A Study on the Outcomes of Introduction of Smokeless Chulahs in The Rural areas of Thondamuthur Panchayat Union, Coimbatore Dt.

BY

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Introduction

INTRODUCTION

The kitchen has definite contribution to make towards the health, comfort and happiness of the family. Women who constitute nearly one half of the human resources of the country spend a considerable amount of their time in the kitchen. Therefore the kitchens should be made convenient working places for them.

The Indian kitchens have all along remained to be suffocating chambers of pungent smoke, violantly irritating the eyes, nose and lungs and also the temper of the house wife. Open smoky chulahs needing frequent blowing of fire and backwalls dirty with soot, creates and environment, which is unhygienic, inaesthetic and depressing. Nearly 100 million women of India spend a quarter of their lives in these gloomy kitchens with thick layers of smoke, due to burning cowdung cake and firewood. (Salariya and Jindal, 1983).

Smoke nuisance is a public health problem and a serious health hazard. According to the studies at the East-West centre in Hawaii, U.S.A., the

amount of carcinogenic particles emitted by smokefire in enclosed kitchens, can be equal to smoking 20 packets of cigarettes. Smoke from wood burning stoves and fire places contains 17 major pollutants, 14 known cancer causing substances and toxic agents (Kotary and Mugdani, 1980)

The Thermal Efficiency of the traditional chulahs is also very low leading to wastage of the fuel, namely firewood, which has now become a scarce commodity. It is estimated that in the open fire cooking on a traditional chulah, only 5 - 10 percent of the potential energy in the wood fuel is utilised (Grover and Sharma, 1981, Prasad and Mandal, 1983, and Salariya and Jindal, 1983).

Thermal efficiency chulah not only solves the problems of health and housing but also contributes to the fuel and forest economy which are essential for the prosperity of the country (Gupta, 1982). The improved cook stoves having a combustion effeciency of more than 15 per cent have drastically cut down consumption of firewood (Hindu, 1985).

The scientists who are greatly concerned with environmental pollution have started paying more attention to pollution free kitchens through alternate fuels and cooking stoves. Introducing smokeless chulahs in the rural kitchens is one such effort in this direction(Pushpa and Swaminathan, 1985).

Smokeless chulahs have several advantages. They give freedom from smoke, soot, heat, waste, fire risks etc., The smokeless chulah is simple, saves on fuel and labour, is adaptable and improves the home environment. It solves a number of problems connected with health, housing and fuel economy (Devadas, 1969).

Attempts had been made from the 50's to evolve suitable designs for smokeless chulahs (starting from the Raju Chulah) by all those concerned with rural development. Sporadic and adhoc aefforts had also been taken up to introduce smokeless chulahs in the rural households as part of the nationwide Community Development Programme.

However, the outcomes in terms of adoption of the devices were not noteworthy and significant.

Today, meeting the 'energy crisis' has received the highest priority in all our national policies, programmes and developmental strategies. Alongwith exploring alternate sources of energy, attempts are being made to introduce smokeless chulahs specially in the rural households as a measure to alleviate drudgery of the home makers and to promote fuel economy. It is a happy augury that science and technology are considered to be the major inputs to foster rural development as enunciated in the VII Five Year Plan documents, New 20 Points Programme etc., It is with these in view, the new programme of popularisation of smokeless chulahs has been initiated which is being implemented by the existing rural development machinery at the block level. The programme initiated in 1984-85 has enlarged its scope in terms of increased targets to be achieved from year to year.

While quantitative expansion is essential, the qualititative dimension also needs to be considered. For instance, to what extent has this programme reached the rural households and how far has it satisfied

the rural homemakers in terms of convinience and saving of fuel are questions which remain unanswered. The problems in using these devices should also be located in order to introduce correctional measures.

