume. The gas was stored at a maximum pressure of 100 cm of mercury column. The surroundings might be kept clean. Draining the slurry and cleaning the plant were easier. The cost was less than KVIC plant and the cost worked out almost same to the Janatha Biogas plant.

Problems : The operational procedure of feeding the slurry was found difficult, since the inlet was at a height of 5' from the ground level. As the plant was kept near the kitchen, disposal of the digested slurry was costlier involving more time.

Conclusion

The mobile biogas plant can be recommended as it is available readymade and at cheaper cost and can be installed where the space is a limiting factor and shifting is necessary.

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AN EVALUATION OF FOOD GRAIN STORAGE PRACTICES ADOPTED AMONG FARM FAMILIES

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Venmathi, A.*

Introduction

In almost every country grain is the symbol of life. Grain indeed is life itself. It is also the symbol of prosperity. To the farmer particularly, it is like currency (Ministry of Agriculture and Irrigation, 1976). The strength of a nation depends on the wealth of food it can provide to the people.

With all the achievements made in attaining self sufficiency in food grain production, India is still suffering from inefficient distribution due to inadequate storage. Proper storage and preservation of food grain pose a problem to be tackled in an effective and scientific manner.

The post harvest losses of food grain in developing countries are enormous. Even the most conservative estimates indicate that a minimum of 107 million tonnes of food were lost in 1976; the amount lost in cereal grains and legumes alone would provide more than the annual minimum calorie requirements of 168 million people.

Farmers all over the world lose much of their grain after it is harvested to insects, rats, birds and microorganisms. Food is wasted in the field, in storage, during transport and processing (Birewar et al, 1980 and Ranganathan, 1981.)

The idea of providing proper storage is to wage a war against all wastes and save every grain produced and keep it in good condition till it is consumed (Pingale, 1976.) The effectiveness of newly developed structures, fumigation methods and pest control measures depends mainly on their proper and consistent use.

Since a study has been undertaken to find out the traditional food grain storage practices adopted among selected villages and to find out the new storage devices adopted and their efficiency.

Methodology

The methodology of the study consisted of two parts :

1. A household survey to find out the grain storage practices in hundred selected farm families using interview schedule.

2. An experiment to analyse the efficiency of the selected storage receptacles by finding out the variations in moisture content and temperature of paddy and refraction analysis of paddy stored in different storage receptacles.

Findings :

The findings of the study are discussed under the following headings.

- A. Household survey on the existing storage practices.
- B. Conducting experiments to analyse the efficiency of selected storage receptacles.

A. Household Survey on the Existing Storage Practices

1. Details on crops produced

All the 100 families surveyed were having irrigated land. All the families surveyed were cultivating paddy in their land in addition to cotton (95 per cent). Other crops cultivated in rotation were gingly (70 per cent), plantain (60 per cent), ragi (55 per cent) and kambu (45 per cent).

The yield of paddy in 5 acres was upto 75 bags (59 per cent). Only the quantity of paddy was taken into consideration since it was a common crop cultivated by all the selected families.

2. Traditional and modified storage practices of selected families :

The harvested grain had to be stored for consumption and seed until the next harvest and the surplus had to be sold out. Only five per cent of the surveyed families stored the saleable grain upto 6 months in gunny bags. The remaining 95 per cent were selling the surplus grain in the farm itself since they did not have enough space to store.

a) Storage of grain for consumption :

The amount of paddy stored for consumption depended upon the size of the family. A majority of the families with four to six members (45 per cent) were storing 11 to 20 bags of paddy for their consumption in gunny bag and mud bin.

Based on the informations provided by the improvement of rural storage and processing of rural food grains project it was interesting to note that 75 per cent were modified their storage practices to avoid wastage (75 per cent) and to safe guard the grains from insects and rodents (45 per cent).

The modifications done in structure as well as in treatment are given in Table I.

TABLE I
MODIFIED STORAGE PRACTICES

| Structure | No. of families | Treatments | No. of families |
|--|-----------------|--|-----------------|
| A. Modifying the structure : | | | |
| 1. Fixing inlet and outlet and raising the platform of Mud Bin | 4 | Fumigating the container with EDB ampoules | 25 |
| 2. Using dunnage for bags | 3 | Disinfecting the area with Malathion 50% | 6 |
| 3. Treating gunny bags with Malathion | 5 | Sprinkling B.H. 10% powder on bags | 5 |
| B. New structure : | | | |
| 1. Pucca Kothi | 7 | | |
| 2. Metal Bin | 9 | | |

The modifications done in storage practices were many. Traditional storage structure - mud bin, was modified by fixing inlet and outlet and raising the platform with brick and lining with polythene sheet. As new structures Pucca Kothis were constructed and Metal Bins were distributed under the project called the Programme on Improvement of Rural Family Storage and Processing of Food Grains in Tamil Nadu.

The sun drying was still the major treatment given to the grains before storage. The other new treatments given were fumigation of the containers and grains with EDB ampoules and spraying malathion 50% and sprinkling B.H. 10% powder.

b. Seed grain storage

All the selected families were storing grains for seed purpose. One bag of paddy per one acre was stored in gunny bags and malathion treated gunny bags.

3. Pre harvest and post harvest grain loss and its prevention :

The wastage of food grain occurred during pre harvest and post harvest periods.

a. Pre harvest losses and its prevention :

Very few families (20 per cent) realized that the pre harvest losses by rodents and insects were enormous. The traditional methods

of rodent control at the farm level were pumping water inside the burrow and covering the holes with stones.

In the modern rodent control measures ALP tablets were used by 40 per cent and malathion was used by 20 per cent.

b. Post harvest losses and its prevention :

The grain loss was occurred due to transportation from the field to the processing yard (approximately two kgs) and in the processing yard (about four kgs) due to birds and scattering of the grains.

c. Storage losses and its prevention

Eighty per cent pointed that loss during storage was due to insects and mites, rodents and fungi.

In the past the only step taken to prevent loss in storage was sun drying the grain as well as the storage structure before putting the grain and at an interval of six months in a new moon day.

Table II depicts the remedial measures taken by the selected families to control insects and rodents.

TABLE II
INSECT AND RODENT CONTROL MEASURES

| Insect control measures | % of families | Rodent control measures | % of families |
|---|---------------|--|---------------|
| * Sun drying | 100 | *Using rodafarin-anticoagulant bait | 20 |
| * Fumigating the grains with EDB ampoules | 15 | *Using trap | 15 |
| * Prophylactic treatment (spraying malathion 50%) | 5 | *Fitting drainage shutters | 10 |
| | | *Fixing galvanised sheets at the bottom of doors and windows | 3 |
| | | *Fixing wire mesh on the damaged windows | 2 |

Sun drying was a common method to protect the grain against insects and moisture damage. Only 10-20 per cent adopted modern techniques to control insects and rodents.

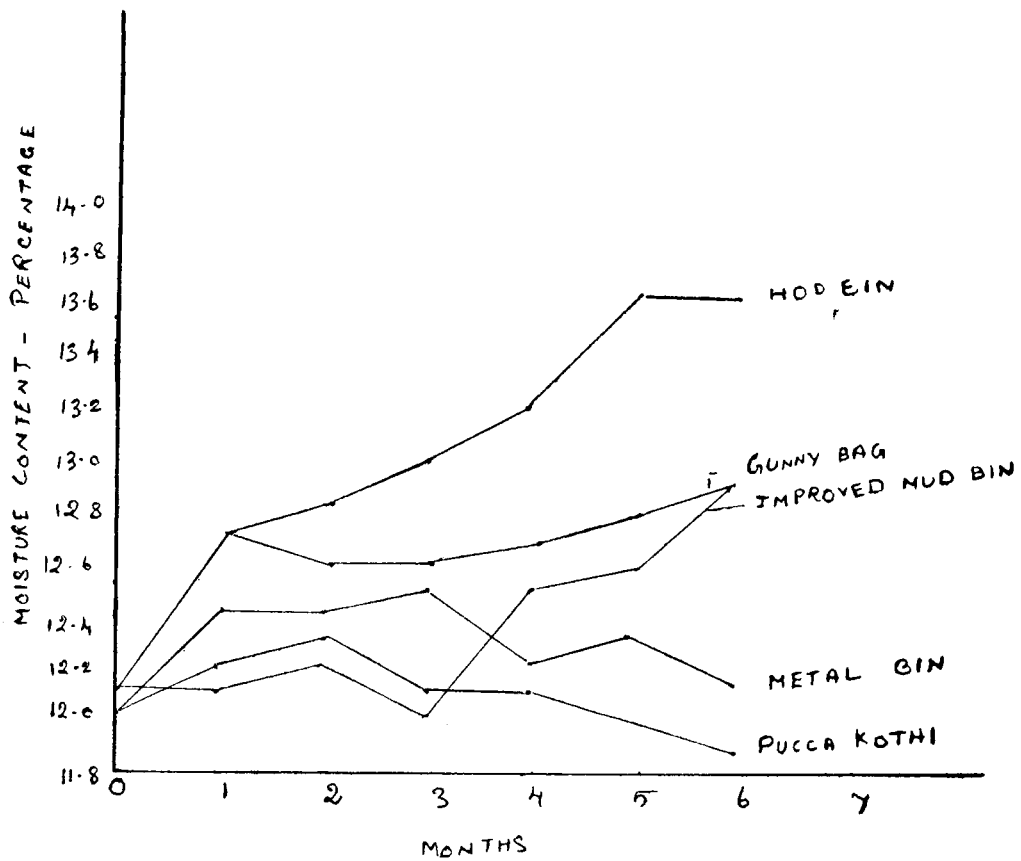
The improvements done for the storage receptacles as mentioned in modified storage practices such as attaching inlet and outlet and raising the platform of the mud bin and using dunnage to keep gunny bags could help in insect and rodent control.

B. Conducting Experiments to Analyse the Efficiency of Selected Storage Receptacles :

The study revealed the following :

1. Variations in moisture content of paddy stored in different storage receptacles

The moisture content of paddy stored for six months in pucca kothi was least (11.0 per cent) when compared to other containers. The moisture content of paddy stored bin traditional mud in was high (13.6 per cent). Metal Bin came next to pucca kothi (Figure. 1.)



VARIATIONS IN MOISTURE CONTENT OF PADDY STORED IN DIFFERENT STORAGE RECEPIACLES

FIGURE 1

TABLE III
PHYSICAL ANALYSIS OF PADDY STORED IN DIFFERENT STORAGE RECEPTACLES

| S.No. | Storage Receptacles | Foreign matter % by wt. | Refractions | | | |
|-------|---------------------|----------------------------|---------------------------|----------------------------|--------------------------------------|-------------------------------------|
| | | | Weevilization % by wt. | Sound Grain % by wt. | Total No. of grains in 20 gms. | Weight of 1000 grains in gms. |
| 1. | Pucca kothi | 0.640 to 0.653 | 0.170 to 0.410 | 98.9 to 99.36 | 1023 to 1058 | 17.9 to 18.7 |
| 2. | Metal Bin | 0.600 to 0.625 | 0.160 to 0.640 | 98.7 to 99.5 | 1018 to 1035 | 18.2 to 18.6 |
| 3. | Improved Mud Bin | 0.545 to 0.560 | 0.145 to 0.700 | 98.7 to 99.5 | 1018 to 1035 | 18.2 to 18.6 |
| 4. | Traditional Mud Bin | 0.660 to 0.675 | 1.190 to 1.755 | 97.8 to 99.3 | 1010 to 1038 | 18.2 to 18.7 |
| 5. | Gunny Bag | 0.880 to 0.890 | 0.645 to 0.900 | 98.2 to 99.1 | 1045 to 1073 | 17.5 to 18.7 |

2. Variations in temperature of paddy stored in different storage receptacles.

The initial temperature (30°C) of paddy stored in pucca kothi was maintained with least variations after six months storage. But in the other structures the temperature was increasing steadily from the initial through the six months.

3. Physical analysis of paddy stored in different storage receptacles

Physical analysis of paddy stored in different storage receptacles is given in Table III.

Physical analysis revealed that the samples taken from different storage receptacles were under the tolerance limit.

In pucca kothi alone the weevilization had started late, from the fourth month. Weevilization was noted from the second month onwards in Mud Bin, the other receptacles come in between. The percentage of weevilization was also less in pucca kothi.

Conclusion :

Pucca kothi came first in all the tests, followed by Metal Bin. The traditional Mud Bin came last in all tests.

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A COMPARATIVE STUDY OF THE SUBSIDIARY OCCUPATIONS OF THE URBAN AND RURAL FAMILIES IN COIMBATORE DISTRICT

R. Malligeswari

Introduction

Nearly one third of the rural people in India constitute the weaker section. The term weaker section includes people who hail from the strata of small and marginal farmers, agricultural labourers and rural artisans. People living under sub-economic levels without enough food, clothing and shelter have been estimated variously from 40 per cent of the population to 70 per cent.

The problem of unemployment and under-employment is of staggering magnitude. The per capita income of the family in India is very low that many families fall with in the poverty line. Finding more employment opportunities for the people should get top priority in the efforts to uplift rural India (Bernala, 1977). Improvement in the living standards of the rural people can be broguht about only through improving the earning capacity of the farmer, whose main occupation is animal husbandry and agriculture. (Srinivasan, 1978).

In the socio-economic context, income generating measures assume greater significance for women, especially the rural women, Both in rural and urban families, the women in lower income groups are condition to take up some activity for supplementing the family income. Subsidiary occupation are the activities which help to augment the main income and thereby help to utilise the available leisure time in creative activities. They are useful in combating unemployment in rural areas. Especially in rural areas, people are not employed during off seasons, to them subsidiary occupation is a boon.

Such subsidiary occupations should agree with main occupation-agriculture and the leased land. This would include rearing cattle, goat keeping, sheep rearing, mushroom cultivation, vegetable cultivation, vegetable gardening, fruit cultivation, sericulture etc. Subsidiary occupations such as mat weaving, basket weaving, broom making, coir making, pottery, tailoring, garment making, crafts works, drawing, painting, book binding, petty shop owning and cycle - shop are also possible income generating activities. They also provide employment opportunities to enhance the family income and resources.

To provide gainful employment both in rural and urban areas, a multi-service approach is needed. For this, institutions like Banks, Cottage Industries, Khadi and Village Industries, Handicrafts, Industrial Centres are sought to be involved in encouraging people to take up subsidiary occupations. There is need to provide opportunities to the farmers to earn income through subsidiary occupations during off seasons. It is essential for the farmers and entrepreneurs to know the lending schemes available for subsidiary occupations so that they can approach banks for financial, technical and legal assistance.

Follow-up studies must be taken to see how for these occupations are improving the standard of living of beneficiaries on a long term basis. Hence, an attempt has been made in this study to highlight the scope for some subsidiary occupations to be undertaken along with farming in rural areas.

The general objectives of the study were :

1. To study the existing opportunities available in the selected areas for supplementing the family income.
2. To find out the motivational factors in stretching the family income.
3. To study the existing pattern of subsidiary occupations in the urban and rural areas.
4. To study the role of subsidiary occupations in improving the standing of living.
5. To suggest ways and means of improving the overall economic status of the families and.
6. To find out the type of financial assistance received by the selected families from government agencies, banks and voluntary organisations.

It is hoped that the findings of this study may be of use to the government, banks, Khadi and Village Industries, Cottage Industries, Small Scale Industries, handicrafts, handloom, and voluntary organisations in formulating schemes to improve the welfare of the weaker sections in our country.

Literature Reviewed

The literature pertaining to the research is reviewed under the following headings :

- A. Concept of subsidiary occupation

- B. Problem of unemployment and under-employment in India.
- C Importance of Subsidiary occupation
- D. Role of National Development Programmes
- E. Financial assistance rendered by selected agencies
- F. Social and economic aspects of subsidiary occupations.

Methodology

The methodology of the study comprised of the following steps

- A. Selection of the area
- B. Selection of the sample
- C. Selection of the method
- D. Conducting the study and analysis of the data,

A. Selection of the area

Urban and rural areas of Coimbatore District were selected for the study included the following places in the urban areas of coimbatore City : 1) Rathnasabathypuram, 2) Town Hall, 3) Gandhipuram 4) Ukkadam, 5) Trichy Road, 6) Pappanaickenpalayam, 7) Saibaba Colony, 8) Ramalingam Colony and 9) Muthumariamman Puram.

Two Blocks namely Perur and Sarkarsamakulam with the following villages were selected to represent the rural areas in Coimbatore District : A) Perur : Village - 1) Muthannakulam, 2) Perur 3) Venkatapuram, 4) Telugupalayam and 5) Velandipalayam, B. (Sarkar samakulam, village - 1) Kottaipalayam, 2) Vaiampalayam, 3) Kovilpalayam, 4) Agrahasamakulam and 5) Vellamadai.

The above mentioned areas were chosen for the study due to the following reasons.

- 1) Easy accessibility and convenience of the investigator.
- 2) The investigator became interested in these areas through her earlier associations with the members of the Community Social Service Volunteers (Sri Avinashilingam Home Science College, Coimbatore) who visited during Village Adoption Scheme and also rendered valuable service to the down - trodden masses in other areas in Coimbatore.

B. Selection of the Sample

Fifty families each from urban and rural areas were selected as respondents for the research. A Cluster sampling method was followed.

C. Selection of the Method

Keeping in view the objectives of the study, an interview schedule was framed. It was selected as it was the best method for collecting personal views and information (Devadas, 1968).

Preliminary Study

In order to determine the feasibility of the interview schedule framed, a pilot study was conducted with fifteen families from each urban and rural areas who were not included in the sample. Based on the pilot study, certain modifications were made in the schedule.

D. Conducting the study and analysis of the data

Before conducting the interview, the investigator approached the families individually and established good rapport through friendly conversations. The native language Tamil was used to elicit the information. The approach of the head of the family was made with the assistance of Municipal Authorities, Collectorate, Development Branch, Coimbatore Panchayat Union and Local leaders.

E. Collection and analysis of the data

The information collected was consolidated, tabulated, and analysed statistically using appropriate tests.

Major Findings:

The major findings of the study were :

1. In general, a majority of 88 per cent of the urban and 82 per cent of the rural families belonged to the nuclear type.

Of the 100 families of urban and rural surveyed, 56 per cent comprised of medium sized (4 - 6) (family). Most of the families in the urban and rural, studied upto S.S.L.C.

2. A majority of the heads of families in the urban (34.6 per cent) and rural areas (22.1 per cent) were engaged in full-time mill work. This may be due to large number of textile mills in and around Coimbatore.

3. Table 1 indicates the prevailing subsidiary occupations of the urban and rural families.

TABLE I
DETAILS OF SUBSIDIARY OCCUPATION *

| S. No. | Subsidiary Occupation | Urban % | Rural % |
|--------|-----------------------|---------|---------|
| 1. | Cattle rearing | 80 | 70 |
| 2. | Goat Keeping | 20 | 52 |
| 3. | Basket weaving | 20 | - |
| 4. | Handloom weaving | - | 24 |
| 5. | Poultry | - | 8 |

* Multiple choice

It reveals that in both the urban and rural families cattle rearing and goat keeping were the common subsidiary occupations. A majority of the families owning agricultural lands, even in dry land area where irrigation facilities were poor, dairying could generate job opportunities to combat unemployment and under employment problems in a great measure. This helps in improving living conditions of the weaker section. The other subsidiary occupations pursued were handloom and pottery by the rural families and basketry in the urban families.

4. Income derived from the main and subsidiary occupations were compared and statistically tested for its significance by applying 't' test.

There was no significant difference in the income derived from the main occupation between urban and rural families. Hence the study accepted the null hypothesis. (Fig. 1).

There was significant difference between the income derived from subsidiary occupation among the urban and rural families. Therefore, the data reject the null hypothesis (Fig. 2). The total income derived from subsidiary occupation was more among urban than the rural families. The study also revealed that both the urban and rural families compelled by stress and strain of economic condition to take up certain activities for supplementing their family income.

Table II indicates significant difference between the income from main and subsidiary occupations in urban as well as in

TABLE II
COMPARISON BETWEEN MAIN AND SUBSIDIARY OCCUPATIONS

| INCOME | Urban | | Rural | |
|-----------------------|-------|--------|-------|--------|
| | Mean | S. D. | Mean | S. D. |
| Main Occupation | 688 | 475.52 | 700 | 435.55 |
| Subsidiary Occupation | 436 | 442.00 | 264 | 128.51 |

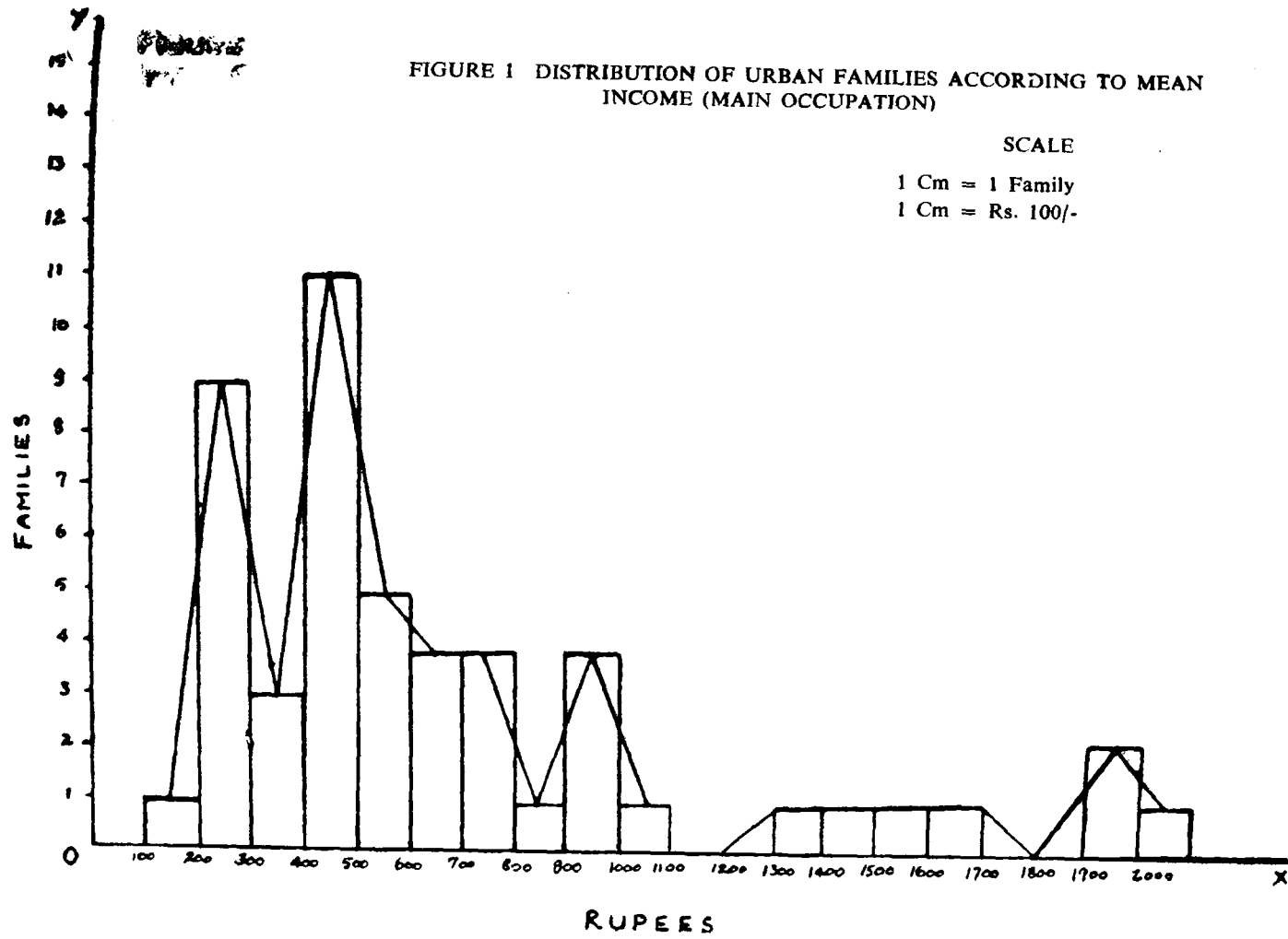
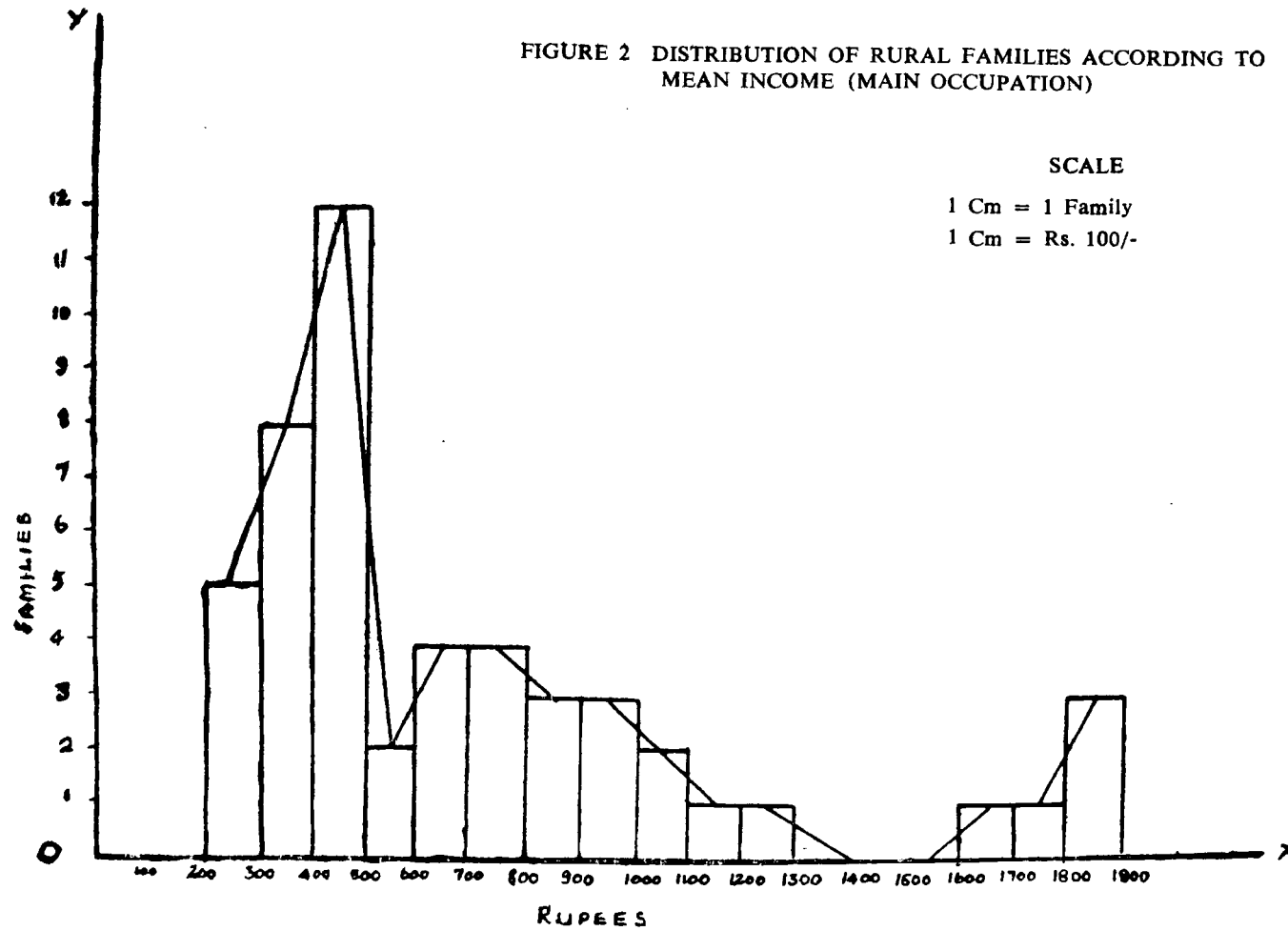


FIGURE 2 DISTRIBUTION OF RURAL FAMILIES ACCORDING TO MEAN INCOME (MAIN OCCUPATION)



rural families. The null hypotheses, therefore were rejected. (Fig. 3 and 4). A majority of both the urban and rural families pooled their income from both the occupation. The economic position of the family depends upon the number of its earning members and the family income. It is encouraging to note that most of the homemakers, children and other dependents at home were engaged in these subsidiary occupations during free time and thereby supplemented the main occupation of the head of the families.

5. Percentage of family expenditure of both the urban and rural families revealed that a major proportion of income was spent on food. Expenditure on subsidiary occupation ranks as the second item in their budget, being 16.3 per cent and 13 per cent among urban and rural families. Saving potential was negligible among the selected of the families (Fig 5 and 6)

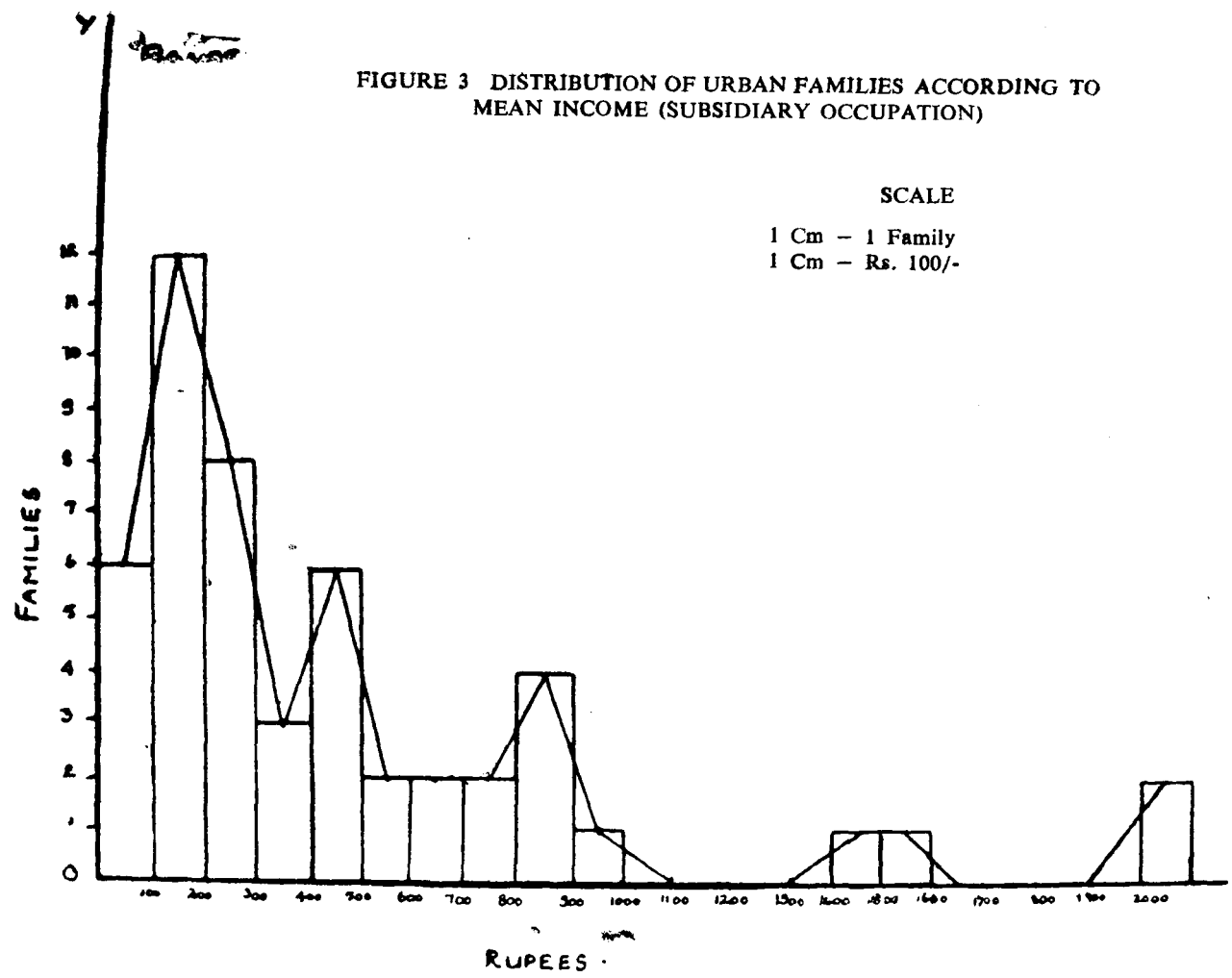
6. Of the 17 families owning agricultural land in the rural areas, 30 per cent were employed in the field for three months, 60 per cent for six months and ten per cent for about nine months. Of the eight families, owning agricultural land in urban area, were employed for nine months in a year. This shows the gravity of unemployment and utter waste of human resources of the rural masses are still untapped. Hence, the necessity of taking up subsidiary occupations to supplement the income derived from the main occupation in the logical conclusion.