The present study was therefore undertaken with the following specific objectives:

To

1. Understand the benefits accruing to the rural homemakers from the introduction of smokeless chulahs.

2. Become aware of the operational difficulties and

3. Suggest solutions to overcome the problems located.

Review of Literature

II REVIEW OF LITERATURE

The literature pertaining to this study has been reviewed under the following headings:

A. Rural Energy Crisis
B. Need for Smokeless Chulahs in the Rural Areas and
C. Principles of Smokeless Chulah.

A. Rural Energy Crisis:

Rural energy crisis has come to be identified with the fire wood crisis. Cooking is the predominant fire wood—— Consuming activity in the rural areas.

When Village level aggregate energy flow is considered , energy consumption for cooking accounted for about 80 percent of the village energy flow/ budget. Thus, in any effort to alleviate the rural energy problems, energy needs of cooking get the first priority. While considering the energy needs of cooking, one must bear in mind the growing scarcity of firewood and the need for improving the

quality of life of rural women.

The cooking process in traditional cooking stoves is characterised by low thermal efficiency and drudgery due to smoke in the kitchen and long cooking hours. The growing scarcity of firewood and the need for improving the quality of life calls for fuel saving and smokeless alternative.

The dwindling firewood resource, apart from causing irrepairable damage to environment, also leads to i) longer gathering hours or increased time spent on collection of cooking fuel and (ii) increased diversion of cattle dung, crop residue and even cropland for fuel purposes.

An ASTRA study has shown that the thermal efficiency of the traditional stoves is low and it ranges from 14 to 19 percent. Thus there is a compelling need to increase the thermal efficiency of the stove, especially in a situation of dwindling firewood resources.

Cooking in traditional stove leaves smoke in the kitchen. This not only leads to great inconvenience but

also to eye and lung diseases for the women. Since, cooking requires 4.58 women hours per day per household,, it is necessary to put an end to this health hazard. The need for a faster cooking device arises as women have to attend to other domestic as well as agricultural activities in addtion to cooking.

As firewood becomes increasingly scarce, human hours required for gathering and the distance to be travelled increases. This leads to human drudgery and particularly greater involvement of child labour, which already accounts for 30 percent of the human labour used for gathering firewood. In case of households where firewood is bought, firewood scarcity will lead to higher proportion of income being spent for purchasing fuel.

As the pressure on trees increases, dung and certain types of crop residue currently used as manure would be increasingly diverted to uses as fuel, at the cost of its manurial value.

In addition to diversion of dung and crop, residue, shrubs and trees will come under pessure. All these will deprive the soil of its organic matter, thus affecting soil fertility and causing erosion.

All these factors strongly point to the need for a fuel-efficient, smokeless, time-saving and environmentally-sound alternative for meeting the energy needs of cooking (Ravindranath) and Shilaja 1986).

The non-commercial fuel consumed in rural India accounted for 94.5 percent of the fuel consumption, practically the entire energy requirements of rural India were met by non-commercial fuels.

The report of the Working Group on Energy Policy, Planning Commission, Government of India, 1979, indicated that 68.5 percent of the energy in rural

India was obtained by firewood, followed by oil which contributed 8.3 percent. Firewood, thus, remains the major source of cooking energy in India (Shyam Sundar, 1986). Rural People will have to continue to depend primarily on fuelwood as their main source of energy for several decades to come (Chandran, 1986).

About 130 million tonnes of wood is burnt every year for cooking purposes in the rural areas. The supply of wood is fast depleting because of indiscriminate felling of trees in the rural areas. [Mannan (1981) and Sudha and Prasad (1981)].

A large programme of fuel, and farm-forestry was taken up in the sixth plan covering 13 lakh hectares of plantation. The objectives are mainly maintaining ecological balance, supply of fuel and fodder and other domestic needs of the population and the needs of the village small scale and large industries (Pathak, 1984).

The problem of rural energy supply, therefore, calles for a new approach and a new planning strategy deliberately oriented to the specialised needs of Integrated Rural Development (Chadurvedi, 1986).

B. Need for Smokeless Chulah in the Rural Areas:

A majority of the world's population living in backward areas use cooking devices which are smoky, primitive, unhygienic and wasteful, They constitute a world problem affecting simultaneously, housing, fuel economy, health physical and mental and forest economy (Perumal, 1983).

The ordinary 5000 years old household open chulah , has an extremely low thermal effieiency, when food is cooked. The amount of heat actually absorbed by the substances cooked is extremely low, compared to the heat given out by the wood consumed during the process. The losses are due to the unscientific method of burning ~~for~~ wood,

inefficient design of the cooking device and uneconomical cooking methods employed by the housewifes (Batliwala, 1983).

The present Indian Chulahs are hundreds of years old. They have an efficiency of less than even ten percent, which means that over 90 percent of the heat released by the fuel goes waste. The result is a colossal demand of firewood well over 130 million tonnes a year - and an extensive pressure on trees to yield energy. Even, if the efficiency of these can be doubled to 12-15 percent, which is technically quite simple todo half the firewood consumed in the country can be saved. An efficienct chulah would also be smokeless, turning cooking into a pleasure instead of a suffocating ordeal that millions of women have to suffer every day.

Several attempts have been made in the past to design efficient chulahs but no serious attempts have been made to disseminate them to the rural areas (Gupta, 1982).

The division of labour in our society is such that generally the woman is burdened with the work of collection of fuel; she has to do this work, besides the daily routine work and if the woman is from the labour class, she is entrusted with the achievement of the triple task: household work, wage earning and collection of fuel (Gupta, 1993).

The introduction of improved cook stoves may fulfil two important needs:

1. Reduction in fire wood and
2. Improvements in environment by control of the fire intensity and smokeless operation.

Open fire cooking is very inefficient because only 5 to 10% of the potential energy in the wood is utilised in the cooking process. Generally only one food item can be prepared at a time (Sodha and Prasad, 1991).

Efforts are being made to develop and popularise efficient 'Chulahs' (ovens) to reduce consumption of energy resources. The implementation of these programmes however, require an integrated approach involving local bodies, voluntary organisations, schools and other decentralised grass root agencies (Chaturvedi, 1986).

In the conventional chulah used by the rural people, the heat efficiency is only 10 percent and ninety percent goes waste, where as the heat efficiency of this smokeless chulah is hundred percent and hence no waste of fuel at all. It is to be noted that the fuel used for three days in this conventional chulah can be used for seven days in the smokeless chulah. It is also harmless to the house since the smoke goes out into the atmosphere through the cement pipe chimney. A single unit contains three separate chulahs and thus different items can be cooked at a time and lot of time is saved. Now in modern times when the scarcity of fuel is at its highest level 50 to 60 percent of fuel can be saved on this account (Harihara Iyer 1985).

'The Kitchen kills more than a sword' is an old German saying. Somoky kitchen is messy, unsanitary and requires ceaseless attention. For judging the health and living standards of people, there is hardly a better index than the standard of their kitchens.

The system of cooking meals two or three times a day is a common feature in India. Smoke blackens the utensils beyond cleaning. Much time and efforts are wasted in cleaning the utensils (Salaria and Jindal, 1983).

Therefore, improved, well designed, fuel efficient, low cast and appropriate smokeless chulahs should be made available to the poor families. By doing so, an effective solution to the problem of fuel wood ciris, deforestration process and soil erosion will be found (Indira Gandhi, 1981). Considering all these facts the improved thermal efficient smokeless chulahs are the best and cheapest measure to mitigate the health hazards and the drudgery of rural women and the most effective fuel wood conservation method-(Pandit (1983) Devadas (1985) and Vedant (1985).

The advantage of smokeless chulahs, have been enumerated by several authors.

Smokeless chulah ensures a clean and safe cooking process. Due to elimination of smoke and soot, the kitchen will be clean and made a cheerful place for the family. The other adjoining living apartments will also be free from irritating smoke and blackened walls. (Phadnis, 1983) and Srivastava, (1984).