7. Economy of both the urban and rural families was improved by supplementing their income through live stock and farming. Therefore, dairy farming received greater attention among these families, which will certainly improve the economic conditions and thereby their standard of living. The household consumption of milk in both the families will certainly improve their nutritional status, which will in turn improves the capacity to earn more. A study of goat keeping shows economical for the masses. One goat or two can supply a family with wholesome milk for much less money than it takes to keep a cow.

8. Almost a higher percentage of families from both the urban and rural areas were engaged in subsidiary occupations for more than ten years. In urban area, there was not much diversification in trades.

9. Augmenting the family income influenced the subsidiary occupation in both the urban and rural families. The idea of profit making was the main motive among rural families, whereas the idea of savings held more away in the urban families. Psychological factor too plays a

FIGURE 3 DISTRIBUTION OF URBAN FAMILIES ACCORDING TO MEAN INCOME (SUBSIDIARY OCCUPATION)



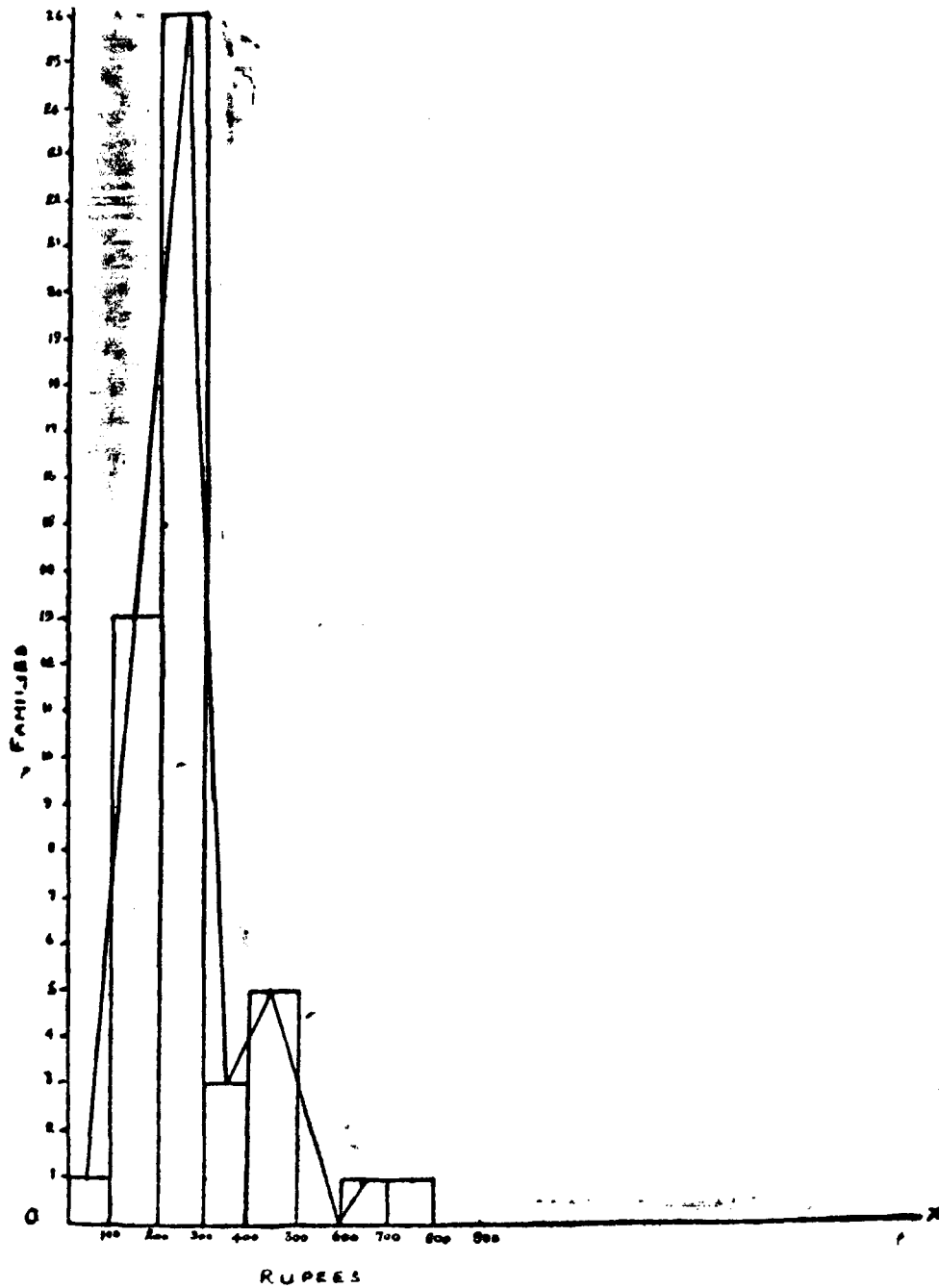


FIGURE 4 DISTRIBUTION OF RURAL FAMILIES ACCORDING TO MEAN INCOME (SUBSIDIARY OCCUPATION)

SCALE

1 Cm — 1 Family
 1 Cm — Rs. 100/-

greater role. Both the urban and rural families aspired for higher income and better standard of living. Hence, subsidiary occupations are a boon to the weaker sections.

10. Since the subsidiary occupations followed were tradition bound, a majority of both the families reported that they had acquired practical skill from their own family members (100 per cent) and close friends (above 70 per cent).

11. Facilities available in the locality had a greater influence on subsidiary occupations in both the urban and rural families. These occupations selected were based on local resources and requirements.

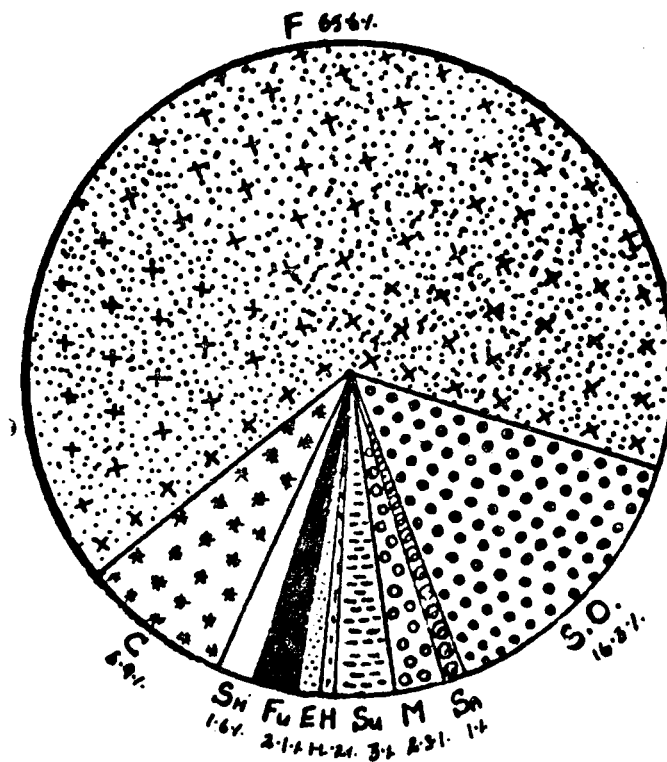


FIGURE 5 FAMILY EXPENDITURE PATTERN OF URBAN FAMILIES

- | | |
|--------------|--------------------------------------|
| F. Food | H. Health |
| C. Clothing | SU. Sundries |
| SH. Shelter | M. Miscellaneous |
| Fu. Fuel | SA. Savings |
| E. Education | S.O. Subsidiary Occupational Expense |

12. The major problems and difficulties confronting urban and rural families were related to lack of organisation, finance, marketing, transport, research, technical guidance, managerial aspect, adequate space, storage, veterinary facilities, production, middlemen and education.

13. Government Programmes, co-operative societies and bank officials played a prominent role in the urban areas, whereas the family members, neighbours and friends induced more in rural areas. This indicates the need for the Government and bank officials to stretch their activities towards the rural areas, where inducement is of great necessity.

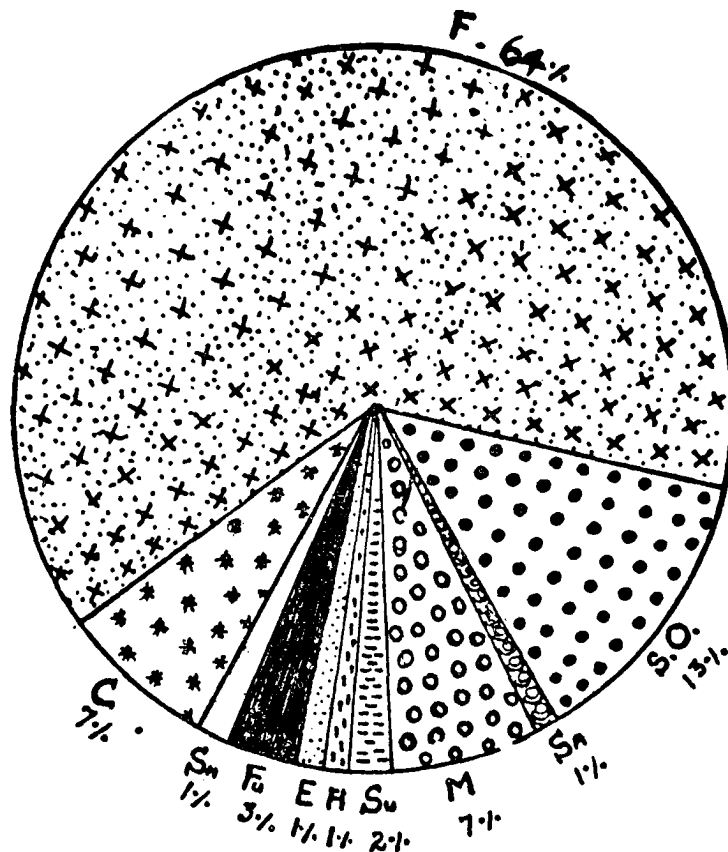


FIGURE 6. FAMILY EXPENDITURE PATTERN OF RURAL FAMILIES

| | |
|--------------|--------------------------------------|
| F. Food | H. Health |
| C. Clothing | SU. Sundries |
| SH. Shelter | M. Miscellaneous |
| Fu. Fuel | SA. Saving |
| E. Education | S.O. Subsidiary Occupational Expense |

14. A lesser percentage of members from both the urban and rural families were trained in basket weaving, handloom weaving and pottery. Adequate training has to be imparted to bridge the gap between existing traditional skill and new technology on the one side and to develop the skill among the unskilled on the other. These traditional occupations can be revived on healthy lines with reference to skill and talents.

15. Nationalised banks like Bank of Baroda and Canara Bank played a prominent role in the urban area in giving loans for the cattle rearing to 70 per cent of families as against 12 per cent of the rural families. In the rural area, banks and Khadi and Village Industries Commission provided loans but in inadequate amounts. The mode of payments of loan was on monthly instalments for a short term.

16. As regards the technical know-how of the availability of loans, in both the urban and rural areas, voluntary organisations, co-operative societies, institutions like Sri Avinashilingam Home Science College rendered help in processing the loan application and providing information from the banks and other organisation. The common difficulties expressed by all the families from both the urban and rural areas were such as seeking financial assistance, too much of delay in sanction of loan and to confirm the requirement of banks.

17. A greater percentage of the families (70 per cent) from the urban area were members of the co-operative Milk Society as against a very few families in the rural area (24 per cent) who were the members of the Handloom Weavers' Society and Kula Pot Makers' Society.

18. A majority of both the urban and rural families expressed their views regarding the benefits derived through financial assistance. There were significant implications shown in improving the living condition of the family status and profit obtained after the sanction of the loan like owning a milch animal with calf, the establishment of handloom unit and pottery unit.

19. Marketing facilities available in the locality for the products derived from subsidiary occupations were very much influenced by the local resources and requirements. The total nett profit derived from the subsidiary occupation of the urban families was greater (Rs. 433/-) than of the rural families (Rs. 6,999/-). The waste products like cow dung, bamboo and waste threads were saved, used as fuel for cooking purpose and thus expenses on fuel

20. A close look at the operational details of the subsidiary occupations from the point of view of social, economic and managerial aspects were also gathered for more precise valid reasons.

From the managerial aspects, more time was spent for cattle rearing in the urban than in rural families. In both the urban and rural areas, the commercially motivated occupations like basket weaving handloom weaving and pottery attracted more human resources compared to less commercial occupations like cattle rearing. Considering the amount of time taken and also the type of work, the wages received by them very low. Therefore, both the urban and rural families suggested that the wages must be enhanced. The Government can fix a minimum wage with special reference to present standard of living in consultation with the management and the workers. Housewives and other members at home were pursuing these occupations, not only to utilise time profitably, but also to accrue profits.

Money management certainly influences the subsidiary occupations. To some extent, the profit from the subsidiary occupations supplemented the main income of the family.

21. A majority of both the urban and rural families could not afford to save due to the large family size, high cost of living, rise in price, high family expenditure and limited income. Propaganda about the importance of savings must be made known to the families.

22. Families indebtedness clearly showed that majority of the rural families were the victims of money lenders and pawn brokers. It is suggested that multipurpose co-operative societies can be formed in these areas. The families should be made aware of the banking facilities, which will free them from the clutches of money lenders. Unanimously both the urban and rural families hopefully expressed their future intention of adopting subsidiary occupations, in order to increase production and income, to raise the standard of living and involve more members of the family in these occupations.

23. Lastly, the suggestions offered by both the urban and rural families for persuading more people to undertake the subsidiary occupations were to get the help of Government Schemes. Hence, suitable steps for the enrichment of the subsidiary occupation may be taken up to improve the social and economic conditions of the weaker section in both the urban and rural families.

Thus the highlights of the study reveals that the subsidiary occupation is necessary to augment their main income for the welfare of both the urban and rural families.

Based on the above findings, the following recommendations are made for further study.

1. Study of viable subsidiary occupations in different localities.
2. Effective implementation of the subsidiary occupations.
3. Factors which will help occupations like cattle rearing, goat-keeping and poultry rearing to succeed in a number of areas in Tamil Nadu, which will improve the economic conditions and standard of living of the weaker sections.
4. Role of banks, cottage industries, small scale industries, Khadi and Village Industries Commission and other voluntary organisation in promoting subsidiary occupations and assessment of their socio-economic impact.
5. Income levels of the weaker sections and their purchasing power vis versa in their subsidiary occupations. How far their quality of life improved?
6. Follow-up on the effect of subsidiary occupations in improving the living standards of the beneficiaries on a long term basis.
7. Role of colleges and students in conducting periodical base line surveys on subsidiary occupations, micro-level projects on the rural resources, inputs and handicaps and suggestions for remedial measures.
8. Special aspects of social, economic and managerial effects or benefits of maintaining or pursuing certain selected subsidiary occupations.

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AN EVALUATION OF A HOSPITAL DIETARY DEPARTMENT

INTRODUCTION

Thilaka Baskaran

Introduction

Diet is an important factor in the daily routine of patients laid up in a hospital. A frequent question faced by one who comes out of a hospital is "What was the food like.?" In the total care of the patient the dietary department of a hospital performs an essential function. Well planned, well prepared and properly served nutritious meals may play a crucial role in the patient's recovery.

In Indian hospitals, one of the least satisfactory aspects of patient care is the dietary service. In the average hospital organisation, administration and sanitation of the dietary section leaves much to be desired, though food services account for approximately one fifth of the total expenditure of hospital care.

This study was undertaken with the following objectives :-

1. To study the organisational setup and the method of management of the dietary department in a hospital.
2. To evaluate the nutrient content of the diets served.
3. To collect information on patient reaction to the food service.
4. To determine the extent and nature of involvement of doctors in the functions of the dietary department.
5. To formulate suggestions for improvement in order to enable the governing body of the hospital to bring about possible changes.

Experimental Procedure

The dietary department of the Coimbatore Medical College was selected to be studied. The tools selected to carry out the study were :

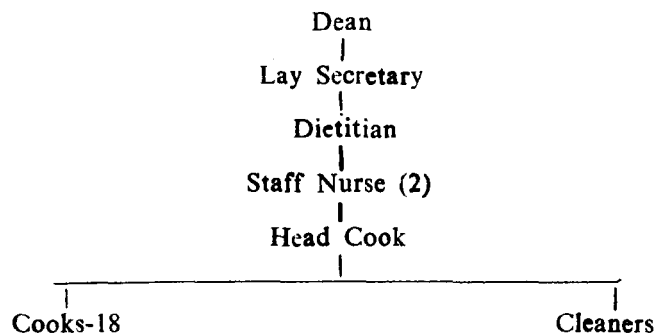
1. Interview schedule
2. Observation and
3. Questionnaire

The Lay secretary and the dietitian were interviewed to collect information regarding the different aspects of organisation and management of the dietary department. Questionnaires were administered to a sample of doctors and patients in the different wards.

Results and Discussion

Organisation and Management

The information collected revealed that a line type of organisation as shown is followed.



The controlling authority is the Lay Secretary who is responsible for calling for tenders, purchasing and receiving of all perishables and nonperishables.

A postgraduate dietitian with 10 years experience would be a better qualified person to be the controlling authority of the dietary department since she will be trained in the various functions of the dietary department like—menu planning, purchasing, receiving, preparation, food distribution, planning and calculation of therapeutic diets and administration of the department.

Physical facilities

The department was found to be poorly planned with inadequate space. According to the recommendation of the Indian Dietetic Association Subcommittee (1979) the space requirement for a dietary department serving 500 meals and above is seven square feet/person. This hospital which serves 550-600 patients worked out to only 4.2 sq.ft/person.

The building is poorly planned without even work tables. The only labour saving equipment available are the electrical grinding stones.

Personnel

Data regarding the personnel in the dietary department studied against the recommendation of the subcommittee of the Indian Dietetic Association (1979) is presented below.

| | Recommended for 500 beds | The hospital studied 600 beds |
|-----------------------------|--------------------------------|-------------------------------------|
| Chief Dietitian | — | — |
| Senior Dietitian | — | — |
| Dietitian | 1 | 1 |
| Asst. Dietitian | 5 | — |
| Steward | 1 | — |
| Store keeper (Ration) | 1 | — |
| Asst. store keeper (Ration) | 1 | — |
| Store keeper (General) | 1 | 1 |
| Clerk / typist | 1 | — |
| Head Cook | 2 | — |
| Therapeutic Cook | 2 | — |
| Cooks | 10 | 18 |
| Asst. Cook | 28 | — |
| Masalachi | 8 | 2 |
| Store attendant | 2 | — |

The personnel, particularly at the supervisory level is totally inadequate and the single dietitian is able to supervise only the cooking and other functions like patient counselling and education is totally neglected.

Food distribution and timing

The cooked food is transported in bulk on a handcart to the wards. The manner of serving leaves much to be desired. The hand weighing balance is used as a laddle to dish out the food rather than for weighing.

Dinner is served between 2-30 p.m. and 3-30 p.m. in the wards, whereas the dinner timing according to the hospital standing order is 7 p.m. Eighty one per cent of the patients studied complained about the inconvenient dinner timing and the long duration without food between dinner and breakfast.

Diets served

The department caters the following diets to the patients :

1. Adult ordinary diet (Vegetarian & Non Vegetarian)
2. Paediatric diet
3. Convalescent milk & bread diet.
4. Tuberculosis diet.
5. Diabetic diet (Vegetarian & Non Vegetarian)
6. Acute special diet.

Seventy five per cent of the diet served are normal diets. The average nutrients calculated for a three day period is presented below:

| | Pro. tein g | Calories KCals | Ca mg | Iron mg | Caro tene μ g | Thiamine mg | Ribo flavin mg | Ascorbic acid mg |
|---------------------------------|-------------------|-------------------|----------|------------|-------------------------|----------------|----------------------|------------------------|
| Indian Ordinary Veg. | 52 | 2113 | 780 | 40.0 | 3193 | 1.28 | 0.62 | 88.5 |
| Non Veg. | 58 | 2163 | 908 | 40.5 | 3619 | 1.28 | 0.70 | 77.2 |
| ICMR recom- mended allowance | | | | | | | | |
| Woman | 45 | 1900 | 400-500 | 30 | 3000 | 1.0 | 1.0 | 50.0 |
| Man | 55 | 2400 | 400-500 | 20 | 3000 | 1.2 | 1.3 | 50.0 |

Requirement for men and women have not been differentiated and one finds that calories is lacking for a male patient. However the ICMR recommendation is for a working man and not for a patient in bed. All the other diets were also found adequate quantitatively and nutritionally, but improvement can be introduced through a set of cycle menu instead of the one day cycle menu which is repeated *adnauseam* and everyday except for the change in vegetables.

Diets like the bread and milk diet which are not popular among the patients can be abolished and instead an Indian ordinary diet can be served.

The tuberculosis diet as it is served is a strictly non-vegetarian diet. This can be modified effectively to include dhals, vegetables and groundnuts and reduce milk given which will also bring down the cost of the diet. Idli for breakfast was welcomed by the patients instead of bread and butter which is being supplied every day.

Conclusion and Recommendations

1. For efficient functioning the physical plant must be conveniently planned if finance does not permit the existing one to be modified.
2. Due to inadequate staffing the dietitian is unable to perform the different functions. The recommendation of the Subcommittee of the Indian Dietetics Association to be followed.
3. A post graduate qualified dietitian with experience and assistant dietitians may be appointed and the chief dietitian to be the controlling authority.
4. Patient counselling and teaching dietetics to nursing and medical students to be an integral part of the dietary department and to cooperate with the medical personnel in dietetic research programmes.
5. To critically study and plan cycle menus, evaluate the diet scales and modify whenever necessary with the help of a committee of qualified people.
6. Meal timings to be altered to suit the Convenience of the patients and not the dietary department workers.
7. Regular staff meetings to be held with representatives of medical and Nursing Staff.
8. Evaluate functioning of the department through periodic surveys.

EDUCATIONAL FOR SELECTED WORKERS IN FOUR INDUSTRIAL CANTEENS

P. Tamilarasi

In industrial enterprises, where high productivity of workers is important to effect greater volume of business the provision of good food through the cafeteria has become a matter of policy to the establishment - Good quality food could be served only through the trained hands which do not grow spontaneously, but are made by good management and a well planned training programme.

An earnest attempt has been made to train the food service personnel intensively by integrating the group method of teaching, through which skills were taught to the employee participants.

The training programme was time consuming, but was most rewarding in its accomplishments. The subject matter stressed, nutrition, sanitation and work habits using audiovisual aids, lecture and demonstration.

Four industrial canteens were selected from the city of Coimbatore and ten personnel from each canteen were selected for the study. All the canteens selected for the study were managed by the concerned industries themselves. In these canteens facilities were provided for the proper functioning. The workers in all the selected canteens did not have proper education which was a handicap for the investigator to conduct the study, but to the extent possible the investigator was able to educate the canteen workers.

The type of diet that is being supplied in all the canteen is vegetarian. All the meals were subsidised in all canteens. The number of clientele depend upon the size of the industry.

The required items for the canteen was purchased from any one of the co-operative stores through the management or by the canteen itself. The food items were all properly and carefully stored.

The education has a very positive effect on the worker. It was very evident that in all the canteen the workers were able to work independently without any type of supervision. There was good

co-operation among the workers and each workers from all the canteen was able to follow the direction given to them carefully. All the workers were aware of the existing standards and their working conditions.

The education programme made the workers to realise the importance of personal hygiene. They were able to understand the importance of hairnets, uniform and aprons. After education every one could remember that papaya and carrot play a major role for good eye sight and able to understand the nutrients which were good for the eyes, teeth bones and skin. It was found that all workers showed interest and improvement about their service standards and work habits. Thus the training programme showed an improvement in the standards of sanitation and personal hygiene, gain in knowledge on the subject matter ; nutrition, sanitation and work habits.

In order to enhance the learning programme, a brochure consisting of work simplification techniques, sanitation and nutrition was formulated in the local language Tamil and distributed to the kitchen personnel who know to read and write, which in turn would be a guideline for future improvement.

NUTRITIONAL IMPACT OF SCHOOL LUNCH PROGRAMME ON CHILDREN FOR A PERIOD OF FIVE YEARS

S. Premakunari

This investigation aimed at finding out the nutritional impact of a well organised school lunch programme on children over a period of five years. Sri Avinashilingam Junior Basic School situated in the Sri Avinashilingam Home Science College campus was selected for this study, since it is operating the school lunch programme from 1962, and maintaining the records of the nutritional status of children. The lunch programme operating under the Midday Meal Scheme provided 1/3 of the day's requirements for nutrients as specified by the Indian Council of Medical Research.

Using the records of the past, all the children (5 to 11 years old) who had been continuously participating in the programme for periods of five years (No. 73), four years (No 88), three years (No 106), two years (No. 127) and one year (No. 159) were identified and designated as groups A,B,C,D and E respectively. For each such group, a comparable group of children who had never participated in the programme was selected as controls and designated as groups AC, BC, CC, DC and EC respectively.

For studying the anthropometric measurements, class attendance and academic performance of children longitudinal records maintained in the school were used for the entire groups. For studying the blood haemoglobin levels, clinical picture and nutritional knowledge of children and parents, 25 subjects were selected from each group randomly and their cross sectional data was considered for evaluation. To estimate the levels of nutrient intake of children only five children were randomly selected from each of the experimental and the control groups.

The results of the study revealed the following :

1. Energy and nutrient consumption by the children

The school lunch alone was supplying 583 kcal of energy, 12.1g of protein, 13.0 mg of iron, 226 mg of calcium and 15mg of ascorbic acid per child per day. Because of that significant contribution, children participating in the school lunch were able to consume more nutrients than the non school lunch children. Even then their calorie and ascorbic acid intakes were inadequate although significantly higher than those of children in the non school lunch groups.

2. Anthropometric measurements-Heights

The mean increments in heights registered by the children in the different groups are presented in Table I.

TABLE I
MEAN INCREMENTS IN HEIGHTS OF CHILDREN AFTER
DIFFERENT PERIODS OF PARTICIPATION

| Groups | No. Studied | Heights cm | | | Groups compared | 't' value |
|--------|-------------|-------------|-------------|------------|-----------------|-----------|
| | | Initial | Final | Increase | | |
| A | 73 | 106.26±6.39 | 129.40±2.12 | 23.14±2.12 | A vs AC | 7.97** |
| AC | 73 | 105.92±7.95 | 126.08±2.38 | 20.16±2.38 | | |
| B | 88 | 106.63±5.93 | 124.12±3.00 | 17.49±3.00 | B vs BC | 5.30** |
| BC | 88 | 106.41±7.61 | 121.84±2.08 | 15.43±2.08 | | |
| C | 106 | 107.18±5.75 | 122.81±1.44 | 15.63±1.44 | C vs CC | 7.82** |
| CC | 106 | 106.97±7.21 | 120.88±1.71 | 13.91±1.71 | | |
| D | 127 | 107.51±6.00 | 117.46±1.18 | 9.95±1.98 | D vs DC | 7.79** |
| DC | 127 | 107.32±7.22 | 116.18±1.22 | 8.86±1.22 | | |
| E | 159 | 107.21±5.84 | 112.10±1.16 | 4.89±1.16 | E vs EC | 3.36** |
| EC | 159 | 107.36±7.27 | 111.88±0.76 | 4.52±0.76 | | |

** Significant at one per cent level.

Children in all the groups registered increments in heights irrespective of their period of participation in the school lunch or non participation. However, children in the school lunch groups had registered significantly greater increments in height than the children in the control groups ($P < 0.01$).

Weights

The mean increments in weights registered by the children in the study are presented in Table II.

Children in all the groups had registered increases in body weights. However the increments in weight of the five experimental groups were significantly greater than those of the control groups.

3. Biochemical changes in children

The mean blood haemoglobin levels of children in the different groups is presented in Table III.

The blood haemoglobin levels in the five groups of school lunch children ranged from 9.29 to 10.32 g/100 ml whereas in the non school

lunch children, it ranged from 8.59 to 9.83 g/100 ml blood. In both the groups as the children grew older the blood haemoglobin concentration also increased. However, the levels in the school lunch children were significantly greater than those in the non school lunch children.

TABLE II
MEAN INCREMENTS IN WEIGHTS OF CHILDREN AFTER
DIFFERENT PERIODS OF PARTICIPATION

| Groups | No. Studied | Weights kg | | | Groups compared | 't' value |
|--------|-------------|------------|------------|------------|-----------------|-----------|
| | | Initial | Final | Increase | | |
| A | 73 | 16.80±2.37 | 30.67±3.31 | 13.87±2.44 | A vs AC | 7.48** |
| AC | 73 | 16.03±2.83 | 26.91±2.73 | 10.88±2.38 | | |
| B | 88 | 16.96±2.40 | 27.99±3.29 | 11.03±2.32 | B vs BC | 9.71** |
| BC | 88 | 17.85±2.78 | 26.16±2.75 | 8.31±1.18 | | |
| C | 106 | 17.20±2.51 | 25.83±3.25 | 8.63±2.02 | C vs CC | 9.13** |
| CC | 106 | 17.27±1.83 | 23.71±2.98 | 6.44±1.55 | | |
| D | 127 | 16.50±2.91 | 22.47±3.01 | 5.97±1.54 | D vs DC | 7.40** |
| DC | 127 | 16.64±2.92 | 21.18±2.98 | 4.49±1.52 | | |
| E | 159 | 17.19±2.83 | 19.45±2.58 | 2.26±0.74 | E vs EC | 4.00** |
| EC | 159 | 17.06±2.91 | 19.00±3.48 | 1.94±0.71 | | |

** Significant at one per cent level

TABLE III
MEAN BLOOD HAEMOGLOBIN LEVELS OF CHILDREN AFTER DIFFERENT
PERIODS OF PARTICIPATION
(No. 25 in each group)

| Groups | Haemoglobin level g/100 ml | Experimental Vs Control 't' value | Comparisons among experimental groups | 't' value |
|--------|----------------------------|-----------------------------------|---------------------------------------|-----------|
| A | 10.32±0.43 | 2.88** | A vs B | 0.30 |
| AC | 9.83±0.74 | | A vs C | 1.80 |
| | | | A vs D | 4.29** |
| | | | A vs E | 7.92** |
| B | 10.26±0.89 | 2.68** | B vs C | 1.15 |
| BC | 9.78±0.61 | | B vs D | 3.11** |
| | | | B vs E | 4.62** |
| C | 9.96±0.90 | 2.73** | C vs D | 0.27 |
| CC | 9.38±0.48 | | C vs E | 3.29** |
| D | 9.42±0.91 | 2.67** | D vs E | 0.62 |
| DC | 8.83±0.62 | | | |
| E | 9.29±0.49 | 5.00** | | |
| EC | 8.59±0.48 | | | |

** Significant at one per cent level

The mean blood haemoglobin levels of children in group A and B were significantly greater than that of children in groups D and E ($P < 0.01$). Similarly comparisons between C and E were significant ($P < 0.01$).

4. Changes in the clinical picture

In the beginning children had some symptoms such as angular stomatitis, bleeding gums, dry eyes, bitot's spots and anaemia (Table IV). But the children in the non school lunch groups were found to be suffering from more deficiency symptoms than their counterparts participating in the school lunch. Furthermore, the deficiency symptoms disappeared more and more as the duration of participation in the school lunch increased.

TABLE IV
CLINICAL PICTURE OF CHILDREN PARTICIPATING AND NOT PARTICIPATING IN THE SCHOOL LUNCH PROGRAMME
(No. 25 in each group)

| Clinical symptoms | Percentage of children under different years of participation | | | | | | | | | |
|--------------------|---|----|---------|----|---------|----|---------|----|--------|----|
| | 5 years | | 4 years | | 3 years | | 2 years | | 1 year | |
| | A | AC | B | BC | C | CC | D | DC | E | EC |
| Angular stomatitis | — | 8 | — | 12 | 4 | 16 | 8 | 16 | 8 | 16 |
| Bleeding gums | — | 12 | — | 12 | — | — | 4 | 16 | 8 | 12 |
| Anaemia | 4 | 12 | 4 | 16 | 4 | 16 | 8 | 20 | 8 | 20 |
| Bitot's spots | — | — | — | 4 | — | — | 4 | 8 | — | 4 |

5. Educational outcomes of school lunch programme

All the five groups put together the school lunch children attended the school for 93.78 per cent days while the non school lunch children attended for 90.39 per cent days. The school lunch programme attracted 3.38 per cent more children in classes I to V.

TABLE V
ACADEMIC PERFORMANCE OF CHILDREN IN SCHOOL LUNCH AND NON SCHOOL LUNCH GROUPS

| S.No. | Years of participation or non participation | Number studied | School lunch group | | Non school lunch group | |
|-------|---|----------------|--------------------|------------------------|------------------------|------------------------|
| | | | No. of failures | Percentage of failures | No. of failures | Percentage of failures |
| 1 | 5 | 73 | 2 | 2.7 | 4 | 5.4 |
| 2 | 4 | 88 | 2 | 2.2 | 3 | 3.4 |
| 3 | 3 | 106 | 2 | 1.9 | 5 | 4.7 |
| 4 | 2 | 127 | 3 | 2.4 | 5 | 3.4 |
| 5 | 1 | 159 | 2 | 1.3 | 4 | 2.5 |

Table V presents the academic performance of children as assessed by the number of failures observed.

The percentage of failures was higher in each non school lunch group.

6. Changes in the nutritional knowledge of children and parents

The mean scores obtained by the children in the experimental and the control groups for their knowledge of nutrition are presented in Table VI.

TABLE VI
MEAN SCORES OBTAINED BY THE
CHILDREN FOR NUTRITIONAL KNOWLEDGE
(No. 25 in each group)
(Maximum scores-25)

| Details | Years of participation or non participation in the school lunch | | | | | Groups compared | 't' value |
|-------------------------|---|------|------|------|------|----------------------------------|-----------|
| | 5 | 4 | 3 | 2 | 1 | | |
| School lunch groups | 23.3 | 20.0 | 18.6 | 15.4 | 10.2 | School lunch Vs Non school lunch | 13.97** |
| Non school lunch groups | 12.2 | 12.1 | 8.9 | 7.7 | 5.4 | | |

** Significant at one per cent level.

The scores obtained by the school lunch children put together was significantly greater than that of the non school lunch children ($P < 0.01$).

The nutritional knowledge of 25 parents of the experimental children and 25 parents of the entire control groups are presented in Table VII.

TABLE VII
NUTRITIONAL KNOWLEDGE OF PARENTS OF SCHOOL LUNCH AND
NON SCHOOL LUNCH CHILDREN
(No. 25 in each group)

| Questions | Answers | Years of participation | | | | | Control |
|--|---|------------------------|----|----|----|----|---------|
| | | 5 | 4 | 3 | 2 | 1 | |
| Why should we consume green leafy vegetables | 1. For good health | 20 | 12 | 18 | 10 | 10 | 3 |
| | 2. Supplies iron | 11 | 12 | — | 2 | — | — |
| | 3. Purifies the blood | 7 | 6 | 8 | 10 | 7 | 4 |
| | 4. Avoids constipation | 3 | — | — | — | 2 | — |
| What are the foods you like most? | 1. Cereal preparation | 12 | 14 | 8 | 5 | 6 | 6 |
| | 2. Fruits and vegetables including green leafy vegetables | 15 | 10 | 10 | 8 | 6 | 6 |
| | 3. Milk and milk products | 11 | 11 | 8 | 7 | 5 | 6 |
| | 4. Non vegetarian foods | 2 | 4 | 2 | 1 | — | — |
| How do you cook rice? | 1. Absorption method | 22 | 20 | 20 | 15 | 14 | 10 |
| | 2. Draining the water | 3 | 5 | 5 | 10 | 9 | 15 |

The results showed that the parents of children in the school lunch groups were better informed about the nutritional facts. It was noted that as the number of years of participation of the children in school lunch increased the nutritional knowledge of parents also increased.

The study establishes that the participation of children in a well organised school lunch programme would bring about significant nutritional and educational outcomes. As the period of participation in the programme increases the beneficial effects also increase.

Experience after receiving the M.Phil degree

This paper was presented during the Diamond Jubilee Celebrations of National Institute of Nutrition held at Hyderabad in October 1978.

It was also published in a scientific journal under the reference Rajammal P. Devadas and Prema kumari, S. Nutritional impact of school lunch programme on children over a period of five years. *Ind. J. Nutr. Dietet.*, 1978, 15, pp. 257-263.

**PREVALENCE OF MALNUTRITION, MORBIDITY PATTERN AND
NUTRITIONAL STATUS OF 0-6 YEAR OLD CHILDREN
IN COIMBATORE**

Dr. Rajammal P. Devadas

Geetha G.

Investment in child development is an investment in human resource development. Yet millions of children are still struggling to have their needs fulfilled. The gross neglect of childhood health and nutrition, ravages the child population. In India, children in the age range of 0-15 years constitute 42 per cent of the total population, among whom 19 per cent are under 6 years and 62 millions are below three years. (Ghosh, 1981) Malnutrition is one of the most important causes for the high rate of morbidity and mortality amongst the preschool children. The long term consequences of malnutrition are chronic undernutrition, retarded growth and mental development, stunted adult stature and low working capacity (Devadas, 1977, Ramalingaswami, 1981 and Mohan Ram, 1982). Malnutrition and infection are closely linked, one precipitating the other (Devadas *et al.* 1980). The problems of infection and nutrition are acute among children, under five years of age, who are experiencing rapid growth and are therefore more vulnerable (Devadas *et al.* 1980, Scrimshaw and Underwood, 1980 and Ghosh, 1981).

One million children die in India every year as a result of malnutrition and non nutritional diseases resulting from poor resistance due to malnutrition. About 17 per cent preschool children suffer from severe malnutrition and 45 per cent from moderate malnutrition (Gopalan, 1980). At least 2,50,000 children are blind from xerophthalmia or keratomalacia (World Health Organisation 1979). Fifty per cent of the children in the preschool group suffer from anaemia and vitamin deficiencies (India Year Book, 1981.) A high rate of child mortality retards the prosperity of the country. In order to develop a scientifically sound and economically feasible nutrition strategy, it will be necessary to understand the nature of the nutrition problem of preschool children in different parts of the country (Swaminathan, 1981). Incidence and prevalence of signs and symptoms of nutritional and non nutritional diseases should be carefully watched, because unfavourable changes in the incidence of these diseases can be indicative either of deterioration as a whole or of undesirable changes in feeding children. With this aim, the present study attempts to know the extent of prevalence of malnutrition, morbidity pattern and dietary habits of 0-6 year old children in Coimbatore.

Experimental Procedure

Selection of the Centres and the Subjects

Sri Avinashilingam Institute of Child Health and Nutrition - a Nutrition Rehabilitation centre run by Sri Avinashilingam Education Trust, Coimbatore and the Coimbatore Medical College Hospital in Coimbatore city were selected for the study during the period June 1979 to April 1981 covering 1245 infants and preschool children in the age range of 0-6 years. About 746 children were attending the Nutrition Rehabilitation Centre and 500 children attending the Medical College Hospital as out patients and inpatients.

Formulation of the Schedule

A schedule was formulated to find out the socio economic background, breast feeding/formula feeding practices, meal pattern followed for the children, weaning and supplementary foods given, immunisation measures adopted and the existing health and sanitation conditions

Collection of Data

Socio economic and dietary data : Informations about the family socio economic background was obtained using the schedule covering details regarding the child such as birth order, number of siblings, immunisation picture, duration of breast feeding, weaning and supplementary foods and history of past illnesses.

Anthropometric assessment : For all the selected children, height, weight, mid upper arm circumference and head and chest circumferences were recorded. The height of the infants and young children were measured using an infantometer and fibre glass tape respectively to nearest 0.1 centimetre. The weight of the children was recorded using the weighing balance accurate to 0.5 kilogram. The mid upper arm circumference and chest and head circumferences were measured using fibre glass tape to nearest 0.1 centimetre.

Weight for age gives an indication of size at different stages of life. Certain cut off points exist above or below which a child can be said with a certain confidence to be normally, over or under nourished (Patel, 1980). Accordingly for all the children attending Nutrition Rehabilitation centre, a Child Health Record Card was formulated based

on the one published by Voluntary Health Association of India on the basis of Gomez classification given below :

| | | |
|------------------------|-------------------------------------|---|
| Normal | ≥90 per cent of the Standard Weight | |
| Grade I Malnutrition | 75 to 89 per cent of | „ |
| Grade II Malnutrition | 61 to 74 per cent of | „ |
| Grade III Malnutrition | ≤ 60 per cent of | „ |

Clinical Examination and morbidity Pattern : All the children in the study were subjected to a through clinical examination with the help of an experienced medical practitioner. The children were examined for the manifestations of clinical symptoms of nutritional deficiencies and presence of infections and other illnesses.

Dietary intake of the selected Children : Four subjects in each illness of energy protein malnutrition, vitamin A deficiency, respiratory tract infection and acute gastro enteritis were selected randomly. For all the selected children, a three day weighment survey was carried out. From the amount of foods consumed by the individual, the raw equivalents were computed and their caloric and nutrient content calculated.

Biochemical Analysis of blood : Blood samples were collected from randomly selected 200 children and analysed for haemoglobin level. Serum protein, albumin and globulin ratio were estimated for a subsample of 50 children randomly selected using the tyrosine method (Tietz, 1976).

RESULTS AND DISCUSSION

A. Socio-economic background

Out of 1,246 children studied, 54 per cent were males and 46 per cent were females. About 59 per cent of the children fell in the birth order of one to two and 30 per cent were in the birth order of three to four. Nearly half of the families surveyed had three to four members per family. Twenty nine per cent had five to six members per family and only four per cent had more than eight members per family. Educational level of the mothers showed that 35 per cent of the mothers had no education and the rest had school education. It was observed that 72 per cent of the parents were engaged in unskilled work like cooli, business, agriculture, police, peon, conductor, teacher and the like where as the remaining were occupied in skilled work like weaving, carpentry, tailoring, driving, workshop and the like. Very few mothers were involved in skilled work. About 72 per cent of the families had their income in the range Rs. 300 to 700 per month. Less than four per cent of the families had income below Rs. 200 per month.

Food expenditure pattern of the families revealed that 60 per cent of the households spent 60 to 80 per cent and 18 per cent spent 40 to 60 per cent of their income on food. More than 80 per cent of food expenditure was incurred on cereals by 10 per cent of these households. The staple cereals were rice in the urban and urban slum areas and rice and jowar or ragi in rural areas. A majority of the households spent less than 15 per cent of their food expenditure on pulses. About 30 to 65 per cent of the families spent less than two per cent of their food expenditure on green leafy vegetables, roots and tubers, other vegetables, milk and milk products and beverages. Only 10 to 30 per cent of the families had spent three to four percent of their food expenditure on roots and tubers, other vegetables, fruits, milk and milk products, sugar and jaggery, prepared foods and beverages.

B. Feeding Practices of Children

Out of 1,246 children studied, 99 percent were breast fed completely for the first week of life. Of the infants 0-2 years old during the study period, 52 per cent were breast fed, 21 per cent were on bottle feeding and the rest were on mixed feeding. Only for two percent of the sample, breast feeding was continued beyond two and a half years. The prolonged breast feeding by these mothers might be attributed to their low socio economic status. Bottle feeding was started for 64 percent of the children before six months of age. Only for three percent of the children, it was started after one year of age, 76 percent of the children were given cow's milk, 14 per cent buffaloes milk and the rest on milk powders.

No special weaning foods were prepared for the children. Fifty per cent of the children were continued on diluted, unhygienically prepared formula feeding and 12 per cent were given ready made foods purchased from outside. In the rest of the families, adult diet was given to the children. The supplementary foods given were rice, ragi, jowar, bun, varki and biscuits at the age of 7-12 months for 44 per cent of the children.

Anthropometric Measurements

Height and Weight of the Selected Children

The mean height and weight of the children are presented in Table I

TABLE I
MEAN HEIGHT AND WEIGHT OF THE SELECTED CHILDREN

| Age (years) | Sex | No. of children | Height (cms) | Weight (kg) |
|-------------|-----|-----------------|-----------------------|----------------------|
| 0-6 months | M | 82 | 56.52±5.76 (58.5) | 5.18±1.24 (5.4) |
| | F | 80 | 54.29±5.41 (57.5) | 4.91±1.20 (5.1) |
| 6-12 months | M | 109 | 67.96±4.86 (72.0) | 6.90±1.25 (9.1) |
| | F | 91 | 66.57±5.54 (70.3) | 6.77±1.18 (8.3) |
| 1-2 | M | 140 | 72.69±5.13 (82.8) | 8.31±1.74 (9.9) |
| | F | 130 | 72.12±5.06 (81.8) | 7.77±1.87 (9.9) |
| 2-3 | M | 104 | 80.67±7.34 (88.9) | 9.79±2.07 (11.6) |
| | F | 87 | 78.76±7.43 (82.8) | 9.66±1.88 (12.1) |
| 3-4 | M | 94 | 85.16±7.74 (93.0) | 11.57±1.81 (13.1) |
| | F | 75 | 84.43±7.99 (82.5) | 10.49±2.19 (12.2) |
| 4-5 | M | 67 | 93.77±7.45 (103.3) | 12.80±2.09 (15.4) |
| | F | 49 | 91.48±7.14 (105.2) | 12.19±1.69 (14.1) |
| 5-6 | M | 69 | 98.95±9.93 (105.9) | 13.85±2.73 (16.5) |
| | F | 69 | 98.73±6.99 (108.2) | 14.11±1.91 (15.6) |

The numbers in parenthesis indicate standards given by ICMR (1971) for 2-5 years and Ghosh (1977) for 0-2 years.

Height and weight of all the children were found to be below the standard norms and particularly weight Female children in the age group of one to two years as well as five to six years were found to be as equal in their height as their counter parts of opposite sex. The female children of five to six years were more heavier than male children of same age. The difference in these measurements between the present study and standard values could be attributed to low socio-economic status and consumption of inadequate foods both in quantity and quality by these children.

Head, Chest and mid upper arm circumferences

The chest circumference of male children in the age group of one to two years and four to five years alone were nearing or equal

to standard values. The head circumference of all the children except those of 0-6 months were below the standard. The mid upper arm circumferences of all the children in all the age groups were found to be below the standard value. This measurement was found to be more or less constant and with in narrow range between 1 and 5 years of life in the present study.

Assessment of Selected Children According to Weight for Age

It has been suggested that classifying children according to weight for age would help in not only the quantum, but also the type of malnutrition in a community (Sevane and Latham, 1971). Detection of malnutrition was done among 746 children using a special card. The weight of the child was plotted on this card weight versus age. The prevalence picture is given in Table II.

TABLE II
SEXWISE PREVALENCE OF PEM

| Sex | No. of Children | | Nutritional Status | | | | | | | |
|--------|-----------------|-------|--------------------|------|---------|------|----------|------|-----------|------|
| | No. | % | Normal | | Grade I | | Grade II | | Grade III | |
| | | | No. | % | No. | % | No. | % | No. | % |
| Male | 379 | 50.8 | 156 | 20.9 | 122 | 16.4 | 70 | 9.4 | 31 | 4.1 |
| Female | 367 | 49.2 | 107 | 14.3 | 115 | 15.4 | 93 | 12.5 | 52 | 7.0 |
| Total | 746 | 100.0 | 263 | 35.2 | 237 | 31.8 | 163 | 21.9 | 83 | 11.1 |

The overall prevalence was found to be 64.8 percent. This value is much higher than the results of Chopdar and Samal (1979) and Luwang and Singh (1981) who have reported 57.7 percent and 42.7 percent respectively in their studies. Sexwise prevalence of mild to severe degree of PEM revealed that female children suffered, more (34.9 per cent) than the male children (29.9 per cent) However, statistically there was no significant association between sex and nutritional grades ($\chi^2=3.34$, d.f=3, $P<0.05$). This coincides well with the results of Srivastava *et al* (1970) and Luwang and Singh (1981) who also could not observe any significant association between PEM and sex of the children.

Age and Nutritional Grades

Mild to Moderate forms of malnutrition were found to be more in the age group of 0-1 year old children (Table III) whereas severe form of malnutrition (weight deficit of 40 > per cent) was found to be higher in the age group of 2 to 3 years.

TABLE III
DISTRIBUTION BY AGE AND NUTRITIONAL GRADES

| Age (years) | No. of children | Nutritional Status | | | | | | | |
|-------------|-----------------|--------------------|------|---------|------|----------|------|-----------|------|
| | | Normal | | Grade I | | Grade II | | Grade III | |
| | | No. | % | No. | % | No. | % | No. | % |
| 0-1 | 226 | 102 | 13.7 | 63 | 8.4 | 45 | 6.0 | 16 | 2.1 |
| 1-2 | 153 | 43 | 5.8 | 54 | 7.2 | 36 | 4.8 | 20 | 2.7 |
| 2-3 | 121 | 36 | 4.8 | 38 | 5.1 | 23 | 3.1 | 24 | 3.3 |
| 3-4 | 101 | 34 | 4.5 | 32 | 4.3 | 24 | 3.3 | 11 | 1.5 |
| 4-5 | 72 | 25 | 3.3 | 24 | 3.3 | 19 | 2.6 | 4 | 0.5 |
| 5-6 | 73 | 23 | 3.1 | 26 | 3.5 | 16 | 2.1 | 8 | 1.0 |
| Total | 746 | 263 | 35.2 | 237 | 31.8 | 163 | 21.9 | 83 | 11.1 |

A cumulative stress of inadequate diet, infections, psychological trauma etc., coincides with high nutritional needs during the transitional period of childhood which is most marked in the second year of life and hence is fraught with risk of malnutrition. There was a significant association between the prevalence of PEM and age of the children ($\chi^2=29.59$, d.f=15 $P>0.05$).

The prevalence of mild to severe forms of PEM was common in any birth order. However there was no significant correlation between birth order and grades of malnutrition.

Family size and Nutrition Grades

Distribution of children according to size of the family and nutritional grades is given in Table IV.

TABLE IV
DISTRIBUTION OF CHILDREN ACCORDING TO
FAMILY SIZE AND NUTRITIONAL GRADES

| Family Size | No. of children | Nutritional Grade | | | | | | | |
|-------------|-----------------|-------------------|------|---------|------|----------|------|-----------|------|
| | | Normal | | Grade I | | Grade II | | Grade III | |
| | | No. | % | No. | % | No. | % | No. | % |
| 3-4 | 364 | 160 | 21.4 | 118 | 15.9 | 59 | 7.9 | 27 | 3.0 |
| 5-6 | 215 | 71 | 9.5 | 70 | 9.4 | 44 | 5.9 | 30 | 4.6 |
| 7-8 | 141 | 28 | 3.8 | 41 | 5.6 | 51 | 6.9 | 20 | 2.7 |
| >8 | 26 | 4 | 0.5 | 7 | 0.9 | 9 | 1.2 | 6 | 0.8 |
| Total | 746 | 263 | 35.2 | 237 | 31.8 | 163 | 21.9 | 83 | 11.1 |

More than 15 per cent of the children from family size of 5 and above were in grade II and grade III malnutrition. The correlation analysis indicated a striking direct relationship between family size and

severity of PEM ($r = +0.23$). Similar results have been reported by Gopalan (1973) Devadas (1974) and Prahlad Rao (1975).

Children who had either no siblings or one or two showed more normal nutritional status strikingly. Statistical analysis showed that there was positive correlation ($r = +0.19$) between higher number of siblings and severity of PEM.

Education of Mother and Nutritional Grades

The percentage of children in mild to severe forms of malnutrition was found to be higher when the mothers had no education. When mothers' education were above the high school level, there was complete absence of incidence of malnutrition among these children.

Family income and Nutritional Grade

As the monthly income of the family was increasing, there was an increase in the percentage of well nourished children there existed a striking inverse relationship between higher income level and severity of PEM ($r = -0.55$).

Selected Anthropometric indices

Weight / Height² for the selected children

As weight / Height² × 100 has been shown to be a reliable and useful age independent index of PEM (Jelliffe and Jelliffe, 1969, Rao and Satyanarayana, 1974 and Prasad and Rangaswamy, 1975) this ratio was analysed and presented in Table V.

TABLE V
WEIGHT / HEIGHT² × 100 IN THE SELECTED CHILDREN

| Age (Months) | Nutritional Grade | | | |
|-----------------|-------------------|---------|----------|-----------|
| | Normal | Grade I | Grade II | Grade III |
| 0-6 | 0.181 | 0.149 | 0.139 | 0.129 |
| 6-12 | 0.162 | 0.142 | 0.132 | 0.130 |
| 12-24 | 0.160 | 0.149 | 0.127 | 0.121 |
| 24-36 | 0.158 | 0.149 | 0.142 | 0.131 |
| 36-48 | 0.152 | 0.149 | 0.141 | 0.126 |
| 48-60 | 0.156 | 0.147 | 0.143 | 0.131 |
| 60-72 | 0.152 | 0.136 | 0.137 | 0.128 |

The ratio $Wt/Ht^2 \times 100$ should be 0.15 for apparently normal children (NRL, 1968). In the present study, the ratio ranged from

0.152 to 0.181 for normal children, 0.136 to 0.149 for grade I, 0.127 to 0.143 for grade II and 0.121 to 0.131 for grade III malnourished children.

Ratio of MAC/HC

It has been suggested that the ratio of MAC/HC Should be 0.31 in normal children, 0.28-0.31 in mild PEM, 0.25-0.28 in moderate PEM and < 0.25 in severe PEM (Patel, 1980). The values obtained in the present study (Table VI) also coincided this range and hence these values could be used as a suggestive index of various grades of malnutrition.

TABLE VI
RATIO OF MAC/HC IN THE SELECTED CHILDREN

| Age (Months) | Nutritional Grade | | | |
|-----------------|-------------------|---------|----------|-----------|
| | Normal | Grade I | Grade II | Grade III |
| 0-6 | 0.32 | 0.30 | 0.29 | 0.25 |
| 6-12 | 0.34 | 0.31 | 0.29 | 0.25 |
| 12-24 | 0.31 | 0.30 | 0.28 | 0.25 |
| 24-36 | 0.33 | 0.30 | 0.29 | 0.25 |
| 36-48 | 0.31 | 0.29 | 0.26 | 0.26 |
| 48-60 | 0.31 | 0.30 | 0.25 | 0.25 |
| 60-72 | 0.31 | 0.30 | 0.27 | 0.26 |

Ratio of CC/HC

The ratio of chest circumference to head circumference is given in Table VII.

The ratio of Chest Circumference/Head Circumference below 1 indicated that the children suffered from severe form of malnutrition. This coincides well with the results reported by Devadas *et al* (1979).

TABLE VII
RATIO OF CC/HC IN THE SELECTED CHILDREN

| Age (Months) | Nutritional Grade | | | |
|-----------------|-------------------|---------|----------|-----------|
| | Normal | Grade I | Grade II | Grade III |
| 0-6 | 1.03 | 1.03 | 1.01 | 0.99 |
| 6-12 | 1.05 | 1.05 | 1.02 | 0.98 |
| 12-24 | 1.04 | 1.04 | 1.02 | 0.96 |
| 24-36 | 1.07 | 1.06 | 1.03 | 0.94 |
| 36-48 | 1.05 | 1.03 | 1.00 | 0.98 |
| 48-60 | 1.06 | 1.06 | 1.02 | 0.98 |
| 60-72 | 1.06 | 1.05 | 1.02 | 0.98 |

Morbidity Pattern of the Children

Table VIII presents the prevalence of non nutritional diseases among the selected children.

TABLE VIII
NON-NUTRITIONAL DISEASES AMONG THE SELECTED CHILDREN

| | Age in Years | | | | | | Total No. | % |
|--|--------------|------------|------------|------------|------------|------------|--------------|------|
| | 0-1 No. | 1-2 No. | 2-3 No. | 3-4 No. | 4-5 No. | 5-6 No. | | |
| Upper Respiratory Tract Infections | 134 | 69 | 59 | 50 | 62 | 56 | 428 | 34.3 |
| Lower Respiratory Tract Infections | 38 | 15 | 13 | 13 | 5 | — | 84 | 6.7 |
| Bronchitis, broncho Pneumonia, Acute pharyngitis | 25 | 11 | 19 | 14 | 7 | 8 | 84 | 6.7 |
| Whooping cough | 2 | — | 8 | 6 | — | 7 | 23 | 1.8 |
| Pyrexia of unknown origin | 96 | 45 | 23 | 20 | 35 | 19 | 238 | 19.1 |
| Acute Gastro Enteritis | 99 | 49 | 27 | 20 | 5 | 6 | 206 | 16.5 |
| Dysentery | 19 | 5 | 9 | 3 | 2 | 2 | 40 | 3.2 |
| Skin infection | 40 | 35 | 39 | 40 | 29 | 14 | 197 | 16.6 |
| Primary complex | — | 15 | 10 | 6 | 1 | 4 | 36 | 2.9 |
| Otitis media | 12 | 6 | 16 | 8 | 9 | 3 | 54 | 4.3 |
| Throat infection | 2 | 2 | 4 | 9 | 1 | 6 | 24 | 1.9 |
| Others (Urticaria, viral hepatitis, Nephritis, Polio, chicken pox) | 6 | 12 | 12 | 6 | 1 | 2 | 3 | 3.3 |

Non-nutritional disorders occurred most frequently in young preschool children as they are the most vulnerable sections of the population. In the present study, respiratory tract infections ranked the highest (49.5 per cent) followed by gastro-intestinal infections (19.7 per cent) pyrexia of unknown origin (19.1 per cent) and skin infections (16.6 per cent). These results are in accordance with the results reported by Banik (1978), Bhansali (1979) *et al.*, Sharma *et al.* (1979) and Devadas *et al.* (1980).

The deficiency symptoms observed in these children are depicted in Table IX.

TABLE IX
DEFICIENCY SYMPTOMS OBSERVED AMONG THE CHILDREN

| Deficiency symptoms | Age in Years | | | | | | Total Number | % |
|----------------------------------|--------------|-----|---------------------------|-----|-----|-----|--------------|------|
| | 0-1 | 1-2 | 2-3 Number of Children | 3-4 | 4-5 | 5-6 | | |
| Gross Anaemia | 62 | 82 | 60 | 46 | 35 | 34 | 319 | 25.6 |
| Oedema | 26 | 20 | 19 | 14 | 2 | — | 81 | 6.5 |
| Pot belly | 20 | 6 | 6 | 7 | 1 | — | 40 | 3.2 |
| Muscle wasting | 11 | 15 | 16 | 7 | 6 | 8 | 63 | 5.1 |
| Dry skin | 32 | 40 | 43 | 34 | 25 | 21 | 197 | 15.8 |
| Hair Changes | 15 | 36 | 48 | 29 | 25 | 14 | 167 | 13.4 |
| Marasmic Kwashiorkor | 12 | 10 | 10 | — | 4 | — | 30 | 2.9 |
| Kwashiorkor | 12 | 6 | 16 | 16 | 9 | — | 59 | 4.7 |
| Marasmus | 5 | 10 | 9 | 9 | 7 | 8 | 41 | 3.9 |
| Bitot's Spots | — | 19 | 19 | 11 | 13 | 9 | 71 | 5.7 |
| Others signs of Vit A deficiency | 7 | 66 | 51 | 32 | 32 | 34 | 222 | 17.7 |
| Angular stomatitis | 9 | 35 | 49 | 51 | 22 | 24 | 190 | 15.2 |
| Bleeding gums | — | 22 | 12 | 18 | 7 | 7 | 66 | 5.3 |

Overall prevalence of various forms of clinical manifestations attributable to protein energy deficiencies and deficiencies of Vitamin A and B complex were quite marked. The incidence of iron deficiency anemia topped the highest (26 per cent) followed by symptoms of vitamin A deficiency (18 per cent) and angular stomatitis (15 per cent).

Dietary intake of the Selected Children

Mean food intake of the selected children

Table X gives the mean food intake of the selected children.

The intake of cereals, pulses, milk and milk products sugar and jaggery and fats and oils by the children suffering from kwashiorkor and enteritis were inadequate when compared to recommended dietary allowances (ICMR, 1981). The poor intake of milk and milk products, fruits and neglect of green leafy vegetables must have aggravated vitamin A deficiency.

Mean Nutrient Intake of the Selected children

The mean daily nutrient intake of the selected children is presented in Table XI.