While based on scientific principles, the smokeless chulah is simple in design, construction and use. It can be adopted for the needs of the families of different sizes and income groups, hotels, schools and restaurants. Smokeless chulah is readily adaptable for burning a wide range of locally available fuels.

Because the time spent in cooking and the drudgery involved are reduced by using smokeless chulahs, women find more leisure to be spent on useful income generating activities. Further more, the construction and sale of smokeless chulah promotes job opportunities for rural artisans.

The study conducted by Social Work and Research Centre (SWRC) Jagjitpur (1983) shows the following benefits:

1. Reduction infuel consumption; effective removal of smoke from the kitchen with its concomittant impact on the discomfort and irritation caused to the eyes as well as reduced time spent on washing blackned kitchen walls.

2. Household goods remain clean
3. Time is saved in cooking and cleaning of utensils.
4. Removal of ash is minimised
5. Time spent in fuel wood collection is saved.

Devadas et al (1983) Phadnis (1983) and Srivastava (1984) narrate the following benefits:

1. Kitchen is smoke free.
2. The draft helps in starting and maintaining bright fire,
3. Heat from fuel is more fully utilised; the saving of fuel is about 25 percent if used properly.
4. The person cooking is freed from getting scarched by radiated heat,

5. Designed to use wood fuel completely,
6. Heat could be controlled.
7. Makes cooking a cheerful occupation as there is no smoke or heat reaction and
8. Small chips of dried fuel help to start the fire easily.

The use of smokeless chulahs should be popularised all over the world specially in villages where the majority of population lives. The use of smokeless chulah will not only make the women folk healtheir, but will also increase their life span (Salariya and Jindal, 1990; and Pant 1993).

The benefits of smokeles chulahs as outlined by Muniandi (1996) are as follows:

1. It keeps smoke properly regularised.
2. It is easier to start and maintain fire, as there is always a fresh supply of air from under the gratings and there is no necessity for blowing air frequently.
3. The heat emanating from the fuel is calcualted to be about one-third, when properly used.

4. Charcoal and other burning materials can also be used in this oven besides the usual firewood.

5. The vessels and the kitchen are kept clean of soot.

6. Different degrees of heat prevail under the three pot-seats, which help the cooking to a great extent (100%, 60% and 40%).

7. The cook is freed from the burning heat of the oven as a current of fresh air is maintained near the choola by the draft which keeps the kitchen also cool and comfortable.

8. The cooking is finished in lesser time, thus relieving the homemaker to get some leisure to be utilised for other purposes.

9. The heat in the second and third pot-seats may be conveniently used for drying and light roasting. Chips of fuel and fire-wood may be profitably placed on the oven for drying soon after the completion of cooking.

10. It is purely hand-made and locally made.

11. It is easily repairable when it goes wrong.

12. It is durable and comparatively stronger than the traditional chulahs.

13. It is portable for short distances and is less unwieldly than the other patterns.

14. By providing baffles (gradient) upto the chimney base in the fule passage between the three pot-seats, it has been found that the choola has a better performance, fully utilising the heat units and the smoke entering the chimney base having sufficient heat to raise it against atmospheric pressure or wind currents above the root, thus preventing any back draft.

C. Principles of Smokeless Chulah:

The features of smokeless chulah mentioned by Raju as early as in 1957 are given below:

1. The chulah should have a simple design with a minimum of two pot seats.

2. It must be smokeless at the time of cooking.

3. The construction should be simple for general adoption in every home.

4. The materials required for its construction should be locally available.

5. It should be capable of using different types of fuel like crop stalk, firewood cow dung cake etc.,

6. The cleaning of the chulah and removal of ash from its inner portions must not create any difficulty.

In order to fulfil the above tasks the smokeless chulahs should have the following:

1. The closed hearth where the combustion of wood takes place. This protects the loss of heat through wind, draught etc.

2. The multholed design that makes it possible to prepare two or three items, stimultaneously although only one hole will feed the fuel.