TABLE X
MEAN FOOD INTAKE OF THE SELECTED CHILDREN

| Illness | Subject | Age (Years) | Cereals | Pulses | Green leafy vege- tables | Other vege- tables (in grams) | Roots and tubers | Fruits | Milk and milk products | Fats and oils | Sugar and jaggery |
|---------------------------------------|---------|----------------|---------|--------|-----------------------------------|--|------------------------|--------|---------------------------------|---------------------|-------------------------|
| Kwashiorkor | I | 2 | 108 | 15 | — | 18 | 32 | 28 | 100 | — | — |
| | II | 1½ | 104 | 17 | 12 | 24 | 6 | 8 | 63 | 7 | 3 |
| | III | 2 | 110 | 12 | — | 25 | 7 | — | 152 | 3 | 12 |
| | IV | 2 | 94 | 10 | — | 5 | 4 | 7 | 215 | 4 | 12 |
| | Mean | | 104 | 13.5 | 3 | 18 | 12.3 | 10.8 | 132.5 | 3.5 | 6.3 |
| Acute Gastro Enteritis | I | 2 | 135 | 12 | — | 10 | — | 7 | 180 | 5 | 17 |
| | II | 2 | 165 | 29 | — | 25 | 10 | 12 | 175 | 8 | 9 |
| | III | 1½ | 95 | 17 | 10 | 20 | 7 | — | 152 | 8 | 12 |
| | IV | 2 | 108 | 15 | — | 18 | 32 | 28 | 100 | — | — |
| | Mean | | 125.8 | 18.3 | 3 | 18.3 | 12.3 | 11.8 | 151.8 | 5.3 | 9.5 |
| Vitamin A deficiency | I | 2½ | 106 | 41 | — | 1 | — | — | 100 | — | 12 |
| | II | 3 | 216 | 23 | — | 29 | — | 34 | 50 | 21 | 19 |
| | III | 2½ | 166 | 16 | — | 16 | — | — | — | 10 | — |
| | IV | 3 | 215 | 23 | — | 48 | — | — | 284 | 10 | 15 |
| | Mean | | 175.7 | 25.7 | — | 23.5 | — | 8.5 | 108.5 | 10.3 | 11.5 |
| RDA* | | 175 | 35 | 40 | 20 | 10 | — | 300 | 15 | 30 | |
| Upper respiratory tract infections | I | 5½ | 135 | 35 | — | — | — | 10 | 160 | — | — |
| | II | 4½ | 196 | 35 | — | 16 | — | — | 180 | 5 | 32 |
| | III | 4 | 145 | 49 | 3 | 13 | 65 | 28 | 132 | 18 | 4 |
| | IV | 4 | 160 | 29 | 5 | 15 | 46 | — | — | — | 13 |
| | Mean | | 159 | 37 | 2 | 11 | 27.8 | 12 | 118 | 5.8 | 14.8 |
| RDA* | | 270 | 35 | 50 | 30 | 20 | — | 250 | 25 | 40 | |

TABLE XI
MEAN NUTRIENT INTAKE OF THE SELECTED CHILDREN

| Illness | Subject | Age (Years) | Energy (Kcal) | Protein (g) | Calcium (g) | Iron (mg) | B-Carotene (kg) | Thiamine (mg) | Riboflavin (mg) | Vitamin C (mg) |
|------------------------------------|---------|-------------|---------------|-------------|-------------|-----------|-----------------|---------------|-----------------|----------------|
| Kwashiorkor | I | 2 | 657 | 11.4 | 0.241 | 5.3 | 92 | 0.337 | 0.490 | 4.0 |
| | II | 1½ | 595 | 10.0 | 0.142 | 8.2 | 91 | 0.305 | 0.160 | 5.0 |
| | III | 2 | 627 | 8.0 | 0.128 | 6.5 | 87 | 0.400 | 0.140 | 5.5 |
| | IV | 2 | 677 | 12.0 | 0.152 | 4.8 | 80 | 0.271 | 0.181 | 4.2 |
| | Mean | | 639 | 10.35 | 0.166 | 6.2 | 87.5 | 0.328 | 0.243 | 4.7 |
| Acute Gastro Enteritis | I | 2 | 947 | 14.0 | 0.277 | 8.0 | 125 | 0.500 | 0.402 | 15.0 |
| | II | 2 | 832 | 16.2 | 0.236 | 9.7 | 154 | 0.530 | 0.321 | 4.0 |
| | III | 1½ | 891 | 18.3 | 0.165 | 7.2 | 57 | 0.330 | 0.426 | 13.0 |
| | IV | 2 | 598 | 18.5 | 0.200 | 8.4 | 209 | 0.535 | 0.340 | 16.0 |
| | Mean | | 817 | 16.75 | 0.219 | 8.32 | 136.2 | 0.474 | 0.372 | 12.0 |
| Vitamin A deficiency | I | 2½ | 771 | 23.1 | 0.280 | 8.6 | 88 | 0.460 | 0.490 | 5.0 |
| | II | 3 | 1154 | 20.0 | 0.240 | 9.7 | 90 | 0.700 | 0.700 | 20.0 |
| | III | 2½ | 642 | 14.7 | 0.027 | 6.6 | 39 | 0.225 | 0.119 | 5.0 |
| | IV | 3 | 1299 | 22.2 | 0.664 | 15.2 | 281 | 0.600 | 0.920 | 8.0 |
| | Mean | | 966 | 20.0 | 0.303 | 10.02 | 124.5 | 0.381 | 0.557 | 9.5 |
| RDA | | 1220 | 22.0 | 0.4-0.5 | 20-25 | 1000 | 0.6 | 0.7 | 40.0 | |
| Upper respiratory tract infections | I | 5½ | 900 | 18.0 | 0.180 | 12.0 | 53 | 1.000 | 0.400 | 12.0 |
| | II | 4½ | 1102 | 22.3 | 0.736 | 10.7 | 328 | 0.719 | 1.100 | 8.0 |
| | III | 4 | 1064 | 26.0 | 0.290 | 13.0 | 455 | 0.843 | 0.572 | |
| | IV | 4 | 740 | 22.7 | 0.329 | 13.8 | 489 | 0.770 | 0.300 | 20.0 |
| | Mean | | 951 | 22.25 | 0.384 | 12.37 | 331.2 | 0.833 | 0.593 | 15.5 |
| RDA | | 1720 | 29.4 | 0.4-0.5 | 20-25 | 1200 | 0.9 | 1.0 | 40.4 | |

The gross deficits in food intake had resulted in the poor nutrient intake. The intake of all the nutrients by kwashiorkor children was less than half of the RDA levels which must have pruned the children to high risk of malnutrition. The intake of iron and calcium did not meet the recommended allowances, due to gross deficit in the intake of green leafy vegetables.

Bio-chemical Analysis of Blood for Selected Components

There was a drastic decrease in the haemoglobin content of children having protein energy malnutrition, anaemia, marasmus and ascariasis (less than 7.5g/100ml). All the children had values lower than 9.2g/100ml.

The total serum protein content varied from 5.5 g/100ml in PEM with primary complex to 6.0g/100ml in PEM with respiratory tract infections (Table XII) Corresponding to the depleted value of serum protein, there was reduction in the albumin content (1.9g to 2.7g/100ml) which ultimately resulted in an increase in the globulin level

TABLE XII
SERUM PROTEIN, ALBUMIN AND GLOBULIN
LEVEL OF THE SELECTED CHILDREN

| Illness | No. of children | Serum Protein (g/100ml) | | |
|-----------------------------|-----------------|-------------------------|---------|----------|
| | | Total Protein | Albumin | Globulin |
| Kwashiorkor | 13 | 5.91 | 2.23 | 3.68 |
| Marasmic | 12 | 5.86 | 2.19 | 3.67 |
| Marasmic Kwashiorkor | 10 | 5.80 | 2.44 | 3.36 |
| PEM with vitamin deficiency | 3 | 5.93 | 2.40 | 3.53 |
| PEM with enteritis | 5 | 5.74 | 2.14 | 3.60 |
| PEM with RTI | 3 | 6.00 | 2.56 | 3.44 |
| PEM with Primary Complex | 2 | 5.50 | 2.70 | 2.80 |
| PEM with skin infections | 2 | 5.85 | 1.90 | 3.95 |

Summary and Conclusion

The present study was carried out to assess the quantum of under nutrition, malnutrition and infectious diseases. The results revealed that height, weight, arm, head and chest circumferences of all the children were found to be below the standard norms. When the children were assessed according to weight for age, severe forms of malnutrition were found to be more in the age group of 2 to 3 years. The

anthropometric indices assessed for these children showed values below the normal value, Morbidity pattern showed prevalence of respiratory tract infections in the highest order followed by gastro intestinal diseases. Protein energy malnutrition was present in 44 per cent of the children varying from mild to severe forms. Next to PEM, iron deficiency anaemia and vitamin A deficiency were widely prevalent. The intake of calories, protein, β -carotene, calcium and iron was very much lower than the recommended allowances. The haemoglobin and serum protein level showed a conspicuous fall from the normal values.

These results indicate the urgent need for, and the formidable task involved in the delivery of basic health and nutrition services to the enormous number of vulnerable and largely inaccessible children.

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DIETARY INTAKE AND SERUM CHOLESTROL LEVEL OF SUBJECT ADULT WOMEN BELONGING TO THREE DIFFERENT COMMUNITIES IN COIMBATORE CITY

Mrs. V. Anuradha

The dietary intake and serum cholestrol levels of selected premenopansal women doing sedentary work and belonging to high income group was investigated. For this study, Tamilian vegetarians and non-vegetarians, Gujarathi vegetarians (since all are basically vegetarians) Malayali vegetarians and non vegetarians were chosen. Each group was comprised of ten subjects.

The socio economic status, the dietary picture and the personal and familial medical history of the subjects were surveyed. The means food and nutrient intake (by recall survey) and the serum cholesterol levels were determined.

The findings of the study ase discussed under the following headings.

1. Socio Economic Status

The socio economic survey revealed that all the subjects belonged to nuclear families and were educated. Business was the main occupation of the Gujarathis. Gujarathis spent more money on food than the Tamilians and Malayalies. None of the Gujarathi families spent below Rs. 400 on food. In general non vegetarian Tamilians and Malayalies spent more on food than the vegetarians. Majority that is 9 out of 10 subjects in each group spent within Rs. 50 for clothing. Six out of the ten owned a house. The four Gujarathies who rented a house paid above Rs 250 for rent Since business was the main occupation Gujarathis saved more money than Tamilians and Malayalies.

2. Daily Meal Pattern

The dietary picture revealed that the Gujarathis and Malayalies had adopted certain dietary practices of the Tamilians of Coimbatore. For example, Gujarathis consumed common South Indian items such as iddli and dosai for breakfast.

Pongal was an item, eaten exclusively by Tamilians for breakfast Bread and egg were included only by Tamilian and Malayali non-vegetarians. Rice pittu was consumed for breakfast by the Malayalies.

The lunch pattern indicated that Tamilians and Malayalies consumed rice everyday and Gujarathis consumed wheat preparations daily. Gujarathis consumed less green leafy vegetables and more expensive other vegetables such as cauliflower and green peas compared to Tamilians and Malayalies. Malayalies consumed more of tapioca and other roots and tubers than other two communities. Fried items and snacks were included exclusively by the Gujarathis for lunch. Fish was consumed everyday by at least two out of ten Malayali non vegetarians. Their frequency of consumption of fish is greater than Tamilian non vegetarians.

Coffee was consumed daily by at least six out of ten Tamilian and Malayali vegetarians, Malayalies in general consumed less of snacks during tea time

Tamilian vegetarians had either rice or tiffin items (made from cereals) for dinner, Gujarathis had South Indian snack items for the dinner at home or at restaurants, Malayali vegetarians included more of roots and tubers in their poriyals than the other groups. Malayali non vegetarians did not mention the use of curds for dinner in their three day menu and meal pattern.

3. The frequency of food consumption

The frequency of use of different foods influences the nutrient intake and cholesterol levels. The frequency pattern indicated that while wheat was consumed by all Gujarathis daily, rice was consumed daily by Tamilians and Gujarathis Red gram dhal and black gram dhal were the common dhals used by all the three communities. Only Malayalies mentioned the use of horsegram. The preparations of Malayalies call for inclusion of more roots and tubers. Malayali vegetarians made a special mention of the frequency of use of raw plantain, ash gourd, pumpkin and plantain flowers. More expensive other vegetables like (cauliflower and green peas) though never consumed daily was more frequently consumed by Gujarathis than the other two communities, saturated fats like ghee and vanaspathi was commonly used by the Gujarathis. All Malayalies used coconut oil and none of them used gingelly oil. Cows milk was consumed daily by all subjects in the three communities in varying quantities Gujarathis had buttermilk daily. Tamilian vegetarians had curds daily. Mutton was consumed more frequently than fish or egg by Tamilians unlike Malayalies. All Tamilians used tomatoes daily in cooking. The Gujarathis consumed other fruits daily. Prepared items like ice-cream and milk sweets were consumed

commonly by the Gujarathis, Tamilian vegetarians resorted to pickles. None of the selected subjects consumed alcohol. None of the families of the selected subjects maintained kitchen garden, dairy or poultry.

4. Foods given and avoided in special conditions

Cows milk was given to infants in all families. Farex was included in the infants diet by eight families in each of the three communities. Majority (ie) eight out of ten Tamilian non vegetarians families included strained mutton soup in the infant's diet. Whereas only two Malayali non vegetarian families gave egg as special food in late infancy. Only three Malayali vegetarians mentioned that they give ragi malt as special food. The striking factor was that rich foods like ice cream and milk sweets were given to preschool children by the Gujarathis, whereas Tamilians and Malayalies were better in their selection of special foods for preschool children. No special foods were given during adolescence in the three communities. Being a predominantly vulnerable group, the pregnant women's diet had an inclusion of extra foods such as fruits, milk, meat, fish (by non vegetarians) in all the three communities. Gujarathis believed in giving groundnut paste in milk to pregnant women. Garlic was included as special food during lactation.

As regards to what sort of diet should be given to patients suffering from cardiovascular disease, all the subjects did not feel that there is need for inclusion of any special food. Majority in all the three communities felt that fried foods, ghee, butter and sweets should be avoided by patients suffering from cardiovascular disease. Majority (except four Gujarathis) believed in a low salt diet for hypertensive patients. Tamilians mentioned that rice and roots and tubers should be struck off from the diabetic diet.

5. Food likes and dislikes, food beliefs

The common likes and dislikes of the three communities was surveyed. Mustard oil was the most disliked item. Garlic was disliked by seven out of ten Tamilian vegetarians and Malayali vegetarians. Yarm and colacassia were liked by both Tamilian and Malayali vegetarians. All Malayali non vegetarians preferred fleshy foods.

Cucumber was considered as cold food by Tamilian and Malayali vegetarians. Tamilian vegetarians believed buttermilk to be a cold food. Pulses and potato were found to be gas producing food. Nine out of ten

Tamilian vegetarians and seven out of ten Tamilian non vegetarians considered papaya as hot food. None of the Malayali non vegetarians classified any food as heat producing.

6. Comparison of serum cholesterol levels between Tamilians, Gujarathis and Malayalies

The serum cholesterol level was determined by Zak's method for ths subjects (of the three communities). The Gujarathis exhibited a higher mean serum cholestrol level than the other two communities. The difference in serum cholesterol levels between Tamilian and Gujarathi vegetarians and between Malayali vegetarians and non vegetarians was significant at five per cent level. The difference in serum cholesterol level between Tamilian vegetarians and non vegetarians and between Gujarathi vegetarians and Malayali vegetarians was significant at one per cent level. The difference in serum cholesterol levels between the vegetarians (Tamilians and Malayalies) and between the non vegetarian (Tamilians and Malayalies) was not significant.

7. Association of serum cholestrol levels with personnel and familial medical history.

Personal and familial medical history showed that there was a general trend on subjects having high serum cholesterol levels when hypertension was present as a personal or familial factor. Such a trend was prevalent more among the Gujarathis than the other two communities.

8. Mean food intake

The study of food intake indicated that cereals were consumed to a large extent by Malayali non vegetarians. Tamilian vegetarians topped the list in the consumption of pulses and other vegetables. Green leafy vegetables were eaten in unsatisfactory amounts by all the three communities, the Gujarathis taking the least. Tamilian non vegetarians consumed too much tomatoes and onions because of their inclusion in non vegetarian dishes. The intake of milk by the three communities was satisfactory. Gujarathis consumed more of ghee, vanaspathi and sugar than the others.

9. Mean nutrient intake

The nutrient intake of the three communities indicated that Gujarathis consumed as a group minimum energy (1555 K cal) due to

less intake of cereals. The mean intake of protein by Tamilian non vegetarian was highest (70.1 gram), Tamilian non vegetarians also had high mean fat intake (66.4 grams) and high mean Poly Unsaturated Falty Auds (PUFA) of 7.6 per cent. Malayali non vegetarians due to high cereal intake had a high mean carbohydrate intake (299 grams). They had a satisfact ory intake of niacin (15.2 grams) compared to other communities. The intake of thiamine and riboflavin was satisfactory in general except in the case of Malayali vegetarians. All groups had a satisfactory intake of Vitamin C.

No conclusive association between individual food and nutrient intake and serum cholesterol levels could be established in selected subjects in the premenopausal period.

NUTRITIONAL QUALITY AND SHELF LIFE OF SELECTED PROCESSED FRUITS AND VEGETABLES

Dr. Rajammal P. Devadas
U. Kupputhai

In developing India where undernutrition and malnutrition are rampant food preservation plays an important role. Many perishable foods produced go waste during the surplus seasons. They are wasted due to improper handling, distribution, marketing and storage. If the use of fresh foods is delayed their freshness, palatability and nutritive value are affected.

The objective of the study was to preserve selected fruits and vegetables which are plenty in season and to evaluate the possible methods of preservation such as bottling, canning, sugar concentrates, fruit juice beverages, and dehydration. Twelve locally available fruits and four vegetables were selected for the study; Amla, mango, papaya, pineapple, jackfruit, banana, blue grapes, lime, sweet orange, tomato, sapota and pomello were the fruits selected. Among vegetables bitter-gourd, carrot, green beans and broad beans were selected.

The following table gives the various processing methods adopted for the study.

DETAILS OF PROCESSING METHODS

| S.No. | Fruits/vegetables | Method of processing |
|---------------|-------------------|---|
| Fruits | | |
| 1. | Amla | Canning and Sugar concentrate |
| 2. | Mango | do - |
| 3. | Papaya | - do - |
| 4. | Pineapple | } Canning sugar concentrate and fruit juices |
| 5. | Jackfruit | |
| 6. | Banana | Fruit Juices |
| 7. | Blue grapes | Fruit Juices |
| 8. | Lime | - do - |
| 9. | Sweet orange | - do - |

| S No. | Fruits/Vegetables | Method of processing |
|-------------------|-------------------|----------------------|
| 10. | Tomato | - do - |
| 11. | Sapota | - do - |
| 12. | Pomello | - do - |
| Vegetables | | |
| 1. | Bittergourd | Bottling and drying |
| 2. | Carrot | - do - |
| 3. | Green beans | - do - |
| 4. | Broadbeans | - do - |

Three criteria were used for the evaluation of preserved fruits and vegetables such as laboratory observations, nutritional and other important changes and organoleptic evaluation. Laboratory observations included changes in the physical nature of the processed foods, their appearance, head space, microbial decomposition, changes in colour, flavours, texture and drained weights if applicable.

Nutritional and other essential qualities included estimation of moisture, ash, vitamins such as Beta carotene and ascorbic acid. Depending upon the relevance to the individual processed fruits acidity, pH and TSS, (Total soluble solids) were analysed. Since minerals are stable to a great extent, only changes in the vitamin content were estimated during the storage period. Organoleptic evaluation of preserved foods was done by a group of selected taste panel members at the beginning, during and at the end of the storage period using a five point scale score cards.

The results of the study are summarised as follows :

1. Laboratory observations indicated that all the processed fruits and vegetables retained their colour, flavour and texture to a great extent without encountering spoilage.

2. Nutrient analysis of fresh fruits indicated a slightly higher value than those of values reported by Gopalan *et al.* (1977). Acid determination indicated a higher value for canned amla and amla preserve of 1.790 and 1.915 respectively. During the storage period there was a slight increase in acidity in all the fruits within a range of 0.002-0.009. For the fruit juices on storage the acidity increase was less for refrigerated juices.

The pH values in canned fruits ranged between 3.4-4.6 and for sugar concentrates 3.1-3.4 and for bottled juices 2.95-3.4. Ascorbic acid

content was found to be decreased at a range of 5-437 mg for canned fruits whereas for sugar concentrates 7-532. The processing losses were higher than storage losses. Beta carotene content also decreased to a great extent on processing especially with mango (canned and sugar concentrate) The loss of ascorbic acid due to processing in fruit seemed to be less for high sugar methods, where the processing losses were more than storage losses.

Analysis of fresh vegetables indicated a low moisture content for beans (52) carrots showed a higher calcium and phosphorus content (102.8 mg and 461.2 mg) Beta carotene present was more in carrots at a level of 2142 meg.

On storage a decrease of 4-8 mg of ascorbic acid and 3-198meg of Beta carotene were observed among bottled vegetables. Dried vegetables showed decrease in ascorbic acid 5-7 mg and Beta carotene (2-20 ug) over the storage period.

The dehydration ratio was maximum for beans (15:1) whereas the rehydration ratio was maximum for carrots (1:5)

3. Organoleptic scores indicated favourable values for the preserved products of all the four forms immediately after processing and storage.

Recommendations

Based on this study, the following recommendations can be made that further research can be carried out taking all the possible available fruits in season and evolving standardised preservation methods and finding out the extent of nutrient losses in the foods preserved, as basis for a guide in processing.

In addition to nutrient analysis efforts must be made to indicate the cost of the preserved items and their popularisation to facilitate their use in the households.

IMPACT OF APPLIED NUTRITION PROGRAMME ON KNOWLEDGE ATTITUDES AND PRACTICES OF THE SELECTED HOMEMAKERS TOWARDS THE PROGRAMME IN THOOKANAICKENPALAYAM

C. Yegammai

Nutrition during pregnancy, lactation and early childhood are of utmost importance to the health and well being of the future citizens. The general physical condition of the young child resulting from his nutritional status plays an important role in fulfilling his mental capacities. Among the many features of the environment, nutrition has been accepted as a prerequisite for optimum growth and development.

Provision of adequate and nutritious foods, free of cost for the entire population of the vulnerable sections is impossible for any country. Malnutrition along with insufficient knowledge about food values, high birth rate, poor economic conditions and inadequate sanitary environment has victimised millions.

One of the large scale, nationwide challenging programmes that has been undertaken in India is the Applied Nutrition Programmes. It is a concentrated effort to bring about improvement in the nutritional status of the vulnerable sections of the populations is an outcome of this realisation.

Every programme in general and nutritional programmes in particular need to be evaluated for their efficiency, functional and usefulness to the society. Applied Nutrition Programme requires such evaluation as it is a people's programme. Hence, this study was undertaken with a view to find out the impact of Applied Nutrition Programme on the knowledge, attitudes and practices of selected home makers in Thookanaickenpalayam Block after four years of operation of Applied Nutrition Programme.

Materials and Methods

Selection of the area and location of the sample

Thookanaickenpalayam Block was selected for the study because it had completed four years of Applied Nutrition Programme and was in its last year of implementation, during the conduct of the study. Among twenty one villages which were covered under Applied Nutrition

Programme, 10 villages were selected for the study because of their easy approachability and distance. Fifteen home makers were selected in each village at random as the sample for the study. The criterion followed for the selection of the homemakers for the study was that they should have participated at least in one of the activities conducted under Applied Nutrition Programme.

The tools used to collect the data

An interview schedule was prepared to be administered on the sample. The interview schedule called for the background data about the selected households, expenditure pattern, awareness about the operation of Applied Nutrition Programme activities, their participation in the programme, benefits realised, nutritional knowledge acquired nutritional practices observed and change of attitudes towards food habits and nutrition aspects. The data was collected through the interview method.

Results and discussion

Socio-economic background

A majority (55 per cent) were adults. Only six per cent were in preschool age. The level of illiteracy was only 18 per cent. The major occupation of the selected families was agriculture. The standard of living was comparatively better because 36 per cent were having the income of Rs. 801 to 1000 and majority of the families (62 per cent) had family size of 4 to 6. The percentage of nuclear families was 86 per cent.

Extent of involvement in the programme

A majority of the families had started kitchen garden during the first year of implementation of the programme. All had acquired assistance in the form of seeds and seedlings and among the various plants raised papaya and greens ranked first (88 and 70 per cent). All the gardens raised were found to be surviving till the conduct of the study as they supplied vegetable not only to their diet but also added some income. From the point of view of motivating the homemakers to raise kitchen garden, officials rank first (59 per cent). The benefits expressed were increased consumption of vegetables (94 per cent), inclusion of new foods especially papaya, psychological satisfaction, utilising the leisure time in a good way and able to use fresh vegetables. Ninety-six per cent of them said they would continue the garden.

Among the poultry holders, 86 per cent expressed that they started poultry unit only because of the implementation of Applied Nutrition Programme and in many of the families, the number of birds had increased. Majority of them (60 per cent) expressed that all the family members were given egg. The benefits expressed were getting extra income (60 per cent), experience to start on large scale (6 per cent) best recreational activity and able to obtain nutritious food.

Mahalir manrams met once in a week. The major activities carried out were handicrafts mainly making of bags, cooking demonstrations and tailoring. All were aware that they get tailoring machines, cooking utensils and financial assistance for demonstration from the programme.

Knowledge acquired by the homemakers :

The nutritional knowledge acquired by the homemakers been exhibited in Table I.

TABLE I
NUTRITIONAL KNOWLEDGE ACQUIRED BY THE HOMEMAKERS

| S.No. | Nutritional aspects | Percentage of homemakers stating correctly |
|--------------------------------|--|--|
| a) Selection of Foods | | |
| 1. | Whole wheat flour is better than refined wheat flour | 96 |
| 2. | Greens are to be used because they are good for health | 88 |
| 3. | Hand pounded rice is better than parboiled and raw rice | 76 |
| 4. | Rice bran is better than husk | 3 |
| b) Preparation of foods | | |
| 5. | Washing the vegetables before cutting is better than after cutting | 89 |
| 6. | Peeling the skin of all the vegetables is not good | 80 |
| 7. | Cutting the vegetables into bigger pieces is better than cutting into small pieces | 64 |
| c) Cooking of foods | | |
| 8. | Cooking the vegetables for adequate time with just adequate water would preserve the nutrients | 95 |
| 9. | Straining of cooking water of rice is not good | 90 |
| 10. | Tomato is more nutritious when it is eaten raw than cooked | 89 |
| 11. | Cooking soda should not be used | 85 |
| 12. | Sprouted grams should be eaten raw to get all the nutrients | 83 |
| d) Feeding practices | | |
| 13. | Fruits can be fed to the infants | 66 |
| 14. | Caster oil should not be given to children | 64 |
| 15. | Gripe water is not necessary for the children | 63 |
| 16. | Starving the child during disease condition is not good | 63 |
| 17. | Boiled cooled water should be given during diarrhoea | 60 |
| 18. | Nutritious foods should be given to children | 58 |

The nutritional knowledge acquired by the selected homemakers with regard to selection, preparation and cooking of foods and feeding practices was remarkable.

The knowledge of the homemakers with regard to the foods for functions and for vulnerable group is also encouraging.

More than 80 per cent of the homemakers considered the programme essential and that it had effected desirable changes in the villages.

Nutritional Status

The homemakers were aware of the changes like decreased child mortality, incidence of abortions and still births and increased food consumption now-a-days when compared to that of earlier days.

Poultry rearing

The attitude of the homemakers regarding the poultry rearing were desirable which was reflected through the high scores for the following aspects. i.e. hybrid birds will lay more eggs than the country birds (92), the droppings of the poultry unit is the best manure the number of poultry units have increased now-a-days and the births should also have a balanced food.

Kitchen garden

It is alarming to note that majority of the homemakers (73 per cent) were with the attitude that only when they are supplied with the seeds they can raise garden whereas they can do the work with their own collections. Attitude regarding the raising of garden with waste water, engaging of children in gardening and preparation of manure with kitchen waste is desirable.

Mahalir Manrams

The attitudes of the homemakers regarding its importance, its role in women's improvement, the activities and the importance of participation are favourable.

Nutritional facts :

The attitudes of the homemakers about the nutritional facts are summarised in Table II.

TABLE II

ATTITUDES OF THE HOMEMAKERS ABOUT NUTRITIONAL FACTS

| S.No. | Statements | Percentage of home makers Stating | | |
|-------|--|-----------------------------------|----|--------|
| | | Yes | No | Others |
| 1. | The breadwinner only should eat nutritious food | 48 | 48 | 4 |
| 2. | Rich people need not eat greens | 4 | 94 | 2 |
| 3. | Rich people need not eat Ragi | 3 | 89 | 8 |
| 4. | It is not necessary that pulses should be consumed daily | 64 | 36 | — |
| 5. | More expenditure should be incurred on cereals | 62 | 38 | — |
| 6. | Addition of cooking soda is not good for health | 9 | 89 | 2 |
| 7. | There is no loss of nutrients when foods lose their freshness | 21 | 79 | — |
| 8. | Cooking methods do not induce any change in the Nutrients | 29 | 53 | 18 |
| 9. | When we are well off, we need not depend upon breast milk for the baby | 10 | 88 | 2 |
| 10. | As the breast milk contain all the nutrients, there is no need to supplement with any other food till the baby is breast fed | 71 | 29 | — |
| 11. | When the mother feeds the baby she should eat lot of rice | 41 | 51 | 8 |
| 12. | Consumption of nutritious food during pregnancy will result into difficult labour | 61 | 35 | 8 |
| 13. | Anaemia is a infectious disease | 39 | 54 | 7 |
| 14. | Diarrhoea is common among the children during early stage and one need not worry about it | 45 | 53 | 2 |
| 15. | During febrile condition the patient should not eat but fast | 78 | 21 | 1 |
| 16. | Consumption of fruits/juices will cause cold | 43 | 51 | 6 |
| 17. | Obese people will eat lot of food | 19 | 73 | 8 |
| 18. | Importance should be given only to taste and not to nutrient | 11 | 88 | 1 |

The attitude of the homemakers towards some basic facts is sound. The attitude of the homemakers regarding feeding the expectant women is not quite favourable because 61 per cent feel that the consumption of nutritious food may result in difficult labour.

The practices adopted regarding selection, preparation and cooking of foods and feeding practices are given in Table III.

TABLE III

ADOPTION OF PRACTICES WITH REGARD TO SELECTION,
PREPARATION AND COOKING OF FOODS AND FEEDING PRACTICES

| S.No. | Aspects | Percentage of homemakers adopting |
|-------------------------------|---|-----------------------------------|
| a) Selection of foods | | |
| 1. | Using parboiled rice | 94.7 |
| | Raw rice | 2.0 |
| 2. | Using greens twice in a week | 84.7 |
| | Using greens daily | 8.7 |
| 3. | Using whole wheat flour | 93.7 |
| | Using refined wheat flour | 6.6 |
| b) Preparation of food | | |
| 4. | Washing the vegetables before cutting | 83.3 |
| | Washing the vegetables after cutting | 9.4 |
| 5. | Cutting the vegetables - small pieces | 55.7 |
| | Cutting the vegetables - bigger pieces | 42.0 |
| c) Cooking of foods | | |
| 6. | Cooking the vegetables in adequate time and water | 92.7 |
| | Boiling and straining | 7.3 |
| 7. | Not using soda while cooking | 82.3 |
| | Using soda while cooking | 16.7 |
| 8. | Using tomato in cooked form | 83.3 |
| | Using tomato in raw form | 16.7 |
| d) Feeding Practices | | |
| 9. | Liberal amount of water is given during diarrhoea | 61.3 |
| | Water is restricted during diarrhoea | 38.7 |
| 10. | Gripe water is not given to children | 53.3 |
| | Gripe water is given to children | 44.7 |
| 11. | Caster oil is given to children | 55.3 |
| | Caster oil is not given to children | 43.3 |
| 12. | Fruits given to infants | |
| | Dates | 27.3 |
| | Papaya | 24.1 |
| | Tomato | 12.3 |
| | Others | 12.6 |

Adoption of desirable practices of the homemakers was satisfactory.

An attempt has been made to test the following hypothesis.

There is association between -

- i. educational level and the knowledge acquired by the homemakers.

- ii. educational level and the number of practices adopted by the homemakers.
- iii. educational level and the number of desirable attitudes developed by the homemakers.
- iv. the age and the knowledge acquired by the homemakers.
- v. the age and the number of practices adopted by the homemakers
- vi. the age and the number of desirable attitudes developed by the homemakers.
- vii. the knowledge acquired and the number of practices adopted by the homemakers.
- viii. the knowledge and the number of desirable attitudes developed by the homemakers.
- ix. the knowledge acquired and the number of activities participated and
- x. the number of activities participated and the number of desirable attitudes developed by the homemakers.

Results of statistical test based on X² and normal test led to the following conclusions.

- i. Age and practices are negatively correlated i.e. as the age is increases the number of practices adopted is decreasing.
- ii. knowledge and attitude are associated i.e. as the knowledge is widened the number of desirable attitudes are also increased.
- iii. There is an association between the awareness and the activities i.e. increase in knowledge resulted in increased participation in ANP.
- iv. The more increase in the participation of various activities resulted in improvement in desirable attitudes.

Summary and conclusion

The study was conducted to find out the impact of Applied Nutrition Programme on the knowledge, attitudes and practices of homemakers revealed that it had made an impact in the acquisition of knowledge, development of desirable attitudes and the adoption of nutritional practices on the selected rural homemakers.

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KNOWLEDGE ATTITUDE AND PRACTICE OF THE PRIMARY SCHOOL CHILDREN BEFORE AND AFTER THEIR EXPOSURE TO NUTRITION HEALTH EDUCATION AND ENVIRONMENTAL SANITATION

N. Gajalakshmi

Introduction

Health is the birth right of every individual. According to the world Health Organisation (WHO, 1970), optimum health is, "a state of complete physical, mental and social well being and not merely absence of disease or infirmity". The state of health and nutrition of present day children will determine the quality and calibre of nation in 2000 A.D. and beyond (Gopalan, 1980)

Devadas (1975) states that life is the noblest gift of God and health is one of its greatest blessings. That is why health is regarded as wealth. Good nutrition is an important component of health. More than any other single factor, nutrition determines the health of the human beings at all stages. Nutrition and health are essential for physical, motor and psychological development of children who constitute the wealth of the country (Gopalan, 1982).

Malnutrition is a serious national problem affecting the growth and well being of millions of children and adults. It cannot wait for an increase in food supply or individual income for its solution. The best and most effective long term approach to eradicate malnutrition is imparting nutrition education formally and informally in the institutions where any sort of education is imparted (Banerjee, 1975). Nutrition education should stress the individual responsibility and intelligent, informed decisions that are compatible with the ethnic, religious and economic background and habit of people (Theodore, 1975).

The Primary School offers unlimited scope for delivering health and nutrition education. Apart from being easily accessible and responsive to new concepts, school children are good potential disseminators of health/nutrition messages to their families. Primary schools can play a vital role in imparting nutrition and health education to children, who are the future architects of the nation. Through the children, their mothers and the entire community can be reached (Devadas *et al.*, 1982)

There have been some efforts-global and national to give nutrition education to children through the formal educational channels, but the outcomes are not evident in terms of food behaviour and good health habits. The child cannot often, select his own diet but just accepts the food offered. He has limited opportunities to relate his nutrition knowledge to eating behaviour (Ramons, 1973). If good returns are expected from the investments in education conflicts between what is being taught in the school, and those that are being practised at home, will have to be resolved. For this purpose mother's nutritional knowledge must be ensured.

Nutrition education is effective only if it results in behavioural change and the learner begins to eat a variety of foods by changing his attitude (JADA, 1978). Such changes in attitudes require knowledge, awareness of the benefits that may be obtained from acceptance of new ideas and adjustments in food related habits which ultimately lead to practice of what is being learnt (Ascroft, 1976; Gopalan, 1980; and Prasad, 1980) believe that providing adequate knowledge regarding foods and nutrition will help to bring about a behavioural change among the people. Attitudes to food and nutritional knowledge may be the most powerful factors in determining behaviour (Mitchell, 1981).

Evaluation of nutrition education programmes is essential for future programme planning and for improvement (Sims, 1976). Evaluation involves carefully appraising the functioning, measuring the workdone, and the distance travelled toward the stated objectives in a programme and assessing the cost in terms of money, time and material for producing the result (Gopalan, 1974).

Any evaluation strategy must necessarily encompass the cognitive, the affective, and the psychomotor domains of learning. Thus, evaluation determines not only the knowledge acquired, but more importantly, to what extent the acquired knowledge induces a change of attitudes and habits in favour of better nutrition and how this change is reflected in the physical and intellectual activities of the child (FAO 1973).

Since nutrition education at the early of the child's life is every important "a pilot study was undertaken to incorporate Nutrition health education and environmental sanitation at primary stage sponsored by NCERT and UNICEF.

As part of the project hundreds of school teachers were trained to teach nutrition/Health concepts to primary school children. The one

week intensive teacher training programme focused on the use of Nutrition Health concepts. After the children had been exposed to this curriculum, its impact on them and their caretakers were evaluated.

Realising the importance of assessing the gain in cognition and psychomotor domains, arising out of a carefully designed and implemented nutrition education programmes, this study was directed towards determining the gain in knowledge, changes in attitudes and practices of children with regard to nutrition, health and environmental sanitation, in North Arcot District by applying quantifiable tools. It is hoped that the findings of the study will be helpful in planning the primary school curriculum with a focus on health of children.

EXPERIMENTAL PROCEDURE

The experimental procedures followed for the present study "The knowledge, Attitude and Practice Study of the Nutrition Education Programme in North Arcot District" consisted of the following:

1. Selection of the sample
2. Collection of background information regarding the nutrition and health practices, their knowledge in nutrition and health of the sample
3. Preparing the evaluation model for measuring knowledge and retention
4. Evaluation for awareness
- and 5. Evaluation for finding the applicability of nutrition and health knowledge imparted.

1. Selection of the sample

The present study is part of the national programme "Integration of Nutrition/Health Education and Environmental Sanitation at Primary Stage" sponsored by NCERT/UNICEF India. This programme aims at integrating nutrition health and environmental sanitation through the existing syllabus in the primary schools, so that teaching of nutrition education will not involve any additional staff time and resources with this concept in mind, nutrition education is being imparted to the primary school children in the North Arcot District through an integrated approach prior to the teaching of nutrition Education, the teaches were oriented to nutrition education through inservice training programme.

Although nutrition and health education is being imparted to all the children learning through class I to V only. V children were selected to measure the impact, since their comprehension, ability to write and express were higher than that of the children studying in lower classes. The number of subjects chosen for the evaluation study is presented in Table I.

TABLE I
SCHOOLS FROM WHICH THE SUBJECTS WERE CHOSEN TO BE THE SAMPLE

| S.No. | Name of the Schools | No. of Students | |
|-------|--|-----------------|--------|
| | | Male | Female |
| 1. | Passuvankottai | 33 | 39 |
| 2. | Kutchipalayam Panchayat Union Elementary School | 50 | 50 |
| 3. | Olliyathur Elementary School | 43 | 57 |
| 4. | Kilkothur Elementary School | 50 | 50 |
| 5. | Pitchanatham Elementary School | 50 | 50 |

Besides 472 children who constituted the experimental group 50 children selected at random from schools in North Arcot district who did not receive any nutrition education formed the control group. Children in the experimental group and in the control group belonged to the age group of 9+studying in class V. Their families were of similar economic status and social conditions.

2. Collection of Background information

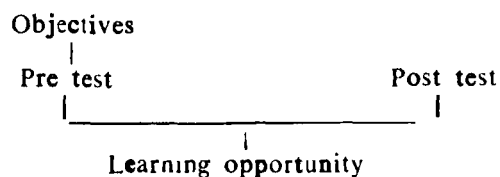
Nutritional surveillance is an essential instrument for the detection of nutrition problems, for the planning and evaluation of action programmes for both development and emergency situation and for the formulation of policy. Hence it was necessary to conduct a survey to find out the existing nutrition practices. The findings of the survey formed the basis for planning nutrition education (WHO, 1976; Maron 1975). An interview schedule (Appendix I) was developed covering the following areas.

1. General background of the family
2. Food expenditure pattern
3. Food habits, knowledge of Nutrition and health

The data were collected by the interview method from the parents of the children studying in class V from the selected primary schools.

3. Preparing the evaluation model for measuring knowledge and retention

To find the effectiveness of the integrated nutrition Health education approach in teaching the primary school children the following model was followed.



a. Objectives

1. Enable primary school children and their care takers to understand that proper nutrition is essential for good health and normal physical and mental development.
2. Educate their children and their caretakers in the selection and preparation and conservation of good quality food.
3. Develop in the children desirable hygienic and environmental sanitation practices.

In the longrun, the following out comes would be expected from the project

1. Improved awareness and knowledge of nutrition health, hygien and environmental sanitation of the target groups of children teachers and parents.
2. Change in Food habits.
3. Improvement of nutrition and health status in farms of height weight and when possible to evaluate the children clinical picture.
4. In creased food production through school kit hen garden.
5. Improvement in school attendance.
6. Reduction in morbidity and mortality.

b. Pre-test and post-test

To evaluate the gain in knowledge 250 children studying in class V were pre and post-tested with 10 questions. The difference between the means of the pre-test and post-test was calculated.

c. Learning Opportunity

Learning opportunities provided to the children included teaching along with the other subjects, participation in the school garden, participation in the noon meal programme, field visits use of audio visual aids etc.

4. Evaluation of Nutrition and Health Knowledge

The effectiveness of integrated nutrition and health education approach in increasing the knowledge of what people had learnt and their practice and application of the principles in day to day life were evaluated by the improvement registered in a written test in nutrition health education. This test was administered before teaching nutrition health concepts and again after seven month of teaching. The test of knowledge contained 10 items.

For the administration of the tests all the teachers from the selected schools were given identical instructions. The teachers were asked not to help the students in during the tests.

Teachers didnot discuss about the tests either with the students of among themselves. Thus, the Chance of teachers helping the children with the test was avoided. The same test items were used for pre and post-tests, However, to make the post-test appear different from the pre-test, the order of the question was changed. To help determine the effectiveness of this approach in stimulating interest in pupils in learning facts about nutrition and health, each teacher was also interviewed once, which this, approach was in progres. The pupils reactin, and enthusiasm or lack of it was observed by the teacher while they were writing the tests, In addition, the pupils were given freedom to express their opinions if any about the subject of nutrition and health.

5. Evaluation of nutrition and health practices

A checklist to findout the practice of nutrition and health Consisting of 15 items was formulated. The teachers and the investi-gator observed the practices of children at dffcient situations.

6. Evaluation to find the attitude of nutrition and health

True or false items to findout the children's attitude of nutrition and health Consisting of 20 items was formulated The teachers and the investigator observed the attitude of children at different situations.

7. Assessment of the nutritional Status

The anthropometric measurements namely height, weight arm cricumferences head cricumferences and, chest cricumferences are the important indices of the nutritional status of the individual. Among these dimensions of the nutritiona'l status of the individual the heights and weight sare the most important as increases in weight is directly propositional to the food intake of the individual, provided the individual doesnot suffer from any physical illness. Hence the heights and weights of children were recorded every month on the same day over a period of six months. The heights, were recorded with the help of a measuring tape and weights were taken by using a bath room scale.

a. Height

For primary school children a non - stretchable fibre glass measuring tape was used for height measurements was fixed to the wall. The subjects were made to stand on the floor; barefooted, with the feet parallel and with heels, buttocks, shoulders and back of head touching the wall. The head was held erect comfortably with the aim hanging at the sides in a natural manner. A wooden scale was placed gently on the head perpendicular to the wall and the height was measured from the tape correct 0.1 cm.

b. weight

weight is a valuable measure of its health and nutrition. The most common weighing machine has a face or dial which looks like a clock. The weights are marked in kilograms around the dial. The subjects were made to stand on the weighing machine with the erect head comfortably with the arm hanging at the sides in a natural manner and weight was measured from the weighing machine.

TABLE II
DISTRIBUTION OF SCORES IN KNOWLEDGE TEST IN NUTRITION

| S.No. | Scores | Before | | Maximum marks = 30 After | |
|-------|----------|--------|--------|-----------------------------|--------|
| | | Male | Female | Male | Female |
| 1. | 6-8 | 2 | 3 | 1 | 2 |
| 2. | 8-10 | 28 | 24 | 5 | 6 |
| 3. | 10-12 | 69 | 68 | 26 | 25 |
| 4. | 12-14 | 26 | 29 | 64 | 66 |
| 5. | 14-16 | 8 | 5 | 25 | 28 |
| 6. | 16-18 | — | — | 7 | 8 |
| 7. | 18-20 | — | — | 5 | 4 |
| | Total(N) | 133 | 139 | 133 | 139 |
| | Mean | 11.150 | 10.986 | 13.226 | 13.187 |
| | SD | 1.6747 | 1.6534 | 2.133 | 2.158 |

| Comparison | Mean Difference | SED | 'T' |
|------------------------|-----------------|--------|---------|
| Before Training | | | |
| Male Vs Female | 0.164 | 0.2026 | 0.81 NS |
| After Training | | | |
| Male Vs Female | 0.038 | 0.2612 | 0.15 NS |
| Among Males | | | |
| Before Vs After | 2.076 | 0.2361 | 8.79** |
| Among Females | | | |
| Before Vs After | 2.201 | 0.2314 | 9.51** |

** Significant at $p = 0.01$ level

Ns : Not Significant

The above table indicates that, the difference in mean scores of both male and female students is statistically not significant, both in before and after the training. This clearly shows that both male and female pupils are alike in their nutrition knowledge.

The differences in before and after scores are statistically significant both in male and female pupils. This shows that the training given to the pupils significantly improves the knowledge in nutrition aspects.

The scores obtained by the pupils in knowledge in the health are presented in Table III.

TABLE III
DISTRIBUTION OF SCORES ON HEALTH KNOWLEDGE

| S. No. | Scores | Maximum Marks = 30 | | | |
|--------|-----------|--------------------|--------|--------|--------|
| | | Before | | After | |
| | | Male | Female | Male | Female |
| 1. | 6-8 | 7 | 8 | — | — |
| 2. | 8-10 | 19 | 20 | 2 | 2 |
| 3. | 10-12 | 75 | 69 | 17 | 14 |
| 4. | 12-14 | 27 | 31 | 66 | 68 |
| 5. | 14-16 | 5 | 9 | 26 | 29 |
| 6. | 16-18 | — | 2 | 14 | 19 |
| 7. | 18-20 | — | — | 8 | 7 |
| | Total (N) | 133 | 139 | 133 | 139 |
| | Mean | 11.060 | 11.273 | 13.857 | 14.007 |
| | S.D. | 1.6803 | 1.9666 | 2.1561 | 2.1103 |

| Comparison | Mean Difference | SED | 't' |
|-----------------------|-----------------|-------|---------|
| Before Trainig | | | |
| Male Vs Female | 0.213 | 0.223 | 0.95 NS |
| After Training | | | |
| Male Vs Female | 0.150 | 0.260 | 0.58 NS |
| Among Males | | | |
| Before Vs After | 2.797 | 0.238 | 11.76** |
| Among Females | | | |
| Before Vs After | 2.734 | 0.246 | 11.13** |

** Significant at $p = 0.01$ level

NS Not Significant

The above table indicates that both boys and girls scored alike in the test for health knowledge before and after class room teaching. This clearly indicates that sex difference do not influence the health knowledge. The significant 't' value indicate that after teaching students gained more score in health test. This clearly shows that class room teaching has significantly improved students knowledge in health aspect.

Table IV presents the scores obtained by the students in environmental sanitation test.

TABLE IV
DISTRIBUTION OF SCORES IN ENVIRONMENTAL SANITATION TEST
OBTAINED BY STUDENTS

| S.No. | Scores | Before | | After | |
|-------|-----------|--------|--------|--------|--------|
| | | Male | Female | Male | Female |
| 1. | 1 | 18 | 21 | | |
| 2. | 2 | 26 | 36 | | |
| 3. | 3 | 63 | 59 | | |
| 4. | 4 | 26 | 23 | 3 | 4 |
| 5. | 5 | | | 17 | 3 |
| 6. | 6 | | | 18 | 26 |
| 7. | 7 | | | 62 | 64 |
| 8. | 8 | | | 19 | 22 |
| 9. | 9 | | | 10 | 9 |
| 10. | 10 | | | 5 | 5 |
| | Total (N) | 133 | 139 | 133 | 139 |
| | Mean | 2.729 | 2.604 | 6.925 | 6.993 |
| | SD | 0.4269 | 0.4339 | 1.2483 | 1.2025 |

| Comparisons | Mean Difference | SED | CD |
|------------------------|-----------------|-------|----------|
| Before Training | | | |
| Male Vs Female | 0.125 | 0.113 | 1.106 NS |
| After Training | | | |
| Male Vs Female | 0.068 | 0.149 | 0.46 NS |
| Among Male | | | |
| Before Vs After | 4.196 | 0.135 | 31.08 ** |
| Among Female | | | |
| Before Vs After | 4.389 | 0.130 | 33.76 ** |

** Significant at p = 0.01 level
NS Not significant

The scores obtained by the male and female students in the test for knowledge in environmental sanitation is not statistically significant. The significant 't' values indicate that both male and female students gained more knowledge on environmental sanitation after they are exposed to the teaching. This clearly shows the influence of teaching on students improvement.

TABLE V
DISTRIBUTION OF PRE-TEST AND POST-TEST SCORES OBTAINED BY THE EXPERIMENTAL AND THE CONTROLLED GROUP

| S.No. | Scores | Pre-Test | | Post-test | | | | | |
|-------|--------|----------|--------------|-----------|--------------|-------|-------|-------|-------|
| | | Control | Experimental | Control | Experimental | | | | |
| 1. | 0 | 3 | 2 | 7 | 6 | — | — | — | — |
| 2. | 1 | 3 | 3 | 10 | 9 | — | — | — | — |
| 3. | 2 | 4 | 5 | 20 | 21 | 2 | 1 | — | — |
| 4. | 3 | 9 | 8 | 60 | 62 | 3 | 3 | — | — |
| 5. | 4 | 2 | 3 | 26 | 27 | 7 | 8 | — | — |
| 6. | 5 | 2 | 2 | 8 | 11 | 6 | 5 | — | — |
| 7. | 6 | 2 | 2 | 2 | 3 | 4 | 5 | — | — |
| 8. | 7 | | | | | 2 | 2 | | |
| 9. | 8 | | | | | 1 | 1 | 1 | 1 |
| 10. | 9 | | | | | | | 3 | 5 |
| 11. | 10 | | | | | | | 20 | 18 |
| 12. | 11 | | | | | | | 39 | 40 |
| 13. | 12 | | | | | | | 52 | 57 |
| 14. | 13 | | | | | | | 14 | 13 |
| 15. | 14 | | | | | | | 3 | 4 |
| 16. | 15 | | | | | | | 1 | 1 |
| | Total | 25 | 25 | 133 | 139 | 25 | 25 | 133 | 139 |
| | Mean | 2.72 | 2.84 | 2.90 | 3.01 | 4.68 | 4.80 | 11.48 | 11.49 |
| | SD | 1.662 | 1.592 | 1.219 | 1.226 | 1.489 | 1.414 | 1.101 | 1.121 |

It can be seen from the above table that pre-test score is very low when compared with post-test score. Male and female students are almost alike in their scores. Control and experimental students are differing significantly from one another. The pre-test score of the both control and experimental groups are almost alike, whereas after the experimental treatment is given the children from the experimental group performed well in the test.

To test the significance of different mean differences, analysis of variance is carried out and the results are given in Table VI.

TABLE VI
ANALYSIS OF VARIANCE SHOWING THE SCORES OBTAINED BY STUDENTS

| S.No. | Source | DF | SS | MS | F |
|-------|-----------|-----|-----------|-----------|-----------|
| 1 | Tests (T) | 1 | 9078.7641 | 9078.7641 | 5888.80** |
| 2 | Group (G) | 1 | 1011.6096 | 1011.6096 | 656.17** |
| 3 | Sex (S) | 1 | 1.2007 | 1.2007 | < 1 NS |
| 4 | T × G | 1 | 906.3936 | 906.3936 | 587.92** |
| 5 | T × S | 1 | 0.0772 | 0.0772 | < 1 NS |
| 6 | G × S | 1 | 0.4077 | 0.4077 | < 1 NS |
| 7 | T × G × S | 1 | 4.4271 | 4.4271 | 2.87 |
| 8 | Error | 636 | 11983.379 | | |

** Significant at = 0.01 level
NS Not significant

1

| Comparisons | Mean | SED | CD |
|-------------|-------|-------|------|
| Pre-Tests | 2.93 | 0.098 | 0.19 |
| Post-test | 10.44 | | |

The average post test score (10.44) is significantly higher scores after giving nutrition education to the school children.

11

| Groups | Mean | SED | CD |
|--------------|------|-------|------|
| Control | 3.76 | 0.135 | 0.26 |
| Experimental | 7.22 | | |

The experimental group of students score significantly higher marks than the control group of students, who are not exposed to the teaching of nutrition education.

Test x Group Interaction

| Group test | Mean Scores | | SED | | |
|--------------------------------------|-------------|-----------|--|-------|------|
| | Pretest | Post-test | | | |
| Control | 2.78 | 4.74 | Pre-test Vs Post-test incontrol group | 0.248 | 0.49 |
| experimental | 2.96 | 11.49 | Pre-test Vs Post test inexperimental group | 0.106 | 0.21 |
| Control Vs experimental | | | | 0.91 | 0.37 |
| Control Vs experimental in post test | | | | 0.191 | 0.37 |

The control and experimental group of students are alike in their pre-test scores since they are not exposed to nutrition education. The students of both control and experimental groups performed better in post-test scores. The reason for increase in post-test by both the experimental and the control group is due to the teaching of nutrition education in addition to the maturity which the students would have obtained over the period of six months between the pre-test and the post-test. However, the high scores obtained by the experimental group is due to the teaching of nutrition education.

Gain in scores (Gain-post-test score-pre-test Scores):

The gain in scores obtained by the students of experimental and control groups is presented in Table VII.

TABLE VII
DISTRIBUTION OF GAIN IN SCORES OBTAINED BY EXPERIMENTAL AND CONTROL GROUP

| S.No. | Scores | Control | | Experimental | |
|-------|-----------|---------|--------|--------------|--------|
| | | Male | Female | Male | Female |
| 1. | 2 | 6 | 5 | | |
| 2. | 3 | 13 | 14 | | |
| 3. | 4 | 4 | — | | |
| 4. | 5 | 2 | — | | |
| 5. | 6 | — | — | 8 | 5 |
| 6. | 7 | — | — | 17 | 20 |
| 7. | 8 | — | — | 37 | 39 |
| 8. | 9 | — | — | 50 | 56 |
| 9. | 10 | — | — | 16 | 14 |
| 10. | 11 | — | — | 4 | 3 |
| 11. | 12 | — | — | 1 | 2 |
| | Total (N) | 25 | 25 | 133 | 139 |
| | Mean | 3.08 | 3.16 | 8.49 | 7.58 |
| | SD | 0.845 | 0.880 | 1.174 | 2.429 |

The experimental group of students scored higher than control group of students. The sex difference was not high among control group as well as in experimental group.

The statistical significance of the difference between the pre-test and post test scores are tested using analysis of variance techniques. The results are presented in Table VIII.

TABLE VIII
ANALYSIS OF VARIANCE SHOWING THE GAIN IN SCORES
OBTAINED BY THE STUDENTS

| S.No. | Source | DF | SS | MS | 'F' |
|-------|-----------|-----|----------|----------|----------|
| 1. | Group | 1 | 1222.496 | 1222.496 | 984.77** |
| 2. | Sex | 1 | 0.311 | 0.311 | < 1 N.S. |
| 3. | Group×Sex | 1 | 0.198 | 0.198 | < 1 N.S. |
| 4. | Error | 318 | 394.771 | 1.241 | = |
| 5. | Total | 321 | 1617.776 | = | = |

*Significant at $p = 0.01$ level

N.S. Not significant

Conclusion

| Group | Mean gain | SED | CD |
|----------------|-----------|------|------|
| 1. Control | 3.12 | | |
| 2 Experimental | 8.50 | 0.71 | 0.34 |

The experimental group of students gained significantly higher scores than control group of experiments. This shows that exposing the students to nutrition education has helped the students significantly to gain more in their test.

B) Change in Attitudes of the people related to nutrition and health

The test item contained 20 true or false statements. They were given to the pupils to find out their attitude regarding nutrition, health and environmental sanitation. Table shows the results of paired 't' test between before and after imparting nutrition and health education.

TABLE IX
PUPILS ATTITUDES TOWARDS NUTRITION HEALTH AND
ENVIRONMENTAL SANITATION

| Total \bar{X} | Mean \bar{d} | Crude Sum of squares | Sum of squares of d^2 | Variance of d | SE | 't' observed |
|--------------------|-------------------|-------------------------|-------------------------------|--------------------|--------|-----------------|
| 2011 | 14.4126 | 3,1307 | 1622.6573 | 11.2863 | 0.2829 | 5019a.49* |

* Significant at $p = 0.01$ level

The observed 't' value was 50.9419 which was greater than the expected 't' value (i.e.) 1.96 and 2.52 at 5 per cent and 1 per cent level. This implies that nutrition education had helped in the development of positive attitude.

TABLE X
IMPROVEMENT IN NUTRITION AND HEALTH AND SANITARY
PRACTICES OF CHILDREN

| S.No. | Nutrition, health sanitary practices | Percentage | |
|-------|--|------------|-----|
| | | Yes | No |
| 1. | Including raw foods in the diet | 35 | 65 |
| 2. | Eating all the foods served to him/her | 55 | 45 |
| 3. | Including fruits in the diet | 40 | 60 |
| 4. | Washing the plates before eating | 68 | 32 |
| 5. | Drinking boiled and cooled water | 48 | 52 |
| 6. | Washing their hands before eating | 93.5 | 6.5 |
| 7. | Trim the nails and keeping them clean | 70 | 30 |
| 8. | Drying beds in the sun | 63 | 37 |
| 9. | Using a dust bin to throw the waste | 90 | 10 |
| 10. | Cleaning the place after eating | 75 | 25 |

Children had improved their nutrition health and sanitary practices after nutrition education 90 per cent of children used the dust bin to throw away the waste; 93.5 per cent of students washed the fruits and vegetables before eating. The least and improvement was noticed in including raw vegetables and fruits in the diet. This may be due to the unavailability of fruits and vegetables and high cost.

D) Improvement in nutritional status of children

One of the impacts of nutrition education is improvement in nutritional status. Nutritional status is assessed by anthropometric measurements are presented in the following tables. Table XI presents the heights of children measured over a period of 6 months time.

TABLE XI
DISTRIBUTION OF GAIN IN HEIGHTS OF CHILDREN BELONGING TO
CONTROL AND EXPERIMENTAL GROUPS

| S.No. | Increase in height (Cm) | Control | | Experimental | |
|-----------|-------------------------|---------|--------|--------------|--------|
| | | Male | Female | Male | Female |
| 1. | 0.0 - 0.4 | 2 | 2 | - | 1 |
| 2. | 0.4 - 0.8 | 19 | 21 | 7 | 6 |
| 3. | 0.8 - 1.2 | 4 | 2 | 10 | 12 |
| 4. | 1.2 - 1.6 | - | - | 26 | 26 |
| 5. | 1.6 - 2.0 | - | - | 52 | 57 |
| 6. | 2.0 - 2.4 | - | - | 30 | 28 |
| 7. | 2.4 - 2.8 | - | - | 8 | 9 |
| Total (N) | | 25 | 25 | 133 | 139 |
| Mean | | 0.632 | 1.600 | 1.737 | 1.725 |
| SD | | 0.193 | 0.160 | 0.475 | 0.484 |

To find out the significance of mean differences in the increases in height analysis of variance technique was used and the results are given in Table No. XII.

TABLE XII
ANALYSIS OF VARIANCE SHOWING THE INCREASE IN
HEIGHTS OF STUDENTS

| S.No. | Source | DF | SS | MS | F |
|-------|--------------|-----|----------|---------|----------|
| 1. | Group | 1 | 52.4978 | 52.4978 | 260.42** |
| 2. | Sex | 1 | 0.0056 | 0.0056 | <1 N.S. |
| 3. | Group Vs Sex | 1 | 0.0165 | 0.0165 | <1 N.S. |
| 4. | Error | 318 | 64.1057 | 0.2016 | |
| 5. | Total | 321 | 116.6256 | - | - |

Comparison

| S.No. | Group | Mean gain | SED | CD |
|-------|--------------|-----------|-------|------|
| 1. | Control | 0.62 | | |
| 2. | Experimental | 1.73 | 0.069 | 0.14 |

The gain in height is significantly higher in the experimental group of students than the students of control group. This clearly indicates the students who received nutrition education (experimental group) gained significantly more height than their counterparts of control group.

Table XIII presents the comparison between different factors like group. (Experimental Vs control) time of observation (initial and final) and sex (Male vs female) in the increase in height of the students.

TABLE XIII
ANALYSIS OF VARIANCE

| S.No. | Source | DF | | | |
|-------|----------------------|-----|---------|-------------------|-------------------------------|
| 1. | Group | 1 | 2047.48 | 2047.48 | 194.28** |
| 2. | Period/Time | 1 | 78.58 | 78.58 | 7.46** |
| 3. | Sex | 1 | 11.60 | 11.60 | 1.10NS |
| 4. | Group x period | 1 | 0.80 | 0.80 | <N.S. |
| 5. | Group x sex | 1 | 136.22 | 136.22 | 12.93** |
| 6. | Period x Sex | 1 | 0.79 | 0.79 | <N.S. |
| 7. | Group x Period x Sex | 1 | 1.94 | 1.94 | <N.S. |
| 8. | Error | 636 | 8980.20 | 10.54= | atp = |
| | Total | 643 | 8980.20 | Significant NS | 0.01 level Not significant |

Comparisons

| S.No. | Group | Mean | SED | CD |
|-------|--------------|--------|-------|------|
| 1. | Control | 120.88 | 0.353 | 0.69 |
| 2. | Experimental | 125.80 | | |

Height is significantly higher in experimental group than in control group.

The average height of students in final measurement is significantly higher than the measurements taken in initial period. This shows the children are growing and no child remains stagnant in its growth.

| S.No. | Period | Mean | SED | CD |
|-------|---------|--------|-------|------|
| 1. | Initial | 124.69 | | |
| 2. | Final | 125.39 | 0.256 | 0.50 |

| Sl.No. | group | Male | Female | SED | CD |
|--------|--------------|--------|--------|--|--------------|
| 1. | Control | 119.68 | 122.08 | Among control group Female vs male 0.649 | 1.27 |
| 2. | Experimental | 125.88 | 125.73 | Among experimental group Female vs male = 0.278 | 0.55 |
| 3. | Mean | 124.90 | 125.17 | Among males control vs experimental among females 0.500 Control vs experimental 0.499 | 0.98 0.98 |

In gained, both sexes are having almost same height when the overall average heights are compared. But among students of control group females are significantly taller than the male students. However, the difference between males and females is not significant among experimental group of students.

Table XIV presents the distribution of weight gain among students of different categories.

TABLE XIV
DISTRIBUTION OF WEIGHT GAIN (IN KG) OF STUDENTS OF
DIFFERENT CATEGORIES

| S.No. | Gain in Weight | Control | | Experimental | |
|-------|----------------|---------|--------|--------------|--------|
| | | Male | Female | Male | Female |
| 1. | 0.4-0.8 | 19 | 16 | - | 1 |
| 2. | 0.8-1.2 | 6 | 8 | 6 | 9 |
| 3. | 1.2-1.6 | | 1 | 25 | 30 |
| 4. | 1.6-2.0 | | | 69 | 68 |
| 5. | 2.0-2.4 | | | 28 | 24 |
| 6. | 2.4-2.8 | | | 5 | 7 |
| 7. | Total | 25 | 25 | 133 | 139 |
| 8. | Mean | 0.696 | 0.76 | 1.803 | 1.760 |
| 9. | SD | 0.1708 | 0.2263 | 0.3416 | 0.3805 |

To find out the significance of mean gain in weight the analysis of variance is carried out. The results are presented in Table XV.

TABLE XV
ANALYSIS OF VARIANCE SHOWING THE EFFECT OF VARIOUS
FACTORS ON THE WEIGHT GAINED BY THE STUDENTS

| S.No. | Source | DF | SS | MS | f |
|-------|-------------|-----|---------|---------|----------|
| 1. | Group | 1 | 46.9521 | 46.9521 | 396.53** |
| 2. | Sex | 1 | 0.0263 | 0.0263 | <1) |
| 3. | Interaction | 1 | 0.1359 | 0.1359 | 1.15)NS |
| 4. | Error | 318 | 37.6539 | 0.1184 | |
| Total | | 321 | 84.7682 | | |

** Significant at $p=0.01$ level

NS Not significant

Conclusion

| S.No. | Group | Mean | SED | CD |
|-------|--------------|------|-------|------|
| 1. | Control | 0.73 | 0.053 | 0.16 |
| 2. | Experimental | 1.78 | | |

RESULTS AND DISCUSSION

The results of the present study which is a knowledge attitude and practice study of the primary school children is discussed under the following heads.

Impact of Nutrition health education integrated approach on,

- a. Knowledge in nutrition health education and environmental sanitation.
- b. Change in attitude related to nutrition and health.
- c. Improvement in nutrition and health practices of children.
- d. Improvement in nutritional status of children.

a. Improvement in nutrition knowledge of the pupils

The scores obtained by male and female students both before and after the exposure to nutrition and health education were collected and scrutinised. The distribution of marks were presented in Table I.

TABLE XVI
DISTRIBUTION OF SCORES IN KNOWLEDGE TEST IN NUTRITION

| S.No. | Scores | Maximum Marks : 30 | | | |
|-------|-----------|--------------------|--------|--------|--------|
| | | Before | | After | |
| | | Male | Female | Male | Female |
| 1. | 6-8 | 2 | 3 | 1 | 2 |
| 2. | 8-10 | 28 | 24 | 5 | 6 |
| 3. | 10-12 | 69 | 68 | 26 | 25 |
| 4. | 12-14 | 26 | 29 | 64 | 66 |
| 5. | 14-16 | 8 | 5 | 25 | 28 |
| 6. | 16-18 | - | - | 7 | 8 |
| 7. | 18-20 | - | - | 5 | 4 |
| | Total (N) | 133 | 139 | 133 | 139 |
| | Mean | 11.150 | 10.986 | 13.226 | 13.187 |
| | SD | 1.6747 | 1.6534 | 2.133 | 2.158 |

| Comparison | Mean Difference | SED | 'T' |
|-----------------------------------|-----------------|--------|---------|
| Before Training Male vs Female | 0.164 | 0.2026 | 0.81 NS |
| After Training Male vs Female | 0.038 | 0.2612 | 0.15 NS |
| Among Males Before vs After | 2.076 | 0.2361 | 8.79** |
| Among Females Before vs After | 2.201 | 0.2314 | 9.51** |

NS : Not Significant

** Significant at per cent level

The gain in weight obtained by experimental group of students is significantly higher than the control group of students. This implies that experimental group of students because of the exposure to nutrition education and apply them in real life gained more weight than their counterparts who are not exposed to nutrition education.