3. The 'fuel' which is the passage providing the heat between the pot seats, it must be providing the heat between the pot designed to concentrate the flames at the pot seats before they are carried out of the stove.

4. The chimney to provide the draught necessary for bringing in air for accelerating the combustion process and also for removing smoke pollution (Paul, 1993).

When the flames pass through the pot seats, most of the heat is absorbed by the vessels on them. As the gas is heated it will rise and as a result of an upward flow provided by the low pressure area created within the chimeny, it causes the gas to move continuously upward and this flow is known as draft (Sharma, 1983). Against a satisfactory draft, smoke cannot retreat and it is necessary that no leakage of smoke is allowed between the pot and hearth (Joslin and Taylor, 1983).

The chimney is the chief feature of smokeless chulah to direct smoke out of the kitchen, The hot smoke has a tendency to rise towards a smoke outlet. But when the heat in it is slowly absorbed, by the atmosphre, it ceases to rise up. When it is left absolutely devoid of heat, it becomes denser than air and being reluctant to rise up it whirls round and round with the breeze and spreads all over the place. Hence, it is essential to keep the smoke free from outside cold air, until it reaches the top of the chimney and mingles with the breeze. For efficient functioning, the chimney should be erected one foot above the roof(Patel, 1983).

Methodology

III METHODOLOGY

The Methodology for this study on Outcomes of Introduction of Smokeless Chulahs in selected Villages of Thondamuthur Panchayat Union of Coimbatore District consisted of the following steps:

A. Selection of the Area;
B. Selection of the Sample; and
C. Selection of the Method of Investigation and Conduct of the Study.

A. Selection of the Area:

Thondamuthur Panchayat Union of Coimbatore District was selected for the study owing to its approachability for the investivator through public transport facilities.

After establishing rapport with the block officials, information was elicited on the details of installation of smokeless chulahs in the various villages of the block, during 1984-85 and 1985-86. Table I gives the particulars collected.

TABLE I

DETAILS OF INSTALLATION OF SMOKELESS CHULAHS IN THE SELECTED AREA FOR THE STUDY.

S.No.	Year	Number of chulahs installed	Number of villages Covered
1.	1984-85	100	12
2.	1985-86	250	23

Over a period of two years, 350 smokeless chulahs were reported to be installed covering 35 villages.

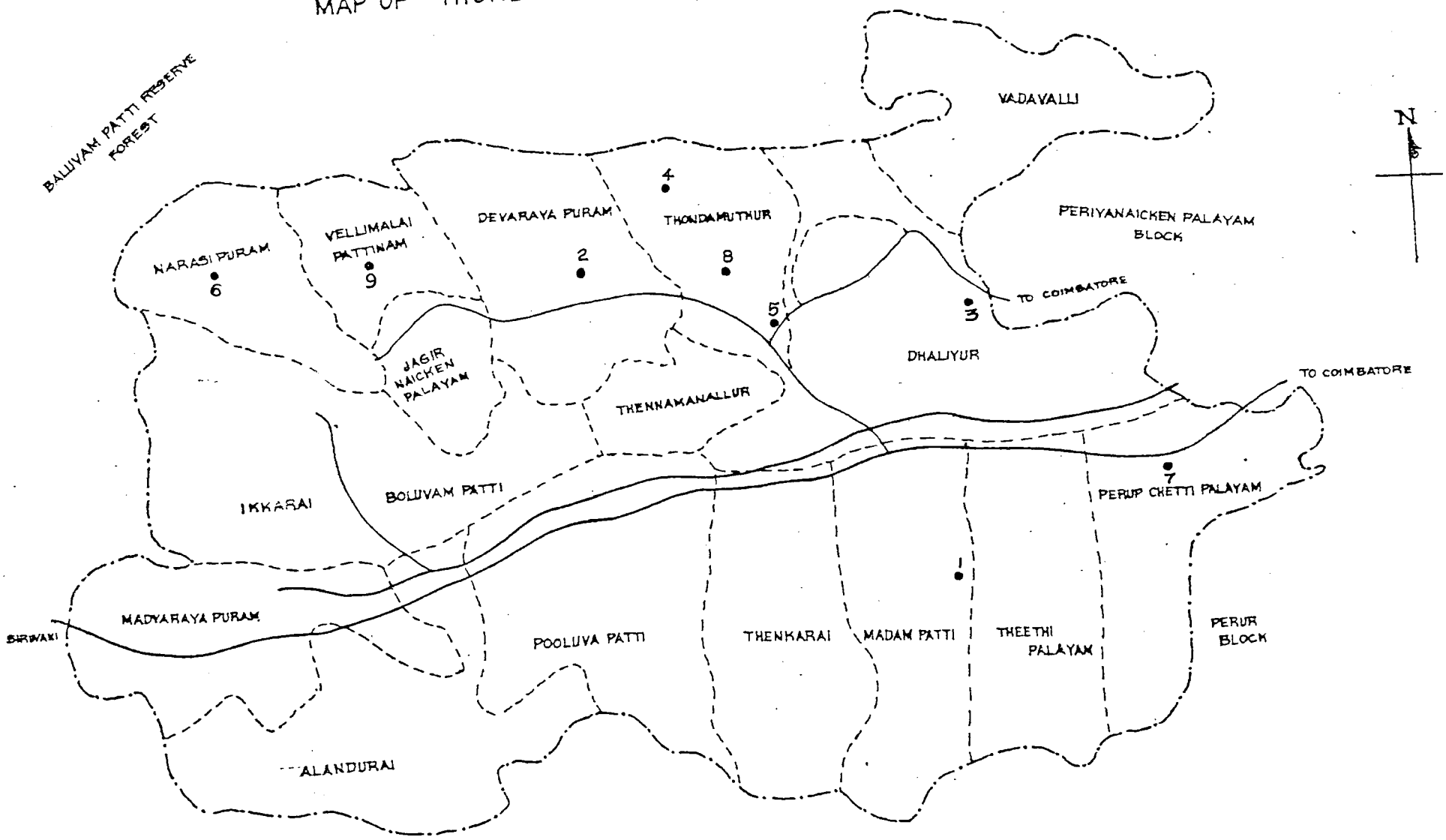
B. Selection of the Sample:

A scrutiny of the list of villages covered pointed out a wide vairation in the number of chulahs installed per village which ranged from one to 54. There were no specific criteria for the selection of these villages. The targets alloted for the block were somehow achieved by the field level functionaries namely Rural Welfare Officers.

The addresses of the households to which the chulahs were supplied were obtained from the block. The families were then contacted. Surprisingly it was noted that certain families received the chulahs but were not utilising them at all. Therefore it was decided to probe into the reasons for this situation . The sample for the study, thus consisted of 100 households which utilised the chulahs and 50 households which received the chulahs but did not use them.

The sample was drawn from nine villages where atleast five chulahs were given. Pachapalayam, Kembanur, Chellappa Goundenpudhur, Vellimadaipattinam, Narasipuram, Dhaliyur, Kulathupalayam, Thondamuthur and Devarayapuram were the villages selected for the study (Figure I).

MAP OF THONDAMUTHUR PANCHAYAT UNION



LOCALE OF THE PROJECT

Figure.1

C. Selection of the Method of Investigation and Conduct of the Study:

Interview method was selected for this study owing to its advantage of getting the first hand information from the respondents, besides facilitiing observation to some extent.

An Interview schedule was prepared eliciting family background, details about smokeless chulah such as sources of information, advantages, problems encounted and suggestions to improve the chulah. The schedule was pretested, finanlised and administered to the sample selected (Appendix I).