Summary and Conclusion

Nutrition health education and Environmental sanitation was integrated in the primary school curriculum and the impact was evaluated among the V Standard Students in North Arcot District.

The objectives of the study were to

1. Enable primary school children and their care takers to understand that proper nutrition is essential for good health and normal physical and mental development.
2. Educate these children and their care takers in the selection preparation and conservation of good quality food
3. Develop in the children desirable hygienic and environmental Sanitation Practices.

Sample

133 boys and 39 girls were included in the evaluation study. These boys and girls were drawn from 5 schools in North Arcot District.

Findings

1. The mean score in the knowledge test between boys and girls is not statistically significant. Which means that boys and girls score a like on the nutrition knowledge test.

2. The difference between the pre and post test scores are statistically significant which implies that children have gained in their nutrition knowledge as a result of teaching nutrition health education and environmental sanitation.
3. Similarly the scores obtained in the post test by both boys and girls in the test for health, and environmental sanitation test are statistically significant.
4. Children in the experimental group performed better in all the tests compared with their counterparts in the control group in the post - tests.
5. A checklist containing 49 items to find the attitudes of children regarding nutrition and health and environmental sanitation. It was found that the observed 't' value was 50.9419 which was greater than the expected 't' value 1.96 at 5 per cent level. This implies that the nutrition education had helped the students to develop positive attitude.
6. Children have improved in their nutrition and health practices 90 per cent of Children Started using a dust pin to deposit the waste. 93.5 per cent of children wash the fruits and vegetables before eating them.
7. The children in the experimental group had shown significantly increase in the heights than their counter parts in the control group.
8. The children in the experimental group had shown significant increase in the weights than their counter parts

Conclusion

It can be concluded that integrating nutrition health and environmental sanitation in the curriculum of the primary school children has made them feel their more knowledgeable and develop good habits.

Limitations

A period of 6 months is too short to jump at any conclusions. It needs a longitudinal study to find the real impact.

NUTRITION PROFILE OF THE SELECTED RURAL COMMUNITIES

*Dr. (Mrs) Rajammal P. Devadas
Sakthivelmani, A.*

Introduction

The best resources of a country are the people who can think clearly and act well. With proper nutrition a man can think and work effectively and productively. Every effort needs to be mobilized to improve the nutritional status of the population. How this can be best done is the subject of several current research programmes. Assessment of nutritional status is the first step in planning and programming nutritional activities. Hence an attempt has been made in this investigation to monitor the nutritional situation of the selected population through the use of simple indicators, to identify the main factors responsible for the existing situation and to make corrections in time.

Materials and methods

The two rural communities namely Thekkampatti (Community I) and Rakkipalayam (Community II) of Coimbatore District were selected and studied to assess the quantum of undernutrition and malnutrition through dietary, clinical and anthropometric measurements. All the 215 households of community I and 173 households of community II were studied for the socio-economic and dietary background. The food and nutrient intake of randomly selected subjects from 114 households were assessed by three day weighment method. Clinical examination and anthropometric measurements were carried out for the selected subsample.

Results and discussion

A. Socio-economic back ground

Out of 388 households studied, the existence of joint and nuclear family system was in the ratio of 1:4. The total number of members in the two communities were 1859 members. The average household size was five. The percentage of children, belonging to the age group of 0-6 years were 12 per cent as against 17 to 20 per cent reported elsewhere in India. Males were slightly predominating than the females. Agricultural and industrial work were the primary occupations of community I and II respectively. Fifty five per cent of the members were working as coolies and agricultural labourers. Only two per cent of the people had college and professional education. The literacy level

of the people (49 per cent) was higher than All India level. The average number of pregnancies per women was 3.5. Three per cent of pregnancies ended in still births, abortion and miscarriages.

Fifty four per cent of the families were living below the poverty line. The major expenditure was on food. Seventy three per cent of the families spent 60 per cent of their income on food. Sixty four per cent of the families spent only 10 per cent on clothing. The expenditure for all the other items ranged from 1-10 per cent.

B. Dietary pattern of the selected communities

The staple cereals used were jowar/ragi and rice in community I and rice in community II. Green leafy vegetables and fruits did not find their place in 42 per cent and 32 per cent of the households respectively. Thirty per cent of the families who belonged to low socio-economic group did not use milk and milk products in their daily diet. Even though the vegetables like cluster beans and tomato were available in abundance during the study in community I, only 15 per cent of the families used to preserve the fruits and vegetables. Boiling was the most commonly used method to cook all types of foods followed by steaming and frying. Deep fat frying was usually avoided due to low family economy.

Breast feeding was continued upto 18 months by 68 per cent of the mothers. Only 39 per cent of the mothers started the supplementary foods during the period of 3-12 months. During pregnancy, papaya was avoided in both the communities by more than 80 per cent of mothers. Jack fruit, greens and mango were avoided by the nursing mothers. During lactation, greens, dhal and fruits were avoided generally, for the fear of indigestion, custom and not good for the child. Inclusion of liquids during diarrhoea, bread and kanji during fever, tender coconut and butter milk during chicken pox by greater number of families of both the communities were encouraging.

C. Food and nutrient intake of the selected groups

The average consumption of cereals was adequate by all the age groups of the two communities except for the school going boys, pregnant and nursing mothers of community II and preschool children of both the communities. The intake of other vegetables, roots and tubers, fruits, fats and oils sugar and jaggery, milk and milk products was not adequate. The green leafy vegetables had not found a place in the diet of these two communities.

The mean intake of calories of all age groups of both the communities was not upto the recommended level. The protein intake of nursing mothers of community I and school going children, adolescents pregnant and lactating mothers of community II did not meet the recommended level. The intake of calcium of all the age groups of both the communities did not all in line with calcium requirement, except for the adult women of community I. The dietary iron supply met the requirement only for the school going children, adolescent boys of both the communities. The intake of Beta carotene and riboflavin was not in tune with the requirements.

D. Percapita availability of Calories and Protein

Table I presents the per capita availability of calories and protein in comparison with that of Tamil Nadu and national level.

TABLE I
AVERAGE PER CAPUT NUTRIENT AVAILABILITY

| Nutrient | Average availability per caput per day | | |
|---------------|--|------------|---------------|
| | National | Tamil Nadu | Present Study |
| Energy (Kcal) | 1985 | 1498 | 1828 |
| Protein (g) | 55 | 36 | 44 |

The consumption of energy and protein was much less than the national level. The per capita availability of calories was only 1828 calories as against the per capita requirement of 2243 calories for those households studied.

The per capita availability of calories and protein according to family size in both the communities is depicted in Table II.

TABLE II
PER CAPUT CALORIE AND PROTEIN AVAILABILITY ACCORDING TO FAMILY SIZE

| S.No. | Family Size | Per caput Calorie availability (Kcal) | Per caput protein availability (g) |
|-------|-------------|---------------------------------------|------------------------------------|
| 1. | 2-3 | 1,998 | 57.4 |
| 2. | 4-5 | 1,936 | 43.7 |
| 3. | 6-7 | 1,670 | 36.0 |
| 4. | 8-9 | 1,150 | 32.8 |

There is an inverse relationship between family size and nutrient intake. This is evidenced in the present study also, in that, the consumption of calories and protein was undoubtedly lower in the family size of 8-9 members.

Incidence of energy and protein deficits in rural households:-

The energy and/or protein deficits in rural households are presented in Table III.

TABLE III
ENERGY AND PROTEIN DEFICITS IN THE TWO COMMUNITIES

| Category | Protein deficits | | Not protein deficit | | Total | |
|-----------------|------------------|-------|---------------------|-------|-------|-------|
| | No | % | No | % | No | % |
| Energy deficit | 22.0 | 39.28 | 22.0 | 39.28 | 44.0 | 78.52 |
| Protein deficit | 4.0 | 7.14 | 8.0 | 14.28 | 12.0 | 21.12 |
| Total | 26.0 | 46.42 | 30.0 | 53.56 | 56.0 | 99.99 |

The energy deficit was predominant among 79 per cent of families. The protein deficit was comparatively less (46 per cent of the families).

E. Clinical picture and anthropometric measurements of the selected Communities

The percentage prevalence of deficiency symptoms clearly reveals that the preschool children are at the greater risks than the other age groups. The common deficiency symptoms observed among the preschool children were anaemia, angular stomatitis, changes in hair bleeding gums, rough and scaly skin. Anaemia was prevalent among all the age groups. Nearly 50-66 per cent of expectant and nursing mothers had anaemia. Next to anaemia, vitamin A deficiency symptoms were more prevalent. Among the members surveyed preschool children and school children had xerosis conjunctiva. The height, weight measurements of all the age groups were lower than the norms of those age groups.

Conclusion

The results of this present investigation offers scope to organise a well planned, intensive nutrition education programme to alleviate the problem of undernutrition and malnutrition, blended with nutrition and health aspects, namely desirable weaning practices, supplementary foods, methods of preservation, immunization measures to be adopted, importance of small family, desirable age for marriage, methods of cooking to be adopted to retain the nutrients and significance of good nutrition during vulnerable period. Many more research opportunities covering wider strata of population with varied socio-economic back ground are required to understand the complexity of factors operating in modifying the dietary habits of the people and to enable nutrition polices and programmes to become more effective.

EVOLVING A NEW SIZING MATERIAL FOR COTTON

*Kamala Rangunathan
Dr. Raiammal P. Devadas*

Introduction

Weaving provides employment to millions of people in India. But due to the increased rate of population growth, millions are still unemployed or under employed in the country. Gandhiji emphasised that spinning and weaving as 'cottage industries could help to solve the problem of unemployment.

Somappa (1972) points out, among the cottage and rural Industries, the handloom industry plays an important role in giving work for millions of people in the 5.5 lakhs of villages in India. Handloom weaving is a traditional art still followed by several millions in the country.

Sizing is a preparatory process for weaving, (Sarmira 1978). Sizing provides a protective covering to yarn before it goes to loom for weaving. Proper selection of the sizing ingredients, preparation of the size and the sizing process, all contribute to quality weaving.

Rice and tapioca are the two most commonly used starches for sizing. Since 5 to 7.5 per cent of the size goes on the woven fabric, enormous amount of starches are used by the textile industry, depriving food for the masses. In the context of population explosion and the need to avoid shortage of food, it has become imperative to find out an alternative to rice and tapioca starches for sizing. Moreover the existing method of sizing in the rural areas is a laborious process involving too many members, space and money.

With the view to solve the problems, the investigator has attempted to study the existing practices and evolve a new sizing material which would ensure:

- a. uniform quality of the end product.
- b. low capital investment as suited to village industries.
- c. simple sizing procedure and
- d. standard sizing procedure for sizing all the different cotton materials.

Procedure :

The procedure consisted of two major parts namely A. Survey and Experiment.

A. Survey :

The objectives of the survey was to study the existing methods of sizing in the selected rural areas. Hundred weavers belonging to the weavers co-operative colonies in Velandipalayam, Saibabacolony and Sukrawarpet areas of Coimbatore city were selected at random based on co-operation and convenience.

Data regarding the type of yarns sized, kind of size used, method of sizing, problems encountered in sizing, time consumed and expenditure incurred were collected from the selected samples following the interview method.

B. Experiment :

The aim of the experiment was to evolve a new size mix apply it on cotton yarn and study the effect of the new size.

Cotton yarn was selected for the study, Barve (1967) points out, cotton is the fabric for every home, as nearly 75 Per cent of the world's population wear cotton clothes. Six hanks of 40s count yarns were purchased from a local shop. One hank was retained as grey yarn and the rest was given the sizing treatment.

The ingredients selected for the preparation of new size mix included starch, Benzyl alcohol, ureaformal dehyde and polyvinyl alcohol.

The main purpose of adding starch is to impart binding, stiffening and weighting to fabrics. The addition of benzyl alcohol makes the size molecule to be well combined with the water molecule and form a viscous solution. Ureaformaldehyde helps to impart resistance or recovery from creasing. As Miyao (1973) points out, polyvinyl alcohol increases the pick up, cohesion, toughness and flexibilities that are required for prevention of fuzzy balls with the very strong fibres.

The size mix was prepared as per the details given in table I.

The ingredients stated in the above table were dissolved in ten litres of water, with constant stirring.

TABLE I
INGREDIENTS USED FOR PREPARING THE SIZE

| S.No. | Ingredients | (Yarn to be sized 2.5 kg) Wt. in Kg. | % on 10% of yarn sized |
|-------|-------------------|---|---------------------------|
| 1. | Urea formaldehyde | 1.5 | 32 |
| 2. | Benzyl alcohol | 0.5 | 28 |
| 3. | Starch | 1.9 | 12 |
| 4. | Polyvinylalcohol | 0.1 | 28 |
| 5. | Water | 10 Lits./10 Kg. | — |

Application of size :

The yarn to be sized which was in hank form was dipped in the size mix and kept well immersed for 30 minutes. The hank was occasionally turned, to ensure uniform application of size. The hank was then taken out and squeezed by hand gently without giving much entanglement and strain to the yarns. The yarns were then dried and wound into cheeses by umbar charka. From these cheeses, the weaver's beams were prepared.

Weaving :

The sized beam were gaited in handloom. The sort woven was of plain construction. The weaving was performed at a handloom factory to get the stimulation of actual weaving conditions.

The fabric thus woven was evaluated for the following aspects.

- a. Desizing
- b. Reaction to dyeing with vat colour
- c. Performance test
 1. Breaking strength
 2. Elongation

Findings :

The findings of the study are discussed under the following heads.

- A. Survey
- B. Experiment.

A. Survey :

1. Cotton and rayon were the two yarns sized by the selected weavers.
2. Rice and tapioca starch were found to be in common use.
3. Lack of awareness of the other materials was found to be the main reason for using the above starches.

4. The main complaint about rice starch was that it was expensive. Moreover in the name of Kanji, all the nutrients of rice were lost. Time and fuel consumption were the main problems expressed by majority of the weavers.
5. Street sizing required lot of space and the use of a special kind of brush which was to be operated by two men.
6. Rainy days were not conducive for sizing treatment.

B. Experiment :

1. The newly developed size posed no problem in desizing.
2. The desized fabric absorbed the dye readily and uniformly.
3. The performance of the sized yarn was studied both in hand and power loom. The results obtained per loom hour are given in table II

TABLE II
PERFORMANCE OF THE SIZED YARN DURING WEAVING

| S.No. | Reasons for loom stops | Power loom | Hand loom |
|-------|------------------------|------------|-----------|
| 1. | Single break | 1 | 1 |
| 2. | Multiple break | 2 | 2 |
| 3. | Entanglement | 3 | 1 |
| 4. | Big knot | 2 | 1 |
| 5. | Weft break | 2 | — |
| 6. | Sizing fault | — | — |
| 7. | Others | 1 | — |

From table II, it could be concluded that the loom stoppage due to warp was 11 and 5 per hour in powerloom and hand loom respectively. The allowable breaks for power loom are 10 per hour. The breaks obtained in the present work compares favourably with the standard. As regards hand loom, the allowable breaks as per weaver's Co-operative society is 15. The breaks obtained in the present work is well within the standard.

Hence it could be concluded that the working performance of the warp sized with the new recipe is good.

Effect of size on yarn strength and elongation is discussed in table III

From Table III. It is clear that the percentage increase in strength for the yarn sized with the new recipe was more by 30 per cent over that of the street sized yarn and equal to that of regular standard sized yarn.

As regards elongation, the newly evolved size proved to be superior to others. The elongation at break for the standard sized yarn become less after sizing. The elongation of the street size yarn remained more or less the same. But for the yarn sized with the new recipe, the elongation percentage at break was more by 65 per cent when compared to the original grey yarn.

Hence it could be concluded that the newly developed size would improve the weavability of the yarn.

As regards co-efficient of variation, in strength and elongation, the yarn sized with the new recipe proved to be advantageous, with its less variation when compared to the other methods.

TABLE III
EFFECT OF SIZE ON YARN STRENGTH AND ELONGATION

| S.No. | Particulars | Mean in lbs | Mean Elong in inches | %increase in strength | % Elong-ation | C.V. of Strength in % | C.V.of Elong-ation in % |
|-------|--------------------------------|-------------|----------------------|-----------------------|---------------|-----------------------|-------------------------|
| 1. | Grey yarn | 0.225 | 0.288 | — | 2.4 | 26.29 | 20.34 |
| 2. | Standard sized yarn | 0.372 | 0.247 | 65.33 | 2.5 | 17.65 | 18.06 |
| 3. | Street sized yarn | 0.337 | 0.260 | 49.3 | 2.41 | 23.48 | 20.97 |
| 4. | Yarn sized with the new recipe | 0.370 | 0.483 | 64.44 | 4.02 | 18.60 | 16.77 |

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STUDY OF SELECTED RURAL TEXTILE CENTRES IN COIMBATORE DISTRICT

Dr. (Tmt.) Rajammal P. Devadas
Tmt. G. Krishnabai

India is a developing country with 80 per cent of her population concentrated in the villages undertaking agriculture as the main occupation. Gandhiji too pointed out that it is not cities that make India but the villages. Reconstructing rural India is a Herculean task not only because of the vastness of the area to be covered, but also because of the numerous problems of various types and magnitudes which engulf the nation. Agriculture alone cannot sustain the family, because agriculture is seasonal and provides employment at the most for seven to eight months in a year. So rural people spend the rest of the year doing nothing. In order to overcome this situation, Mahatma Gandhiji had introduced 'Cottage Industries' which were rural based. The revival of the villages, in his view, could be brought about only when the villager get back his craft in his cottage-home and depended for his necessities on the villages and not on the cities. As large scale industrialization, would necessarily lead to passive or active exploitation, Gandhiji believed that 'Khadi' was the only alternative which could successfully tackle the twin problems of unemployment and idleness.

In 1918, Mahatma Gandhiji stepped up the Khadi movement which had been lunched formally in 1904. Khadi, as Gandhiji said, 'is the sun around which other industries revolve like many planets. He was also of the view that the khadi and village Industries programme would make the people self-sufficient. With this end in view, the All India Spinners Association in 1925, and the All India Village Industries Association in 1934 were started for the development of Khadi and village Industries-Sarma (1978). Revival of hand spinning and hand weaving was advocated as the only practical means of alleviating India's wretchedness and misery. The 'Charkha was expected to restore the villages to their rightful place and abolish the distinction between the high and the low in the society. Millions of unemployed and under-employed can ply the charkha easily and produce their own cloth-Arunachalam (1974).

The Khadi and Village Industries Commission (KVIC) has undertaken the responsibility of manufacturing the charka and introducing new techniques in spinning. The distribution of the charkhas to the rural

women is being done through, The Sarvodaya Sangam in Tamil Nadu, The Tamil Nadu Sarvodaya Sangam helps people to start Rural Textile Centres, that is spinning units or Charkha units; which in turn help people to earn money thereby helping them to use their leisure time properly, increasing their family income and helping the family to fulfil their clothing requirements.

The aim of this investigation was to study selected Rural Textile Centres in Coimbatore district and to find out the extent of their help to the people.

Procedure

Samples for this study included the managers of the Rural Textile Centres and members of the Rural Textile Centre. Forty Rural Textile Centres in and around Coimbatore were covered, out of which twenty were contacted in person and the remaining through mail. The investigator interviewed 100 members in total from three centres, namely 30 from Punjai Pullumpatti, 58 from Singanallur and 12 from Vadavalli.

Interview method was selected for collecting information. According to Prakasam (1972) and Gupta (1977) interview is the direct personal investigation, where the investigator collects the necessary data personally. Investigator goes to the spot in person, meets the persons from whom the information is to be collected.

Interview schedule is a blank form where space is allotted for recording the answers to the questions put to the informants - Pillai (1971). Two separate interview schedules were prepared to collect information, one from the managers and the other from the members of the Rural Textile Centres.

The interview schedule framed to collect information from the managers included questions regarding the name of the unit, time of establishment, number and type of Charkhas in the unit, number of plyers in the unit, number of members in the unit, their regularity in attendance, duration of working time, advantages and disadvantages of spinning, other benefits given by the centres to the members and rules and regulations of the centres.

Since it was not possible to visit all the 40 centres the investigator interviewed the managers of 20 centres and collected data from the other 20 through mail.

Another interview schedule framed to collect information from the members, included the details about the name of the members,

family background, number of members in the family and their income, their earning, the advantages and disadvantages of spinning, other benefits derived use of Khadi by them and by their family members. The selected members were interviewed and the data collected were entered in the interview schedule framed for this purpose.

Findings :

Findings of the study are presented under the following headings

- A. Data collected from the Managers of the Rural Textile Centres.
- B. Data collected from the members of the Rural Textile Centres.

A. Data collected from the Managers of the Rural Textile Centres

The total number of women, employed in the selected 40 Rural Textile centres, were 1162, a minimum of 29 were accommodated in each unit, The Selected centres were started from 1962-63 onwards upto 1978-1979. The reasons for selecting the particular locality for the Rural Textile Centres, as stated by the manager were need for job (22), Co-operation of the rural people (17), unemployment among the people (12) convenience of the place (10), agriculture and dry land (7) Khadi consumers (4), place given free by Panchayat (3) and easy availability of charkha (3).

The members were regular in attending the Rural Textile centres. They took leave only during sickness, marriage time and during rainy season. Difficulty in spinning during rainy season was the major reason for their absence.

The motivation forces for the members to join in the Rural Textile Centres were 'Definite wage', Provident Fund', Definite Job, 'No other job opportunities' and 'To get friends'.

The age limit to become members in the centre was between 14 years and 45 years. Only women and girls were taken except in Devanapuram where one handicapped boy was given job opportunity.

The time duration for working was eight hours per day in all the Rural Textile centres, starting from 8-00 in the morning upto 12-30 in the noon, with half an hour break in between and in the afternoon from 1-30 to 5-30.

The members were not permitted to take the Charkha home. Teaching them the art of spinning, supervising, providing cotton, receiving the spun yarn, giving them wages and all type of instruction were possible only when they are together in one place. The teacher or the instructor was appointed by the Sarvodaya Sangam. The qualification required for the instructor was S.S.L.C. or the equivalent. After selection, six months training was given to the person to make him or her suitable for the purpose of managing the centre. The manager was paid nearly Rs 200/- month as salary and permitted to take Rs. 300/- worth of clothing items per year.

The parts and functions of the spinning wheel, the method of operating the spindle, making the hanks and to rectify the repairs if any were taught to the members. Through Makkal Kalvi Thittam (மக்கள் கல்வித் திட்டம்) the members were also given knowledge regarding nutritious food, natural cure for sickness and to sign their own names.

In addition to the above duties, the manager must maintain the attendance register, register for issue of quantity of cotton to the members and the yarns received from them and also register for daily wages.

Details about the type of charkha, number of centres using the charkha, Count of yarn, cost of charkha, advantage and quantity of yarn spun are indicated in Table-I

TABLE - I
DETAILS ABOUT THE CHARKHA

| S.No | Type of charkha | No. of centres | Count | Cost Rs. | Advantages | Quantity spun/day |
|------|-----------------|----------------|-------|----------|------------------------|-------------------|
| 1. | 6 spindle | 35 | 56 | 750.00 | Comfortable and fast | 20-25 Hanks |
| 2. | 12 spindle | 2 | 80 | 1500.00 | Quicker than 6 spindle | 40-50 Hanks |
| 3. | Muslin | 3 | 100 | 750.00 | Too fine yarn | 10-12 Hanks |

From Table-I it is clear that 6 spindle ambar charkhas were used in 35 centres, the cost of the Charkha being Rs. 750/- whereas 12 spindle Charkhas were possessed only by two centres and the cost of each was Rs. 1500/-, Even though the price for 12 spindle charkha was double that of 6 spindle, Charkha the yarn spun was of fine quality that is 80 counts and double the quantity could be spun namely 40-50 hanks/day. Muslin Charkha was possessed only by three centres, it could spin 100 counts yarn but the quantity spun was very less that is 10-12 hanks.

Wastage occurs at different stages, the minimum in the plyer 0.5 per cent and the maximum 12 per cent in the preparation. Wastage during the process of spinning varied from 3 to 7 per cent. cotton for spinning was obtained from the Sarvodaya Sangam.

The merits of spinning were earning, proper utilisation of time job opportunity, Chance to move with others and to get clothing items for the family members. Demerits as expressed by 14 were chest pain and physical strain. One of the problems in running a Rural Textile Centre in the beginning was attendance of the members as expressed by eight and this could be solved through proper motivation, Problems like difficulty in teaching in the beginning, frequent repairs in the charkha in the beginning and also wastage were all solved through patient teaching and proper instruction.

Minimum requirements for running a Rural Textile Centre are given in Table-II.

TABLE II
MINIMUM REQUIREMENTS FOR A RURAL TEXTILE CENTRE

| S.No. | No. of Items | Cost/item | Total |
|---------|--------------|----------------------------------|--------------|
| 1. | 25 Charkhas | Rs. 750/Charkha Rs. 1000/plya | Rs. 18,750/- |
| 2. | 4 Plyers | | Rs. 4,000/- |
| 3. | Cotton/month | Running Cost | Rs. 5,000/- |
| 4. | Accessories | | Rs. 250/- |
| * Total | | | Rs. 28,250/- |

A total of Rs. 28, 250/- were needed to establish and run a unit

* Data Collected in 1979

Wage given for each hank of yarn made was 20 paise, an individual was capable of spinning 20 to 25 hanks per day, hence the wage would range from Rs. 3/- to Rs. 4/- per day, wage given for a plyer was Rs. 2/- per kgs of tape made. An individual could easily make 2 to 3 kgs of tape in a plya. So the wage received by him would be Rs. 4 to Rs. 6/- per day.

In addition to the wages, the members were provided, provident fund, one set of clothing item once in a year during Pongal time, additional 10 per cent rebate for the member to purchase Khadi clothing items for their family members.

Rules of the Centre were Compulsory prayer, use of Khadi clothing, Sunday as holiday, working hours as eight hours and to spin 20 hanks.

All the managers felt that there was relationship between spinning and educational level of the members. Educated members were found to understand things better and were independent in doing the spinning and also to repair the minor defects in the charkha by themselves. During summer it was easy for the members to spin yarns, because the climate was such that the fibres would cling together whereas during rainy season, the fibres would not cling together due to the wet atmosphere, hence the yarn spun would break causing difficulty in spinning.

B. Data collected from the members of the Rural Textile Centres

In 40 per cent of the families, the number of family members ranged from 2 to 5 whereas in 55 per cent the range was between 6 and 9 and only in five per cent the range was between 10 and 12. The income of the selected families ranged from Rs. 50/- to Rs. 1,150/- per month. For a majority 65 per cent the family income was between Rs. 50/- and to Rs. 450/- per month. With minimum income range and maximum number of members in the families it was essential that they had a full time occupation like spinning for one or two member of the family. Spinning provided them job for 8 hours/day and offered a wage of about Rs. 4/- to Rs. 6/- per day according to their capacity. Hence Rs. 50/- to Rs. 100/- per month were earned by the member in the spinning centre which was of real monetary help to the family. Jain (1979) also found that an average earning per worker went up to Rs. 80/- per month in good centre.

The advantages as stated by the members were that spinning offered earning for them, it provided clothing, made proper use of the leisure time and it also helped them to move with others.

The main difficulties expressed by them were chest pain and body pain in the beginning but as the days passed they were used to the spinning habit.

Conclusion

Since this Rural Textile Centres are providing so much earning and job opportunity to the rural youth girls and women. Khadi and Village Industries Commission (KVIC) should take steps to start Rural Textile Centres in all the villages in Tamil Nadu as per their requirements. Suitable market for the products manufactured in the Rural

Textile Centre must be found. Only then the members would be having job opportunity as well as earning through out. Improved techniques should be taught to the rural girls and women KVIC should take step to provide raw materials and credit facilities without delay to the Rural Textile Centres to enable them to function continuously thereby help the rural women's thus if KVIC could take more effort, then the village women's unemployment problem could be solved through the Rural Textile Centres.

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A STUDY OF BATIK PRINTING OF KHADI COTTON IN RELATION TO WAXES AND DYES

Dr. (Tmt.) Rajammal P. Devadas

Dr. P. Saraswathi

Introduction

Textile printing is the most important of all the processes used at present to decorate textile materials. The process of printing occupies a prominent place in textile finishing. Without the above fabrics manufactured would have become monotonous and would not have been very acceptable, Barve (1967). Therefore, modern artists are giving their attention to textile designing and printing, with excellent results, (Minter, 1954)

Some of the methods of printing in the small scale industries are Block, Screen, Batik and tie and dye. Among these, the resist style of Batik printing offers an effective method of reproduction of design and has a diverse application. Batik implies covering or impregnating certain portions of the cloth which are intended to be kept in the background colour, so that when the cloth is subsequently dyed, the colour does not penetrate the portion which have been previously impregnated with the resist. This produces the desired pattern or design. The process is long and tedious and often requires months to produce a single piece.

Batik work is now entering a new era. There are thousands of artists who are engaged in designing Batik materials for clothing, furnishings and wall hangings. Batik has become one of the largest small scale industries within the limit of textile industries. It has not only given self employment to designers and workers but it is also helping the nation to earn a good deal of foreign exchange, (Krishna, 1977). Consequently there has been an increasing demand for better designs and finer craftsmanship.

The demand for the hand made Batik is growing. It is hoped that in the coming years, thousands of young people will have self employment in this field. Hence this investigation was aimed at study Batik printing on Khadi Cotton material, with the following objectives:

1. Finding out the effect of paraffin and bees wax on Batik, both in their pure as well as combination forms on white khadi materials.

2. Finding out the suitable dye for Batik printing.
3. Evaluating the quality of the Batik printed materials through visual inspection and laboratory tests.
4. Finding out the production cost of Batik printing.

Procedure

Sixteen metres of white khadi material was purchased for the study. A tjap block made out of wood with nails arranged in the form of a floral design which is suitable to apply one colour was selected. The size of the tjap block was 10 cm × 10 cm.

Both paraffin and bees wax were selected and different proportions of the waxes were tried as given below:

1. 100% Bees wax
2. 100% Paraffin wax
3. 50% Bees wax and 50% paraffin wax
4. 75% Bees wax and 25% paraffin wax
5. 75% Paraffin wax and 25% Bees wax

The tjap block method was selected and used for applying the wax and also to maintain uniformity and accuracy in design.

The material was soaked in 5 per cent warm soap solution for half an hour. After that it was rinsed thoroughly in cold water, dried and ironed. Thus the khadi material was desized properly to ensure uniform penetration of dye stuffs.

The desized material was cut into 16 pieces. One piece was kept aside as original and the other 15 pieces were to be used as test samples. They were divided into three groups. Each one with five samples. The first group, second group and the third group samples were named as N₁, N₂, N₃, N₄ and N₅, V₁, V₂, V₃, V₄ and V₅, P₁, P₂, P₃, P₄ and P₅ to be treated with Naphthol, Vat and Procion dyes respectively.

The material to be printed with wax was stretched out on a table (70 cm × 100 cm) attached with a four piece wooden frame which was filled evenly with fine sand. This prevents the hot wax from soaking into the table and also helps to obtain a uniform surface.

Samples, N₁ V₁ and P₁ were spread on the table for waxing, since these three samples were to be waxed with 100 per cent bees wax.