The details necessary were collected after establishing rapport with the families. The details thus collected were carefully checked, analysed, presented and interpreted in the subsequent chapter.

Results and Discussion

IV RESULTS AND DISCUSSION

The findings of this investigation are presented and discussed under the following headings:

A. Background Information about the Beneficiaries.
B. Details of Use of the Smokeless Chulahs;
C. Advanatages of using the Smokeless Chulahs;
D. Problems encountered in the Use of the Smokeless Chulahs;
E. View points of the Non-users of the Smokeless Chulahs ,
and F. Suggestions to improve the Smokeless chulahs.

A. Background Information about the Beneficiaries:

A majority of 87 percent beneficiaries belonged to the nuclear families. Sixty five percent belonged to agricultural families (34 percent out of whom were small farm owners and 31 percent were agricultural labourers).

A majority of 72 percent belonged to middle income class while 28 percent were below the poverty line.

Only 27 percent beneficiaries belonged to the scheduled castes.

Nearly one third of the respondents were illiterates. The maximum education for others was found to be primary (27 percent) or high school level (33 percent).

With regard to housing, a large majority of 93 percent were living in their own houses; 55 per cent households had one of two rooms, 45 percent had three to five rooms.

While 68 percent had separate kitchens, 32 percent families used the multipurpose room for cooking. The cooking was done at floor level in 93 percent cases.

While all the respondents used firewood for cooking, 80 percent supplemented it by dung cake and 76 percent used coconut shells and agro-waste also.

The food expenditure for the families surveyed ranged from 33 to 80 percent of the monthly income. Twenty five percent families did not spend any money on fuel, as they had

obtained them free of cost from their own farms. For the others the expenditure on fuel varied from five to 27 percent of the family food expenditure.

B. Details about the Use of the Smokeless Chulahs:

This aspect is dealt with under the following sub headings:

1. Years of use of the smokeless chulah;
2. Sources of information about the smokeless chulahs;
3. Alterations made in the kitchen; and
4. Amount spent towards construction.

1. Years of use the smokeless chulah:

While 41 percent respondents had been using the smokeless chulahs for the past two years, 59 percentage had been using them over a period of one year.

2. Sources of information about the smokeless chulahs:

Table II and figure 2 gives details about the sources of information about the smokeless chulah.