0.5 kg of bees wax was melted in an enamel bowl and the same was applied on each sample using the selected tjap block. The temperature of the melting point of wax was maintained at 55°C (120°F). For waxing N₂, V₂ and P₂ with 100 per cent paraffin wax 0.5kg paraffin was melted in a separate container and applied on each sample using the same tjap block. Samples N₃, V₃ and P₃ were waxed by melting a combination of 0.250 kg of bees wax and 0.250 kg of paraffin wax (50% bees wax + 50% paraffin wax). Samples N₄, V₄ and P₄ were waxed by melting a combination of 0.375 kg of bees wax and 0.125 kg of paraffin wax (75% bees wax + 25% paraffin wax). For sample N₅, V₅ and P₅ 0.375 kg of paraffin wax and 0.125 kg of bees wax (75% paraffin wax + 25% bees wax) were melted together and applied.

Naphthol, vat and procion dyes were selected for study, since the emphasis was laid only on different proportions of wax the following shades in these dyes were chosen.

| | |
|----------|-------|
| Naphthol | Brown |
| Vat | Green |
| Procion | Pink |

Samples N₁, N₂, N₃, N₄ and N₅ were dyed with the selected Naphthol dye. Samples V₁, V₂, V₃, V₄ and V₅ were dyed with the selected vat dye and samples P₁, P₂, P₃, P₄ and P₅ were dyed with the selected Procion dye. After dyeing, the samples were rinsed in cold water to remove mechanically held excess dye and to respond for better fastness to crocking.

Boiling off method was chosen to remove the wax from the samples. The dyed samples were put in the boiling water for about 10 minutes to melt the wax. After dewaxing, the samples were taken away and rinsed in cold water. After soaping, the samples were rinsed thoroughly, dried and ironed.

The quality of the Batik printed samples was evaluated by the following methods :

1. Visual Inspection
2. Laboratory Tests

The amount incurred for the printing of samples by the selected methods was calculated to find out the least expensive method of Batik printing.

Findings of the study :**Visual Inspection :**

With regard to the brilliancy of colour, clarity of design, evenness of colour, amount of crocking and general appearance, the samples waxed with second wax combination (100 per cent paraffin wax) were rated as good the next being the fifth, third, fourth and first wax combinations.

With respect to the dyes, vat dye was rated as good followed by Naphthol and procion dye.

Labratory Tests**Breaking Strength :**

Comparing the breaking strength in the warp direction, the samples waxed with second combination (100 per cent paraffin wax) were found to register the highest mean value. The wax combination 5 (75% paraffin wax + 25% bees wax), 3 (50% paraffin wax + 50% bees wax), 4 (75% bees wax + 25% paraffin wax) and 1 (100% bees wax) occupied the second, third, fourth and fifth places respectively.

As regards dyes, the majority of the samples dyed with vat dye exhibited the highest mean value when compared with the samples dyed with Naphthol and Procion dyes.

In the weft direction, the breaking strength of the samples waxed with second combination were found to register the highest mean value when compared with the samples waxed with other wax combinations. The majority of the samples dyed with vat dye ranked first when compared with the samples dyed with Naphthol and procion dyes.

Elongation

The elongation in the warp direction of the samples waxed with 100 per cent paraffin wax and dyed with vat dye was more when compared with the other samples.

The elongation in the weft direction of the samples waxed with 100 per cent paraffin wax and dyed with vat dye was more when compared with the other samples.

Fabric Thickness :

The fabric thickness of the Batik printed samples is shown in Table I

TABLE - I
FABRIC THICKNESS

| Dyes | mean value (in mm) | | | | | Total | mean |
|----------|--------------------|------|------|------|------|-------|-------|
| | wax combination | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | | |
| Naphthol | 25.2 | 27.0 | 26.2 | 27.2 | 26.2 | 131.8 | 26.36 |
| Vat | 27.6 | 28.0 | 27.8 | 26.6 | 27.0 | 137.0 | 27.4 |
| Procion | 24.6 | 27.2 | 25.8 | 27.0 | 25.6 | 130.0 | 56.0 |
| Total | 25.7 | 82.2 | 79.8 | 80.8 | 78.8 | 398.8 | |
| | 25.4 | 27.4 | 26.6 | 26.9 | 26.2 | | |

Analysis of variance :

| Source | SS | df | Ms | F. ratio |
|---------------|-------|----|------|----------|
| Between dyes | 5.29 | 2 | 2.64 | 5.07* |
| Between waxes | 4.84 | 4 | 1.21 | 2.33 |
| Error | 4.23 | 8 | 0.52 | |
| Total | 14.36 | 14 | | |

* Significant at 5 per cent level.

Analysis of variance :

From the above table, it is clear that the samples waxed with 100 per cent paraffin wax had the highest mean value when compared with the samples waxed with other wax combinations with respect to the dyes, the majority of the samples dyed with vat dye showed the highest mean value when compared to the samples dyed with Naphthol and procion dyes.

The Analysis of Variance proved that there was a significant difference between the selected dyes. But no significant difference was observed between the selected wax combinations.

Abrasion Resistance :

The greater the loss in weight, the lesser is the resistance to friction.

More resistance was found in the samples waxed with 100 per cent paraffin wax when compared with the samples waxed with other wax combinations. The majority of the samples dyed with vat dye showed more resistance.

Fabric weight:

All samples waxed with 100 per cent paraffin wax were found to be the highest mean value when compared with the samples waxed with other wax combinations. Regarding dyes, all the samples dyed with vat dye showed the highest mean value when compared to the samples dyed with Naphthol and procion dyes.

Colour Fastness :

All the samples dyed with Naphthol and vat dye were observed as colour fast to sunlight, laundering wet and dry pressing and wet and dry crocking. All the samples dyed with procion dye were observed as colour fast to sunlight, dry crocking, wet and dry pressing and not so fast to laundering and wet crocking.

Production cost of Batik Printing :

The production cost of Batik printed samples per metre is presented in Table II

TABLE II
PRODUCTION COST OF THE BATIK PRINTED SAMPLES PER METRE

| Dyes | wax combination | | | | |
|----------|-----------------|-------------|-------------|-------------|-------------|
| | 1 Rs. p. | 2 Rs. p. | 3 Rs. p. | 4 Rs. p. | 5 Rs. p. |
| Naphthol | 13.48 | 11.39 | 12.44 | 12.96 | 11.92 |
| Vat | 14.60 | 12.51 | 13.56 | 14.08 | 13.04 |
| Procion | 12.82 | 10.73 | 11.78 | 12.30 | 11.26 |

From the above table, it is evident that Batik printing by the second wax combination (100 per cent paraffin wax) showed least cost when compared to the other wax combinations as the bees wax was costlier.

Regarding dyes, Vat dye was costlier than the other two dyes namely Naphthol and Procion. This is evident from the fact that vat dye samples cost more irrespective of the wax combinations.

Conclusion

From the above findings, it is concluded that 100 per cent parafin wax is more suitable for Batik printing, It is also least expensive. Although Vat dye excelled in all the aspects, it proved to be costlier than the Naphthol and Procion dyes.

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A STUDY ON THE "EFFECTIVE METHODS TO IMPART POPULATION EDUCATION TO HIGHER SECONDARY STUDENTS"

R. Amirtha Gowri

The study on "The population awareness and impact of population education on Higher Secondary Students" was carried out on 200 Higher Secondary Students of 11th class (100 boys 100 girls) in Coimbatore city. A questionnaire was administered to the sample to find out their awareness of population explosion. Then education was imparted to three groups on population using three different types and combination of methods - Group I — lecture, visual aids, discussion and organising a programme of exhibition, filmshow, songs, drama and puppet show, Group II — visual aids and Group III — lecture only. The effectiveness of the education imparted was evaluated and the data was analysed. The findings of the study are summarised as given below.

1. Significant difference was found between the sample of rural and urban area regarding their awareness of population explosion. But neither family type nor family size influenced the population awareness of the sample.
2. Parent's occupation did not have any influence over the population awareness of the sample. But education of father and family income did influence the awareness of the sample.
3. Highly significant difference was noted between the groups exposed to different methods, which exposed to an enriched programme was found to have gained most.
4. The meaning of population education was given correctly by most of the sample after education. Group I interpreted the meaning and causes of over population better than those exposed to the other two methods.
5. Difference was observed with regard to the unfavourable effects of population explosion on individual families and the nation as the percentage of sample mentioning the effects increased after education. The fact that none was unaware of the effects after the education shows the impact of population education imparted to them.
6. Regarding the measures taken to overcome population explosion, only after education, the sample used the specific and scientific terms like sterilization, contraceptive measures, advertisements etc.

7. Majority of the sample (above 50 per cent) of the Group I were aware of the source of information about population
8. The sample was very poor in the knowledge about the agencies to control population explosion. But after attending the classes the students were able to mention the names of agencies and that too, Group I had better awareness than those of other methods
9. Difference was seen in the expression of the sample regarding the effects of small family and large family before and after education. Group I had expressed the effects better than those of the other two groups.
10. Ninety per cent of Group I interpreted the meaning of population education better after education.
11. Secondary school level was considered as suitable to introduce population education. Forty five per cent boys and sixty five per cent girls preferred it to be included in the syllabus.
12. The boys mentioned economics, moral instruction as suitable subjects to include population education and the girls mentioned history, geography and language. Both the sexes mentioned several appropriate topics to be included better only after education.
13. Difference was noticed between boys and girls before and after education regarding the usefulness of population education to individual and families. Not much difference was observed regarding the usefulness to nation between boys and girls and before and after education.
14. Response of the sample before and after education showed that the education programme improved their decision about themselves. After education, the ideal age for marriage mentioned increased for both boys and girls. For 76 per cent boys and 92 per cent girls the ideal size of the family was four only.
15. Majority of the sample preferred to have one boy and one girl. Five year gap between two children was preferred by 36 per cent of boys but for girls the gap was 3-4 years only.
16. Cent per cent of the teachers felt that population education should be introduced in the schools.
17. Eighty five per cent of the teachers felt that population education should be introduced at the higher secondary level. Population of India and world, Population growth and economic development, factors affecting population growth, family welfare and advantages of small family were the aspects mentioned by above sixty three per cent of teachers to be included.

18. Economics, Home science, biology, and history were the subjects preferred by the teachers where as students preferred science, history and economics.
19. Sixty per cent of the teachers felt that they should be trained adequately and mentioned about the need for inservice teacher training programme for one month (33 per cent) and 15 days (25 per cent). However only 33 per cent of the teachers wanted to undergo training.
20. Seminars, debates, field trips and exhibits and use of audio visual aids were the methods preferred for teaching during training programme. The teachers wanted to have the following aids, books, pamphlets, charts, posters films and film strips.

Recommendations

The findings of the study lead to the following recommendations.

1. Population education should be included in the present curriculum, intergrated with the subjects to create an awareness among the students about the population.
2. The 'Population Clubs' can be established at each and every educational institution.
3. Government and all the agencies of education must take steps to introduce population education in schools and colleges.
4. Special attention needs to be given to impart population education to the adolescents in the rural areas both school going and drop outs.
5. Orientation courses/inservice training programmes be organised for teachers and they can be supplied with necessary resource materials, guide books and teaching aids.
6. Population education cells can be organised in each state so that the teachers and students can be kept informed about the upto date information.
7. Further studies need to be conducted with parents to find out their attitudes about introducing population education in schools taking different variables such as area of residence and income.

VOCATIONAL INTERESTS OF HIGHER SECONDARY SCHOOL STUDENTS

Dr. Rajammal P. Devadas

Mrs. N. Jayapoorani

Introduction

The education given to children and youth must enhance the nation's prestige, bring about the progress of economy and welfare of the people and impart culture. One of the major concerns in life is taking up a suitable vocation. Vocation means the career or job, which an individual has to take up in his life (Forehand *et al* 1977, Justin 1976).

The National Review Committee has observed that the vocationalised spectrum of the Higher Secondary School covers learning a skill or range of skills through study technologies, related sciences and form or other practical work. While education can not produce jobs, vocationalised education makes it more likely for an individual to get a job or to be his own master either by starting new productive activity or a service, which may satisfy a felt need of the community. By broadening the educational horizons for the individual, vocational education enables him to reach higher levels of achievement through self learning, (Agarwal, 1978)

Every adolescent must have ability and opportunity to discover his aptitudes and choose the job which offers scope for the full utilisation of his abilities. Hence there is a need for helping the adolescent to discover what courses are best suited to his aptitude and interests. This calls for research into the adolescents vocational interests and aptitudes. This study is an effort in that direction. It was undertaken with a view to find out the aptitudes and vocational interests of adolescents in selected Higher Secondary Schools to enable educationists identify their interests and difficulties and guide them to make appropriate and realistic occupational choices depending upon their interest, abilities and the demands of the locality

Procedure

The sample consisted of 200 students of both sexes, in the age range of 15-17 years from coimbatore city schools. Fifty school teachers were selected to find out their views on vocational education.

The study consisted of fact finding on three aspects.

- a) the aptitude of selected students
- b) the vocational interests of the selected students
- c) the views of the Higher Secondary School teachers on vocational courses.

The standardised Differential Aptitude Test (DAT) evolved by G.K. Bernet, H.C. Seashore and A.G. Weeman of the psychological corporation, New York (1966) was used. Five of the following subtests were used.

- 1) Numerical ability
- 2) Mechanical reasoning
- 3) Clerical speed and accuracy
- 4) Language usages (Part I) and spelling.
- 5) Language usages (Part II) sentences.

To find out the vocational interests of the sample, a Vocational Interest Inventory Schedule was used. The interest schedule was developed based on the Thurstone Interest Inventory Schedule which was formulated by L.L. Thurstone (1947).

The views of the teachers on Vocational Courses were collected by using questionnaire.

Findings

Above 70 per cent of the sample were 17 years old, 92 per cent were from nuclear families and 80 per cent were from the urban area. Fifty one per cent were from the middle income family and the rest were from low income and high income groups respectively.

- 1) The academic and general subjects preferred by a majority of the students (84%) were natural sciences, Mathematics and English. More boys showed interest in mathematics while more girls preferred natural sciences. The vocational interest inventory showed that boys (59%) had interest in physical sciences and girls in biological sciences,
- 2) Boys (42%) showed interest in Engineering jobs, while girls (55%) showed interest to work as doctors.

- 3) Boys and girls (53%) developed their vocational interests during the age range of 13-15 years vocational interest was provoked by personal interest and also due to the influences of parents and other family members,
- 4) Possessing ability and talents for profession admiration of others to become popular are some of the personal reasons stated by the sample as 'the reasons for their job interests. Desire to serve the community, support the family and to satisfy the parents wish were some of the other reasons.
- 5) To prepare themselves for future vocation, a majority of the sample stated that they worked hard and concentrated on studies enriched their knowledge by reading books, magazines related to their vocational interests and were very attentive to classes.
- 6) Significant difference was observed between boys and girls with regard to their participation in extra curricular activities. The boys were more interested in sports coins/cards collection, music and dance whereas girls liked to participate in sports, music and doing handicrafts.
with regard to aptitude
 - a) the numerical ability of the boys was better compared to that of girls. Between the income groups there were not much differences in this regard.
 - b) Boys were better in mechanical reasoning than girls, in general however few girls scored higher percentile in mechanical reasoning.
 - c) In clerical speed and accuracy there were not much difference between boys and girls or between the income groups.
 - d) In language usages (spelling) test greater percentage of the boys scored above 55 to 65 percentiles. The language usages of high income group was better than that of the other two groups. Statistically there was differences between boys and girls in the case of language usages.
 - e) Comparatively boys had more aptitude for sentence construction than girls as the boys scored at and above 55 to 65 percentiles,

All the teachers in the sample had favourable attitude for vocational courses as they considered the courses were job oriented and practically useful. They were in opinion that 16 years as the appropriate age for introducing vocational courses. They suggested that

trained and experienced persons in vocational training and teachers who handle the classes are suitable persons for giving vocational guidance to students.

Recommendations

Facilities at school and in community need to be given to the adolescents in the form of providing library facilities for reading various subject matter books, booklets, pamphlets and information data cards so as to help them to get acquainted with the subject matter in which they are interested. Motivating them to participate in debates discussions, programmes such as quiz, radio, oratorical, essay, drawing and painting competitions, cultural and youth welfare events and work experience would enable them to make decisions regarding their future career.

The community should render help to adolescents in the form of publishing more literature on vocational courses, conducting study tours, providing job oriented practical experiences and help them to be aware of job opportunities in the community and the school authorities and government need to facilitate the higher secondary students to get vocational guidance from the qualified teachers.

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STUDY OF THE COMMUNITY AND SOCIAL SERVICE IN THE COLLEGES AFFILIATED TO THE UNIVERSITY OF MADRAS

K. Thangamani

True education is a learning from life and the dynamic society around. Education is the major social instrument to foster the all round development of the student with integrity and moral and human values. It must stem from the roots and culture of the society, its mores, living conditions, problems, goals and aspirations. Only then can education become relevant to life and contribute to the development of the individual and his society (Devadas, 1977).

The curricular work needs to be integrated with the developmental activities in the community. Such integration would bring realism to the courses of study, since the subject matter studied can be applied to life situations. Students will become deeply interested in what they are studying and understand the realities as they exist. The colleges affiliated to the University of Madras were fortunate to integrate Community and Social Service (CSS) with higher education. Through CSS, students of the colleges of the University of Madras have an unprecedented opportunity to serve the people in the rural backward and tribal areas and urban slums (Devadas, 1977).

The CSS was introduced into 42 colleges affiliated to the University of Madras who opted for the semester system as a curricular component with 100 marks in 1976 - '77. Encouraged by the response, 21 more colleges entered the semester pattern with CSS in 1977 - 78. Simultaneously the marks allotted for CSS as part of the part III major was 200. While the enthusiasm on the part of the non participants was high, there was also some skepticism. In order to dispel this skepticism through a scientific evaluation this study was undertaken.

Methodology

The colleges affiliated to the University of Madras under the semester pattern and Community and Social Service were selected for the study. The principals, heads of departments, CSS co-ordinators and students were included in the sample.

The questionnaires were mailed to the different colleges with a covering letter, explaining the details. Among the 67 colleges, only 28 colleges furnished informations.

Results and discussion

The number of villages adopted by the colleges varied from one to 22 villages. For CSS work, the students were grouped into 20 per batch in 20 colleges. The CSS programme had weekly plans and annual plans.

Projects undertaken in CSS

General projects, as expressed by the heads of departments and students conducted in their villages, are given in Table I.

TABLE I
GENERAL PROJECTS UNDERTAKEN IN CSS

| S.No. | Projects | Percentage mentioning | |
|-------|-----------------------|-----------------------------------|-----------------------|
| | | Heads of departments (N = 145) | Students (N = 248) |
| 1. | Survey | 76 | - |
| 2. | Exhibition | 44 | - |
| 3. | Preschool education | 36 | 48 |
| 4. | Nutrition education | 31 | 22 |
| 5. | Adult education | 31 | 37 |
| 6. | Flood relief work | 14 | - |
| 7. | Laying roads | 11 | 26 |
| 8. | Intensive agriculture | 3 | 25 |

The general projects were taken up to develop rapport with the people and also to make the students to get interested in their work for the rural people.

The subject matter projects were selected by the students and teachers according to their major subjects of study.

Role played by the Principals, Heads of Departments and CSS Co-ordinators

The items of participation of principals, heads of departments and the CSS co-ordinators are given in Table II.

TABLE II
PARTICIPATION OF THE PRINCIPALS, HEADS OF DEPARTMENTS
AND CSS CO-ORDINATORS IN CSS

| S.No. | Items of participation | Percentage mentioning | | |
|-------|--|-----------------------|----------------------------|----------------------------------|
| | | Principals N = 21 | Heads of depts N=145 | CSS co-ordi nator N= 25 |
| 1. | Discussion with staff members | 98 | 87 | - |
| 2. | Giving instructions to the heads of departments | 93 | - | - |
| 3. | Guiding the co-ordinator | 75 | - | - |
| 4. | Consulting village leaders | 64 | 39 | 79 |
| 5. | Visiting the worksports | 64 | 80 | - |
| 6. | Scrutinising the records maintained by co-ordinators | 61 | - | - |
| 7. | Contacting the officials and agencies concerned | 58 | 39 | 83 |
| 8. | Selecting project areas | 49 | - | 100 |
| 9. | Meeting the students in groups | 46 | 76 | - |
| 10. | Selecting projects | 46 | 66 | - |
| 11. | Solving field problems | 39 | 59 | - |
| 12. | Scrutinising the records maintained by staff | 32 | 59 | - |
| 13. | Scrutinising the records maintained by students | 32 | 59 | - |
| 14. | Selection of special projects | 7 | - | - |
| 15. | Guidance in maintaining records and registers | - | 39 | 88 |
| 16. | Executing the projects | - | - | 100 |
| 17. | Arranging for transport | - | - | 96 |
| 18. | Evaluating the students | - | - | 67 |
| 19. | Finding out the impact on the community | - | - | 67 |
| 20. | Orienting students | - | - | 62 |
| 21. | Orienting staff | - | - | 58 |

The above table indicate the major roles played by the Principals, Heads of Departments and CSS co-ordinators in the CSS programme.

The CSS co-ordinators were asked to express their views about the principals' participation in CSS. The views are presented in Table III

The principals are helping the CSS co-ordinators in all the aspects of successful functioning of CSS programme.

TABLE III
PRINCIPALS' PARTICIPATION IN CSS AS SEEN BY
THE CO-ORDINATORS

| S.No. | Aspects | Number starting (Total 24) | Percentage |
|-------|--|----------------------------|------------|
| 1. | Financial administration | 24 | 100 |
| 2. | General guidance | 24 | 100 |
| 3. | Instructing staff and students | 21 | 88 |
| 4. | Contacting village leaders and officials | 13 | 54 |
| 5. | Getting help from other sources | 12 | 50 |
| 6. | Solving field problems | 10 | 42 |
| 7. | Visiting the project area | 10 | 42 |

Benefits of CSS

The principals who occupy the pivotal position in implementing the CSS programme, viewed the benefits of CSS as given in Table IV.

TABLE IV
PRINCIPALS' VIEWS ON THE BENEFITS OF CSS

| S.No. | Aspects | No. of principals (Total-28) | Percentage |
|--------------------------|--------------------------------------|------------------------------|------------|
| For students | | | |
| 1. | Understood problems in the community | 14 | 49 |
| 2. | Opportunity to serve | 23 | 82 |
| 3. | Learnt traditions | 6 | 21 |
| 4. | Learnt co-operation and team work | 4 | 14 |
| 5. | Rural students felt happy | 2 | 7 |
| 6. | Learnt discipline | 2 | 7 |
| For staff | | | |
| 7. | Realised the community problems | 8 | 28 |
| 8. | Close relationship with students | 5 | 18 |
| 9. | Understood the students' apittude | 2 | 7 |
| For the community | | | |
| 10. | Improved their conditions | 14 | 49 |
| 11. | Understood the worth of student | 8 | 28 |
| 12. | Mutual understanding | 4 | 14 |

The principals strongly expressed that the conditions of the villages were improved to some extent by the CSS work.

The achievements in terms of projects as stated by the heads of departments are given Table V.

TABLE V
ACHIEVEMENTS THROUGH THE PROJECTS AS STATED BY
HEADS OF DEPARTMENTS AND STUDENTS

| S.No. | Aspects | Percentage mentioning | |
|-------|--|------------------------|-------------------|
| | | Head of Depts N=145 | Students N=248 |
| 1. | Maintained cleanliness | 23 | 28 |
| 2. | Improved children's education | 17 | 43 |
| 3. | Maintained kitchen gardens | 12 | 27 |
| 4. | Created interest in women in learning skills | 10 | 27 |
| 5. | Maintained campus garden | 8 | - |
| 6. | Helped poor farmers in getting new knowledge | 11 | - |
| 7. | Taught better nutrition to improve health conditions | 10 | 19 |
| 8. | Arranged for vaccination to Balwadi children | 3 | 28 |
| 9. | Literacy improvement | - | 33 |
| 10. | Helped to get water supply | - | 29 |
| 11. | No answer | 17 | - |

Though the achievements are not very significant, we can expect slow improvement in the villages in due course, through CSS activities.

Problems in carrying out CSS

The problems listed by the principals, heads of departments, CSS co-ordinators and students in carrying out CSS are presented in Table VI

TABLE VI
PROBLEMS ENCOUNTERED BY THE PRINCIPALS, HEADS OF
DEPARTMENTS, CSS CO-ORDINATORS AND STUDENTS IN
CARRYING OUT CSS

| S.No. | Problems | Percentage mentioning | | | |
|-------|-------------------------------------|-----------------------|---------------------------|-----------------------|-------------------|
| | | Principals N=28 | Head of Depts N=145 | CSS co-ors N=24 | Students N=248 |
| 1. | Lack of transport to the villages | 74 | 41 | 96 | 33 |
| 2. | Not having full time co-ordinator | 74 | - | - | - |
| 3. | Difficulties in finding extra hours | 49 | 31 | 79 | 17 |
| 4. | Lack of funds | 45 | 29 | - | - |

| S.No. | Problems | Percentage mentioning | | | Students N= 248 |
|-------|--|-----------------------|----------------------------|-----------------------|--------------------|
| | | Principals N=28 | Head of Depts N≈ 145 | CSS co-ors N=24 | |
| 5. | Lack of understanding of philosophy of CSS | 32 | - | - | - |
| 6. | Lack of help from other organisations | 28 | - | - | - |
| 7. | Selection of subject oriented projects | 28 | - | 71 | - |
| 8. | Unwillingness of staff | 25 | - | - | - |
| 9. | Unwillingness of students | 21 | 20 | - | - |
| 10. | Lack of co-operation of village people | 7 | 13 | 91 | 39 |
| 11. | Lack of orientation to the staff | 7 | - | - | - |
| 12. | Untimely hours for students | - | 21 | - | 7 |
| 13. | Students feel the work as strenuous | - | 13 | 88 | - |
| 14. | Lack of place to assemble in the adopted area for group projects | - | 7 | - | - |
| 15. | No incentives for students | - | 10 | - | - |
| 16. | Lack of facilities | - | - | - | 7 |
| 17. | People are not understanding the facts | - | - | - | 7 |

There are certain problems which could be solved for the smooth functioning in CSS and certain problems are to be managed by the people involved in CSS.

The suggestions given by the students for better performance in CSS are given in Table VII.

TABLE VII
SUGGESTIONS GIVEN BY STUDENTS FOR MOTIVATING
THE PEOPLE FOR CSS

| S.No. | Suggestions | No. of students Total≈248 | Percentage |
|-------|---|---------------------------------|------------|
| 1. | Helping villagers in eradicating problems | 131 | 51 |
| 2. | Giving incentives | 126 | 50 |
| 3. | Starting economic improvement programmes | 118 | 47 |
| 4. | Organising games and competitions | 81 | 32 |
| 5. | Collaboration with the village panchayats | 69 | 22 |
| 6. | Through adult education | 64 | 23 |
| 7. | Giving importance for women | 64 | 23 |
| 8. | Regular meeting with people | 61 | 21 |
| 9. | Providing refreshments | 43 | 19 |
| 10. | CSS should be in college hours | 40 | 17 |
| 11. | Display of the products (exhibition) | 27 | 11 |
| 12. | Encouraging the villages | 20 | 10 |
| 13. | CSS should be on Sundays | 6 | 2 |

The suggestions are given by the students from their experience. These suggestions can help for the future planning of CSS activities.

Summary

An attempt was made to study the working of the CSS in operation in various colleges, affiliated to the University of Madras. All the 67 colleges were approached through mailed questionnaire. Only 21 colleges (42 per cent) responded. The results are summarised as:

1. The number of villages adopted by individual colleges varied from two to 22
2. The staff student ratio for guidance in CSS work was found to be 1:25 (as per the university stipulation) in the case of 25 colleges.
3. Survey of the project area was considered to be an important general project
4. About 98 per cent of the principals participated in CSS work by discussing the programme with their staff and by giving instructions to the heads of departments.
5. As for the benefit of CSS, 82 per cent of the principals expressed that CSS had given opportunity for the students to serve the community.
6. The students felt that they could do some work in the village and serve for the rural community.
7. It was encouraging to note that 92 per cent of the students like to work in adopted villages and they were aware of the problems in adopted families

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**STRENGTHENING MAHALIR MANRAMS (WOMEN'S CLUBS)
THROUGH SOCIO ECONOMIC PROGRAMMES**

Devadas R.P.

Jothimani G.

“The action project of strengthening Mahalir Manrams (Women, clubs) through socio-economic programmes” was conducted by Jothimani (1981) in 10 villages of 3 Panchayat Union with 25 rural women for a period of nine months. The investigator laid stress on the economic and welfare programmes which were the need of the hour.

In each Mahalir Manram 2 to 5 members were selected. The income of 44 per cent of the members was between Rs. 100-200 and 28 per cent had Rs. 200-300.

Based on the interests and skills of the members activities such as tailoring, spinning, candle making, chalk piece making, soap making, book binding and wire bag making were chosen for the Self-employment Training Programme, sponsored by the West Rotary Club of Coimbatore and conducted by Sri Avinashilingam Home Science College for Women, Coimbatore. After the completion of the 16 days training the Canara Bank officials visited the trainees, studied the conditions and disbursed loans of Rs. 12,000.00 to 20 women. The other members have started wire bag making with their own finance. Agencies such as Chinthamani, Cooperative super market, Khadi Craft, Poompubar Sarvodaya Bhavan and Co operative society provided facilities for marketing the finished products.

The educational activities incorporated were to improve their health, nutrition, family life education, literacy and savings habits, because the economic returns should help in the development of total health and happiness. The students going for Community Social Service added impetus to the activities.

The investigator evaluated the assesment of quantitative and qualitative returns accruing from the project after six months. The results showed that :

1. All the members had registered an increase in income of Rs. 30-150. The minimum increase was evinced in bag making. and the maximum in tailoring and spinning. The latter was due to the continuous orders from the agencies concerned.

2. With regard to pattern of savings, the samples involved in tailoring and spinning were able to save more because of higher income.
3. In addition to the quantitative outcomes, due to the project, the members became aware of the various infrastructure, tactics marketing, leadership and soaiability. They communicated about this programme to other women in the village and they are able to enroll them the new members.
4. The beneficiaries trained in tailoring motivated five other needy women to learn tailoring, These five members were employed to stitch seeds bag earning Rs. 13.50 per day in Telungupalayam Cooperative society. Similarly the beneficiarie trained in spinning had given training in spinning for the two members in Telungupalayam village. In Asokapuram, the beneficiaries who learnt new techniques in wire bag making made the others to learn such new techniques.
5. Since the college is involved in continuous untiring task of improving the villages, these villages would be followed up for Community and Social Service work. It would enable the staff and students to meet the beneficiaries regularly (Once a week) guide them and direct them in difficulties.
6. Since the self-employment training had become very much rewarding to the beneficiaries there is a continuous demand and the request from the various villages to organise such training and issue of loans for various projects.

The project has attempted to give some guidelines on how some of these activities should be implemented to uplift rural women so the benefits of economic improvements may be shared by them as active partners in the total development process. Also, how the programmes intend for the welfare of people should be taken to the disadvantaged groups. As the country is too vast with diversified socio-economic structures to make out a common model of training and skill development, the project can only point out the economic schemes, and potential available within the particular area, so that these would benefit the local women in generating employmant and supplementing their incomes. It is also, emphasized that economic development should come along with development in others spheres like health, nutrition, education and social welfare because economic development is an integral part of social and political development. It should be women into each other to bring greater political awareness to enable women to play an important role in the development of the country.

National development is the task of building a bright future for every citizen, men, women, youth or children utilising their participation, inputs and contribution. Emancipation of women is an essential prerequisite to gear economic development and social change. The dynamic Indian Democracy demands women to play their role in economic, educational, political and social spheres to bring forth a new social order and stabilize it. As exhorted by Devadas (1976) women should respond to this clarion call and perform their role effectively as citizens, family members, mothers and as leaders for community action.

SCOPE FOR PARTICIPATION OF A COLLEGE IN THE NATIONAL ADULT EDUCATION PROGRAMME

Dr. Leelavathy Sekhar

Introduction

Elimination of illiteracy is part of the struggle that India is waging to destroy the economic, political and social difference which has helped the privileged minority elite to exploit the poor. The functional literacy campaign is a struggle against obscurantism and oppression. It is a fight for progress and complete independence (Literacy News, 1973) Adult Education means education of the adults who might have gone in for formal schooling at their educable age. Adult Education is more than education. The rapid out dating of knowledge which is an important characteristic of the present times had made adult education both a necessity and a vital tool for a round development of the country (Devadas, 1978).

The central and state governments have now included mass education in the plan. A two fold attack on the problem, to provide universal elementary education to all children in the age group of 6-14 years within a period of 10-12 years and an equally massive effort to make 100 million adults literate within a period of about six years has been envisaged. Both these massive programmes naturally support and complement each other. This is the first time in the history of education in India that a combined massive programme of this size has been attempted. Between these two, the adult education programme is obviously, more complex and difficult.

The National Adult Education Programme (NAEP) was formally launched on Gandhi Jayanthi Day 2nd October 1978. The actual cost of the programme is estimated at Rs. 8000/- million (Mathur, 1978) Mahatma Gandhi exhorted that adult education neither begins nor ends with literacy; the best way to bring literacy to the down trodden masses is to make the education programme life oriented and problem centred. The NAEP which is a programme of development through investment in people puts into practice the gandhian exhortation by helping illiterates and the poor to use their own liberties. (Jalaluddin, 1978) It can be implemented only by the coordinated efforts of the government and citizens and hence every citizen must consider it as his duty to contribute to the success of the programme (Sanjiva Reddy, 1978).

The University Grants commission has now given a golden opportunity to the universities and through this the colleges to take a direct role in adult education. The University of Madras is the only University which incorporated Community and Social Service as a curricular component for grades. The University has also mobilised some colleges for participation in NAEP. In order that colleges can play their roles effectively guidelines for long term planning of adult education centres student participation and motivation, teacher involvement, organisation of adult education centre, supervision of centres, follow up work and monitoring and evaluation have been brought out.

Sri Avinashilingam Home Science College for Women whose inspiration is drawn from the teachings of Sri Ramakrishna, Swami Vivekananda and Mahatma Gandhi has responded to this offer for constructive work, squarely.

The University of Madras is helping NAEP by making it part of the curriculum through the introduction of a course, 'Social Welfare and Functional Literacy' as an ancillary to B.Sc. Branch X Home Science and as a paper in Home Science Extension Education from 1978. Sri Avinashilingam Home Science College (Autonomous) is the only college which has introduced these courses in NAEP. Thus with its rich experience in functional literacy programme and commitment to gear the educational programme to rural development it has responded whole heartedly to the nation's call to participate in the NAEP. The aim of this study was, to elucidate the extent of participation of Sri Avinashilingam Home Science College in NAEP and the impact of its efforts on the adult learners.

Methodology

The methodology for this evaluative study on the participation of Sri Avinashilingam Home Science College for Women, in the NAEP programme covered the following aspects.

- a. Studying the colleges blue print for action in the NAEP
- b. Study of the participation of students
- c. Study of the preparation of teaching and learning materials for the NAEP and
- d. Study of the general trends in progress.

Ten villages from Perur and Parianaicken Palayam Panchayat Union were chosen because of the good rapport established earlier

through CSS, NSS work and other activities. There were two models followed, one involving CSS villages and the other, involving NSS villages.

All the students and faculty members were trained in different aspects of adult education programme and placed in the fields.

Background information of the villages was collected and possibilities for setting up centres were explored. Among the adult learners, a majority were agricultural and non-agricultural labourers and majority of the women were not working. Sixty three per cent of the learners were in the age range of 16-30 years, an active period in life.

The primer used by student teachers to teach the adults was "Varungal Karpom" since the other books prepared were under printing. Attendance register, mark register, bio-data register for adult learners and progress registers were maintained by the student teachers.

The methods adopted by the students to motivate the adult learners are depicted in Table I.

TABLE I
MOTIVATIONAL METHODS ADOPTED BY 100 STUDENTS

| S.No. | Methods | Percentage |
|-------|--|------------|
| 1. | Personal contacts | 100 |
| 2. | Public Meetings | 100 |
| 3. | Cultural programme with songs, drama, puppet show and campaign | 82 |
| 4. | Discussion | 69 |
| 6. | Demonstration | 49 |

All the student - teachers (animators) had used effective methods of communication to motivate the villagers.

The staff and Heads of Departments helped in planning the NAEP, establishing rapport with the people, guiding the students and other staff, assisting students at times of difficulties

The college initiated its NAEP work on October 2nd, Gandhi Jayanthi Day and the mid year evaluation after six months revealed that the student teachers had put in 180 hours of instruction of which 90 hours were devoted to literacy instruction. Fifty percent of men and women could reach the desired levels of reading but the number who would be made to read and write was 40 percent in men and 50 percent among women.

Primers and related materials prepared for NAEP work were a primer on nutrition, Noorpudan Noolum Karpom (primer exclusively for the weavers), and Padikkalam Vange. (Materials suitable for the inhabitants of Coimbatore District).

Table - II Illustrates the number made literate in the different centres.

TABLE II
ACHIEVEMENTS IN LITERACY

| | Total No. of Learners | | Reading alone | | | | Number made literate | | | | Reading and writing | | | |
|------------------------------|-----------------------|-------|---------------|--------|------|--------|----------------------|--------|------|--------|---------------------|--------|------|--------|
| | Men | Women | Men% | Women% | Men% | Women% | Men% | Women% | Men% | Women% | Men% | Women% | Men% | Women% |
| 1. Edayarpalayam | 17 | 30 | 4 | 24 | 9 | 30 | 9 | 53 | 15 | 50 | 4 | 24 | 6 | 20 |
| 2. Jawaharpuram | 9 | 10 | 1 | 10 | 1 | 10 | 3 | 33 | 7 | 70 | 5 | 56 | 2 | 20 |
| 3. Kahirnaickenpalayam | 40 | 40 | 20 | 50 | 5 | 10 | 10 | 25 | 10 | 21 | 5 | 13 | 5 | 10 |
| 4. Koundampalayam (Exterior) | 3 | 14 | - | - | 2 | 15 | - | - | 2 | 14 | 2 | 67 | - | - |
| 5. Koundampalayam (Interior) | 10 | 15 | 7 | 70 | 5 | 31 | 1 | 10 | 5 | 31 | 2 | 20 | - | - |
| 6. Kovilmedu | 7 | 3 | 1 | 14 | - | - | 3 | 43 | 3 | 100 | 3 | 43 | - | - |
| 7. Narasimhapuram | 0 | 35 | - | - | 8 | 23 | - | - | 8 | 23 | - | - | 19 | 46 |
| 8. Subramaniampalayam | 3 | 31 | 1 | 33 | 4 | 13 | 1 | 33 | 15 | 50 | 1 | 33 | 5 | 16 |
| 9. Velandipalayam | 2 | 40 | 1 | 50 | 10 | 25 | 0 | - | 10 | 25 | 1 | 50 | 10 | 25 |
| 10. Venkadapuram | 30 | 20 | 10 | 33 | 12 | 60 | 10 | 33 | 5 | 25 | 10 | 33 | 3 | 15 |
| | 121 | 247 | 60 | | 56 | | 37 | | 80 | | 33 | | 50 | |

The noteworthy feature of the programme was the unstinted interest of the student - teachers, their sense of commitment, the involvement of the faculty and the leadership of the principal.

The number of illiterates in the selected villages was 1,519. Only 368 illiterates enrolled themselves in the NAEP during first phase. There were 20 centres in the selected villages. Stress was laid on the qualitative improvement of the learners and even if the number of members was less, classes were conducted regularly.

The common problems felt and met by the students, staff and Heads of departments were lack of transport facilities, lack of space and other facilities in the centre, demands from the public, like wage rise, employment security, added facilities in the village and monetary or material incentives.

The first experience of the involvement of students in the NAEP revealed the following points

1. The students evinced great interest and commitment towards the programme inspite of their academic demands,
2. The learners were very eager to get involved in the programme and they were verymuch appreciative of the efforts and their attendance in the classes was in progress.
3. We could probe in possibilities and problems in the programme and also the problems met are not insurmountable. They could be solved in due course with great vision and mission.
4. The study indicated the possibilities of preparing the teaching learning materials for varied target groups.
5. It would be interesting to follow-up the study and undertake researches related to the learning moments, factors influencing attendance, ability to learn and follow up activities

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INITIATING VOLUNTARY ACTION FOR ORGANISING NAEP

Velumayil C.

In India learning has been prized and pursued not for its own sake, but for the sake and as a part of religion. From ancient times, learning has been sought as the means of salvation and self-realisation and as the pathway to the highest and of life (Mukerjee, 1947). Various types of institutions were developed, to pass on to the new generation the knowledge and wisdom gained by their predecessors.

Since Independence, several developments have set the pace in free India, for modernising the society through education. The non formal forms of education of adults is one of the new ventures to open the doors of knowledge on massive scale. Literacy is essential for personal and national progress. Yet there are millions of illiterate people in the country imbued with wisdom. If they were able to read, they would be even better persons, less liable to being exploited and misled by others. Education gives greater inner strength to people (Gandhi, 1986).

Adult education is an instrument whereby the whole man, including man at work and man at play, man in his civic, cultural and family roles, could achieve fulfilment; It brings out and refines man's physical, moral, intellectual and spiritual qualities. As such adult education requires decentralized micro planning and centralized macro planning and both should take into account general needs of the community. Adult education is necessary for developing and fostering the human qualities of mutual understanding, integrating respect, sympathy and coexistence. Adult education is a pre-requisite for national development. Although the returns cannot be measured with precision, investment in human resources is a prime factor, contributing to economic and social betterment (Devadas, 1978).

The Government of India issued a policy statement on Adult Education in 1977, which envisaged extension of educational facilities to approximately 100 million illiterate persons in the age group 15-35 years within five years. Adult Education Policy was implemented by launching the National Adult Education Programme (NAEP). The NAEP, recognises that learning, working and living are inseparable and each acquires a meaning only when correlated with the others. Accordingly, while literacy is considered as an indispensable tool for the illiterate

persons, the activities undertaken under the NAEP are not confined to only literacy, but are related also to the needs of the learners for their self reliant development. NAEP is flexible, diversified and decentralised.

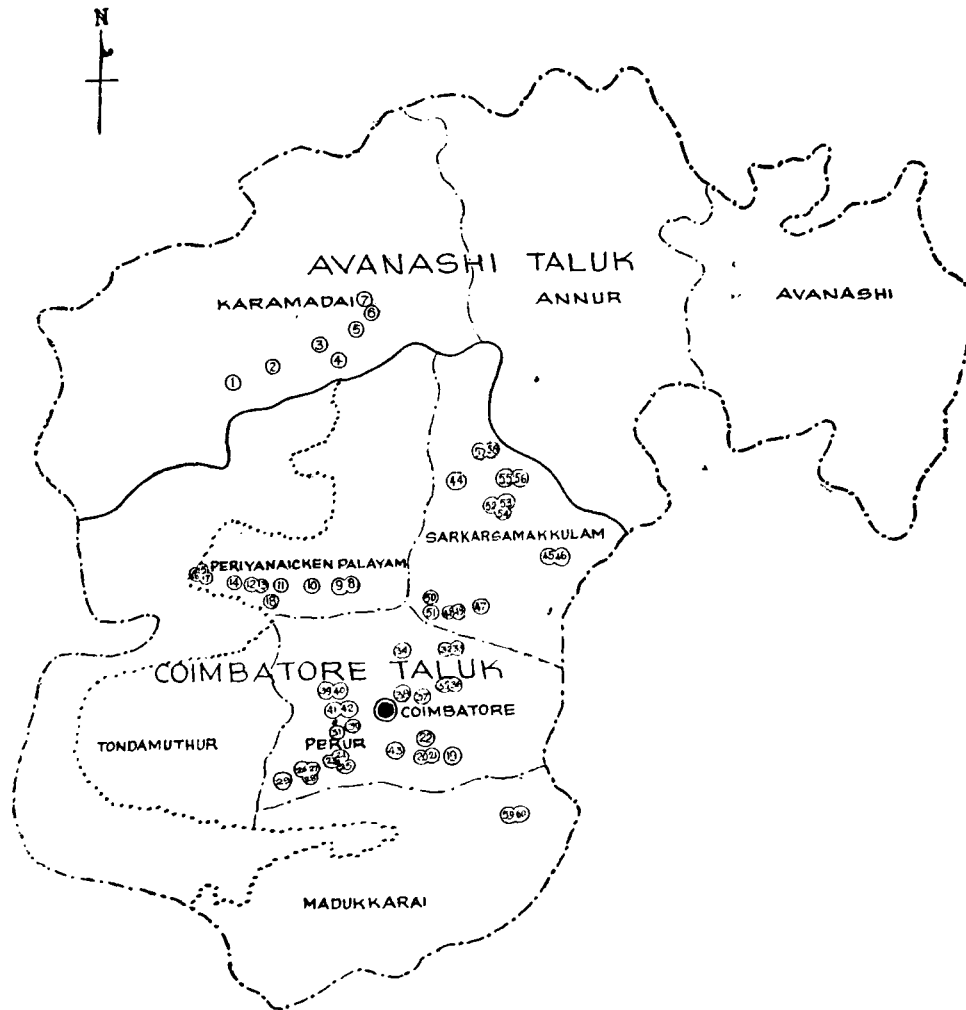
In the planning and implementation of NAEP, voluntary agencies proposed by the Government of India provides the frame work for their involvement (Ministry of Education and Social Welfare, 1977). Under this umbrella, Sri Avinashilingam Education Trust was given the opportunity to organise 60 centres in the Karamadai, Periyanaicken palayam, Sarkarsamakulam, Perur, and Madukkarai blocks where literacy rate was very low. The scheme was sanctioned for a period of one year (1980-81).

The programme covered 1,800 illiterates in 60 centres at the rate of 30 per cent. The instructors were local volunteers. The actual period of instruction was 10 months. The time allotted was two hours/day for six days in a week. The learning materials used in the centres were prepared by the institution. They included a primer, charts, work books and teacher's guide. Utilising that opportunity this study was undertaken to organise NAEP under the schme of assistance to voluntary agencies, working in the field of adult education.

Five blocks namely Perur, Perianaickenpalayam, Sarkar Samakulam, Madukarai (Coimbatore taluk) and Karamadai (Avinashi taluk) were selected for the purpose of organising adult education classes, because of their accessibility as the NAEP required constant supervision even late in the evenings. In these five blocks, 60 centres were organised in 38 villages (figure-1), (Appendix, I) because of the availability of the following supporting features:

- a. Local volunteers
 - b. Easy approachability
 - c. Cooperation of the local leaders and adult learners.
- and d. Good rapport created by Sri Avinashilingam Education Trust Institutions in their earlier programmes.

Sixty instructors were located for these 60 centres. All the 60 had education up to S.S.L.C. Among the instructors, there were 37 women and 23 men. Based on the sex of the instructors, there were 37 centres for women learners and 23 centres for men learners.



AREAS OF OPERATION OF THE PROGRAMME

FIGURE I

APPENDIX I LIST OF SELECTED AREAS FOR THE PROGRAMME

| S.No. | Name of the Block | Name of the village | Number of the centres organised |
|-------|-------------------|---------------------|---------------------------------|
| 1. | Karamadai | Seeliyur | One (1) |
| 2. | " | Marudur | One (1) |
| 3. | " | Billichigoundanur | One (1) |
| 4. | " | Pattakaranur | One (1) |
| 5. | " | Medur | One (1) |
| 6. | " | Kendapalayam | Two (2) |

| S.No. | Name of the Block | Name of the village | Number of the centres Organised | |
|-------|----------------------|-----------------------|------------------------------------|-----|
| 7. | Periyanaickenpalayam | Pannimadai | Two | (2) |
| 8. | „ | Thaliyur | One | (2) |
| 9. | „ | Pappanaickenpalayam | One | (1) |
| 10. | „ | Ramanathapuram | Two | (2) |
| 11. | „ | Madathur | One | (1) |
| 12. | „ | Chinnathadagam | Three | (3) |
| 13. | „ | Kalaiyanur | One | (1) |
| 14. | Perur | Pothanur | One | (1) |
| 15. | „ | Sundarapuram | Two | (2) |
| 16. | „ | Kamarajapuram | One | (1) |
| 17. | „ | Machampalayam | Three | (3) |
| 18. | „ | Edyarpalayam | Three | (3) |
| 19. | „ | Gnanpuram | One | (1) |
| 20. | „ | Telungupalayam | One | (1) |
| 21. | „ | Telungupalayam Pudur | One | (1) |
| 22. | „ | Ganapathy | Two | (2) |
| 23. | „ | Sanganoor | One | (1) |
| 24. | „ | Maniakarampalayam | Two | (2) |
| 25. | „ | Thiagi Nehru Nagar | One | (1) |
| 26. | „ | Kuppuswamy Iyer Nagar | One | (1) |
| 27. | „ | Seeranaickenpalayam | Two | (2) |
| 28. | „ | Kumarasamy Ari | Two | (2) |
| 29. | „ | Kurichi | One | (1) |
| 30. | Sarkarsamakulam | Kalipalayam | Two | (2) |
| 31. | „ | Subbanaickenpudur | One | (1) |
| 32. | „ | Udalyampalayam | Two | (2) |
| 33. | „ | Chinavedamapatty | Two | (2) |
| 34. | „ | Kottaipalayam | Three | (3) |
| 35. | „ | A.S. Kulam | Two | (2) |
| 36. | „ | Vellamadai | Two | (2) |
| 37. | Madukkari | Vellalur | Two | (2) |
| | | | Total | 59 |

With the assistance of the 60 instructors, the eligible learners were sought and for each centre between 30 and 35 learners were enrolled. Altogether there were 1800 learners. Of these 1800 learners, 200 were below 15 years of age, 1200 were between 16 and 35 age group and 400 were 36 and about that age group.

The evaluation of the programme was done in terms of the Quantitative outcome of the project, skills developed by the learners, extent of involvement of the instructors in the programme, views of the learners about the usefulness of the programme, problems faced by the instructors in conducting the programme and suggestions given by the instructors for the future improvement of the programme.

The major outcome of the project was the successful completion of the course (in respect of learning) on the part of the learners:

Table I speaks for the quantitative outcome observed.

TABLE I
THE QUANTITATIVE OUTCOME OF THE PROGRAMME

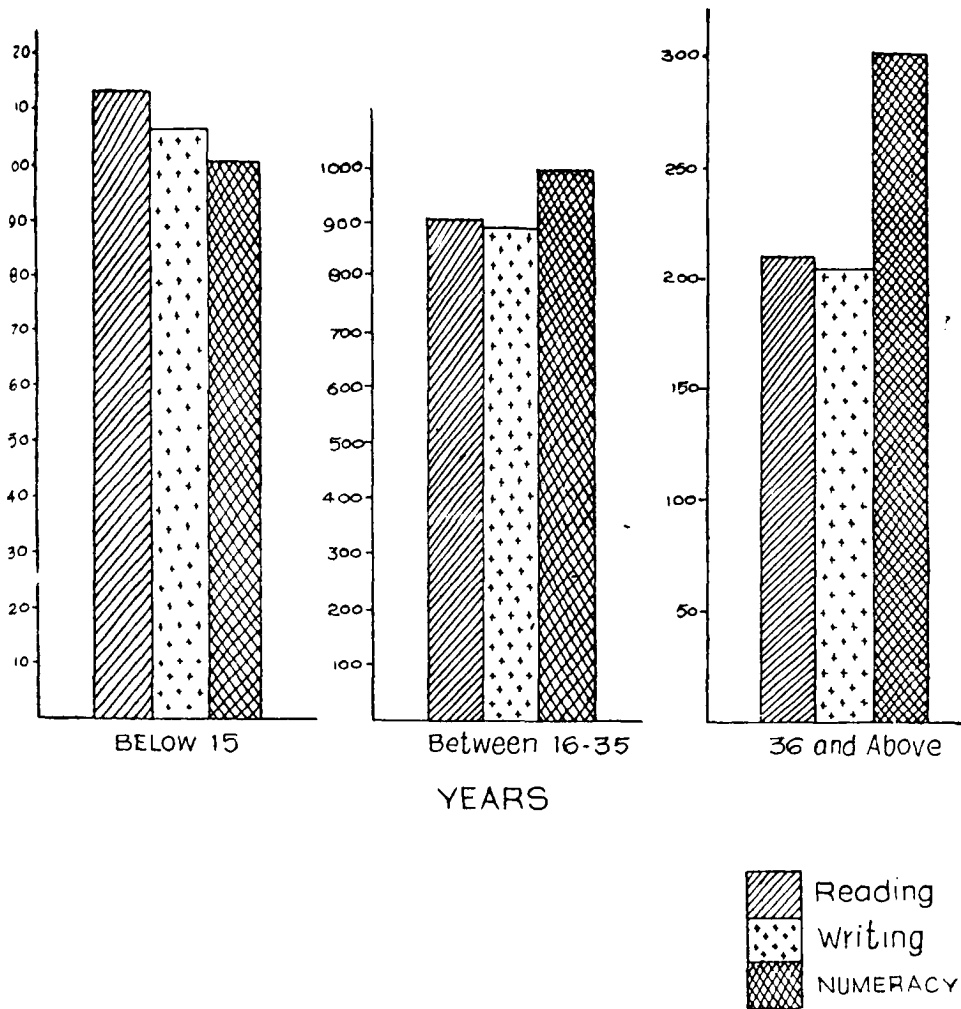
| S.No. | Age group in years | Enrolement | | | No. Completing the Course successfully | | |
|-------|-----------------------|------------|--------|-------|---|--------|-------|
| | | Male | Female | Total | Male | Female | Total |
| 1. | Below 15 | 100 | 100 | 200 | 80 | 70 | 150 |
| 2. | Between 16-35 | 400 | 800 | 1200 | 300 | 700 | 1000 |
| 3. | 36 and above | 130 | 270 | 400 | 100 | 250 | 350 |
| | Total | 630 | 1170 | 1800 | 480 | 1020 | 1500 |

Of the 1,800 learners enrolled, 1,500 learners had completed the course successfully, that is 83 per cent of the illiterates were made literate. This is a great achievement. Both in enrollment as well as in completing the course, women stood first.

The skills developed by the learners were tested in terms of the abilities they developed in reading and writing namely, (figure. 2).

1. Ability of the learners to read with comprehension.
2. Ability of the learners to write with comprehension.
- and 3. Ability of the learners to do sums.

SKILLS DEVELOPED BY THE LEARNERS



1. Ability of the learners to read with comprehension:

FIGURE 2

Table II depicts the ability of the learners in reading, with comprehension.

The number of persons reading upto the expectation of UGC norms (10 wards per minute) was 1223. This was made possible by the efficient conduct of the classes.

TABLE II
ABILITY OF THE LEARNERS IN READING

| S.No. | Age group in years | Number completing the course successfully | Number Reading as per UGC norms (1978) |
|-------|--------------------|---|--|
| 1. | Below 15 | 150 | 113 |
| 2. | Between 16-35 | 1000 | 901 |
| 3. | 36 and above | 350 | 209 |
| | Total | 1500 | 1223 |

2. Ability of the learners to write with comprehension :

Table III illustrates the ability of the learners in writing, with comprehension.

TABLE III
ABILITY OF THE LEARNERS IN WRITING

| S.No. | Age group in years | Number completing the course successfully | Number writing as per UGC norms (1978) (10 words/minute) |
|-------|--------------------|---|--|
| 1. | Below 15 | 150 | 107 |
| 2. | Between 16-35 | 1000 | 891 |
| 3. | 36 and above | 350 | 204 |
| | Total | 1500 | 1202 |

One thousand and two hundred and two participants could write up to the level of the prescribed norms. This is an indication of the work carried out in the field by the animators and the supervisors. Of the three age groups, the age group between 16-35 years had the maximum participation and also the maximum achievement.

3. Ability of the learners to do sums :

Table IV enlightens the ability of the learners to do sums.

TABLE IV
ABILITY OF THE LEARNERS TO DO SUM

| S.No. | Age group | Number completing the course successfully | Number writing as per UGC norms (1978) Writing upto 100 |
|-------|---------------|---|---|
| 1. | Below 15 | 150 | 100 |
| 2. | Between 16-35 | 1000 | 997 |
| 3. | 36 and above | 350 | 330 |
| | Total | 1500 | 1397 |

One thousand three hundred and ninety seven learners could do sums as per the UGC norms. Of these the age group between 16-35 years seems to be well advanced, as it reveals 997 participants out of 1000, completing the course successfully, acquiring the skill, fully.

Emerging from these observations, the following suggestions and recommendations are made for the future conduct of the NAEP.

1. A strong political will for the success of the programme is needed. All the parties should take adult education as one of their activities.
 2. The government should release the funds in advance.
 3. Recognition of thumb impression as substitute for signature by the illiterates and those undergoing the course should be abolished.
 4. Like primary education, adult education must be made compulsory for all the illiterates and those undergoing the course should be given preference for enjoying employment opportunities elsewhere.
 5. The learners should be given some sort of incentives so as to motivate others also, take part in the programme.
- and 6. At least a *Five Year* integrated programme including feed back for adult education is necessary to make the programme, a really successful one.

Literacy, I report, is basic education, literacy is social education. Literacy is developing human beings who will themselves change society of the better (Fisher, 1913). It was once said rather beautifully by Edwin Markham as quoted by Fisher (1973),

“We are all blind until we see
that in the human plan
Nothing is more worth the making
That does n’t make the man
Why build these cities glorious?
If man unbuilded goes
In vain we build the work
Unless the builder also grows”.

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IMPACT OF ADULT EDUCATION PROGRAMME ON THE LIFE STYLES OF SELECTED WOMEN

P. Krishnammal

Education is essential for human development. Literacy is the key to a richer and more productive life for an individual in his many roles as a producer, consumer and citizen. Democracy cannot be successful without education.

However, it is distressing to note that even after four or five thousand years since the introduction of the written world more than two thirds of the adult mankind in the developing world is still remaining illiterate. Every single instance of illiteracy is an instance of human tragedy and national crime. A large percentage of illiteracy represents the waste of its own most precious human resources.

The present patterns of formal education are urban - oriented. Therefore, they cannot meet the hopes and aspirations of the rural poor. But adult literacy or non-formal education in its wider sense, has an important role to play (Sen, 1979). However as Devadas (1979) has stated adult education is not an end in itself, but it is a means to an end. That is, development of men towards which goal, social education is directed.

Realising the magnitude of the problem of illiteracy, the Government of India launched a massive National Adult Education Programme (NAEP) on October 2nd 1978 with the sole aim of liberating millions of illiterate men and women and helping them become self-reliant, responsible and responsive citizens. The NAEP has three major components literacy, awareness and functional development (Sharma, (1979).

The present study was an attempt to assess the impact of the adult education programme on the life styles of selected women in Salem district.

The specific objectives of the study are to :

1. Study the impact of the Adult Education Programme on the life styles of selected home makers in terms of child rearing practices, family welfare, family resource management, health and sanitation, social participation and civics.

2. Find out the differences if any, between the life styles of women who participated in National Adult Education Programme and those of non-participants.
3. Study the impact of participation of neo-literate women in the post Literacy Programme.

Sample :

The sample of the study comprised of 50 literacy participants, 50 post literacy participants and 25 non-participants, drawn from 16 villages spread over eight Panchayat Unions in Salem district. Care was taken to select atleast 10 samples of adult literacy participants in each of the agencies, namely, Rural Functional Literacy Project, State Adult Education Programme, Voluntary Organisations, Colleges and Nehru Yuvak Kendra. The criteria observed for the selection of the sample was mothers having children below 12 years in the participants and non-participants.

Tool :

The interview schedules 1 and 2 were constructed to collect informations from non-participants and participants of the Adult Education Programme. Based on the pilot study conducted, the necessary modifications were done in the final tool. Reliability and validity of the tool were ensured.

Procedure

The data were collected from the 125 individuals with the use of interview schedules 1 and 2. The results were tabulated, interpreted and presented under results and discussion.

Findings:

The major findings of the study are given below :

1. The collected data revealed the fact that 98 per cent literacy participants, all the post literacy participants and non-participants had breast fed their children.
2. Regarding the duration of breast feeding, 62 per cent literacy participants, 60 per cent post-literacy participants and 48 per cent non-participants breastfed their children from 7 months to 1 year duration.
3. Seventy eight per cent literacy participants, 90 per cent post literacy participants and 68 per cent non-participants had stated that they

supplemented the breast milk. The difference between non-participants, literacy participants and post-literacy participants is great.

4. The percentage of samples giving supplementary foods to children from the post literacy participants was higher when compared to literacy participants and non-participants.
5. Among the selected samples, 76 per cent literacy participants, 76 per cent post literacy participants and 68 per cent non-participants had recorded the child's date of birth while the rest did not record the child's date of birth.
6. In the selected families, 76 per cent of the literacy participants and 92 per cent of the post-literacy participants had given triple antigen to their children, whereas only 52 per cent of the non-participants had given triple antigen to their children. The impact of the adult literacy classes is very clear.
7. Fifty per cent of the selected literacy participant families and 56 per cent post literacy participants had children in the Balwadi going age and all of these families were sending their children to Balwadi as importance of sending children to the Balwadi classes is emphasised in the adult education classes. Among the non-participants families 52 per cent of them were having children in the Balwadi going age but only 6 per cent of the families were sending their children to Balwadi.
8. There was a higher per centage among the literacy participants and post literacy participants inculcating good habits in children compared to the non-participants.
9. Among the selected respondents. 78 per cent of the literacy participants and 86 per cent of post literacy participants felt that one or two children per family was ideal while 60 per cent of the non-participants expressed their wish to have three children in the family.
10. Realisation of the problems in having large families by the non-participants were comparatively less when compared to the expresses of the other two groups.
11. There is a great impact in taking up subsidiary occupation to supplement the family income both in the literacy participants (82 per cent) and post literacy participants (80 per cent) compared to non-participants (32 per cent).
12. Almost equal number of literacy participants (66 per cent) and post literacy participants (68 per cent) spend their leisure time profitably whereas only 44 per cent non-participants were using leisure time profitably.

13. Even though family income of the post-literacy participants was, inadequate to meet their family needs, 66 per cent literacy participants and 86 per cent post-literacy participants had the habit of savings to meet the emergencies while the habit of saving is found to be poor among the non - participants (only 32 per cent).
14. Planning the family expenditure was done by a higher percentage of post-literacy participants (78 per cent).
15. Of the three categories, a majority (68 per cent) of the post literacy participants had cut down the unnecessary expenditure on celebrations of festivals, birth, marriage, etc., while only 52 per cent literacy participants and 40 per cent non-participants did so
16. Practice of buying food materials during the season was found to be high among post literacy participants (82 per cent) while 36 per cent participants and 24 per cent non-participants did so.
17. Response of the samples show that in all the three categories, very low percentage of samples had utilised the nationalised banks in getting loans. This aspect must be stressed in the training programmes.
18. Practice of adopting improved storage methods to save grain from damage due to pests, insects and rodents was found to be poor in all the three categories of respondents. This shows that the adult education programme had made no impact in education people in adopting improved grain storage practices.
19. Increase in the percentage of subsidiary occupations undertaken by the literacy participants and post-literacy participants after their participation in adult education, shows that there was considerable improvement.
20. The impact of adult education on the life styles followed for healthful living of the participation is evident.
21. Participation of post-literacy participants in social activities was more in making use of co-operative for buying or selling things, helping the ayahs and teachers in the balwadi activities, taking part in Madar Sangam activities and attending the general meetings in their village compared to literacy participants and non-participants.
22. The knowledge of the post-literacy participants was higher when compared to literacy participants and non-participants with regard to some aspects of civics.
23. The family members of literacy participants and post-literacy participants accepted the suggestion given by the mothers on

various aspects to a large extent, in making changes in their day-to-day activities as a result of attending the adult education classes.

24. The various advantages of adult education programme were realised by the literacy participants and post-literacy participants in varying degrees.

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