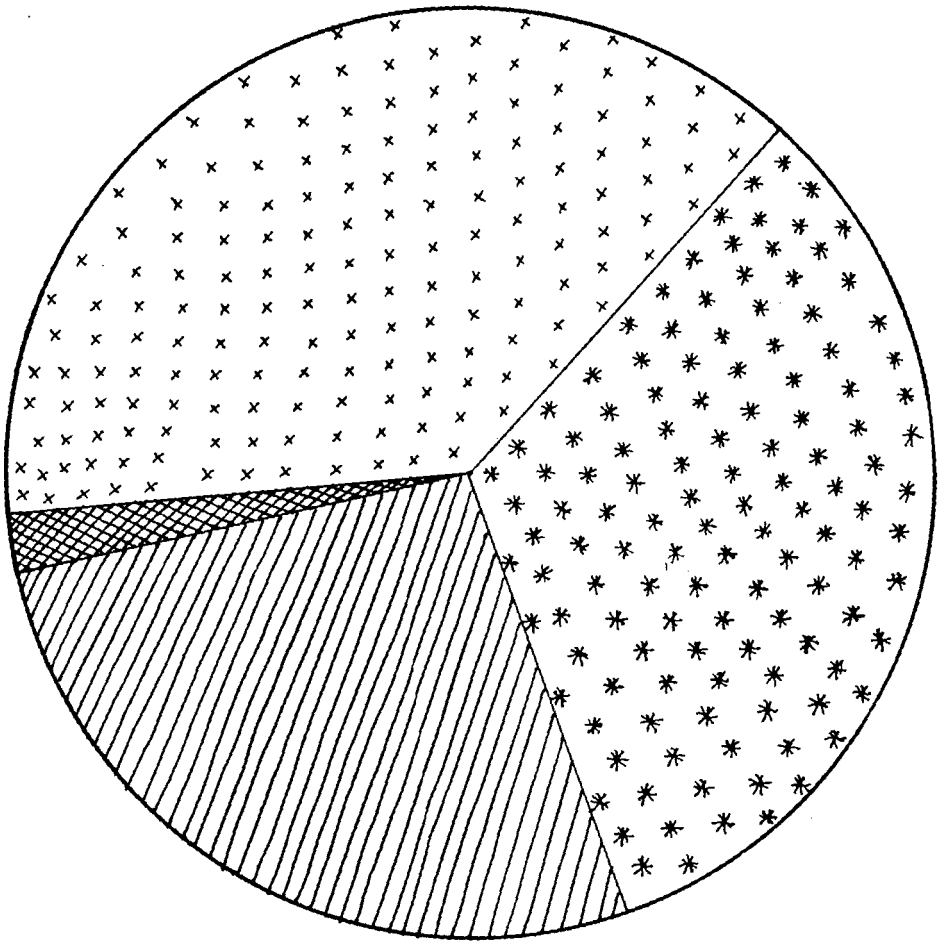


Figure.2 SOURCE OF INFORMATION

TABLE II

SOURCES OF INFORMATION ABOUT THE SMOKELESS CHULAH

S.No.	Sources of Information	Percentage of Beneficiaries (N=100)
1.	Rural Welfare Officers	38
2.	Neighbours	33
3.	Village leaders	27
4.	Others	2

Both official and non official sources functioned as sources of information about the new device. However, the non official sources played a greater role, since 33 percent adopters were informed by neighbours and 27 percent were mitivated through village leaders. Thus personal localite sources played a favourable role.

3. Alterations made in the kitchen:

A large majority of 95 percent respondents constructed the smokeless chulahs without making any alterations in the kitchen. five home makers had an additional raised slab while two had constructed new kitchens (figure 3).

SMOKELESS CHULAH IN USE

Figure.3

4. Amount spent towards construction:

The smokeless chulahs were reported to be installed free of cost. While 14 percent did not spend any extra money towards installation, 75 per cent spent Rs. 10 each extra and 11 percent spent Rs. 15 each extra towards masonary work involved or for replacing the mud chimney supplied, with cement outlet pipe.

C. Advantages of using the Smokeless Chulah:

This aspect is discussed under the following headings:

1. Advantages as perceived by the homemakers
2. Changes in fuel consumption
3. Changes in time consumption for cooking.

1. Advantages as perceived by the homemakers:

Table III and figure 4 gives the advantages of using the smokeless chulahs as perceived by the users.

TABLE III

ADVANTAGES OF USING THE SMOKELESS CHULAHS AS PERCEIVED BY THE HOMEMAKERS

S.No.	Advantages	Percentage stating (N=100)
1.	The smoke is taken away from the kitchen	100
2.	The chulah is 'pucca' and can be used for many years	97
3.	Kitchen walls are clean	95
4.	No soot is deposited on the cooking vessels	92
5.	The chulah is a low cost gadget	90
6.	The chulah lends itself for the use of different types of fuels	85
7.	There is saving in cooking and cleaning time	32
8.	Fuel consumption is reduced.	22

The respondents could state the multifaceted advantages of the smokeless chulah. The aspects like freedom from smoke, clean cooking place, low cost and fuel and time saving were appealing to the homemakers.

1. The smoke is taken away from the kitchen
2. The chulah is 'Pacca' and can be used for many years
3. Kitchen walls are clean
4. No soot is deposited on the cooking vessels
5. The chulah is a low cost budget
6. The chulah lends itself for the use of different types of fuels
7. There is saving in cooking and cleaning time
8. Fuel consumption is reduced

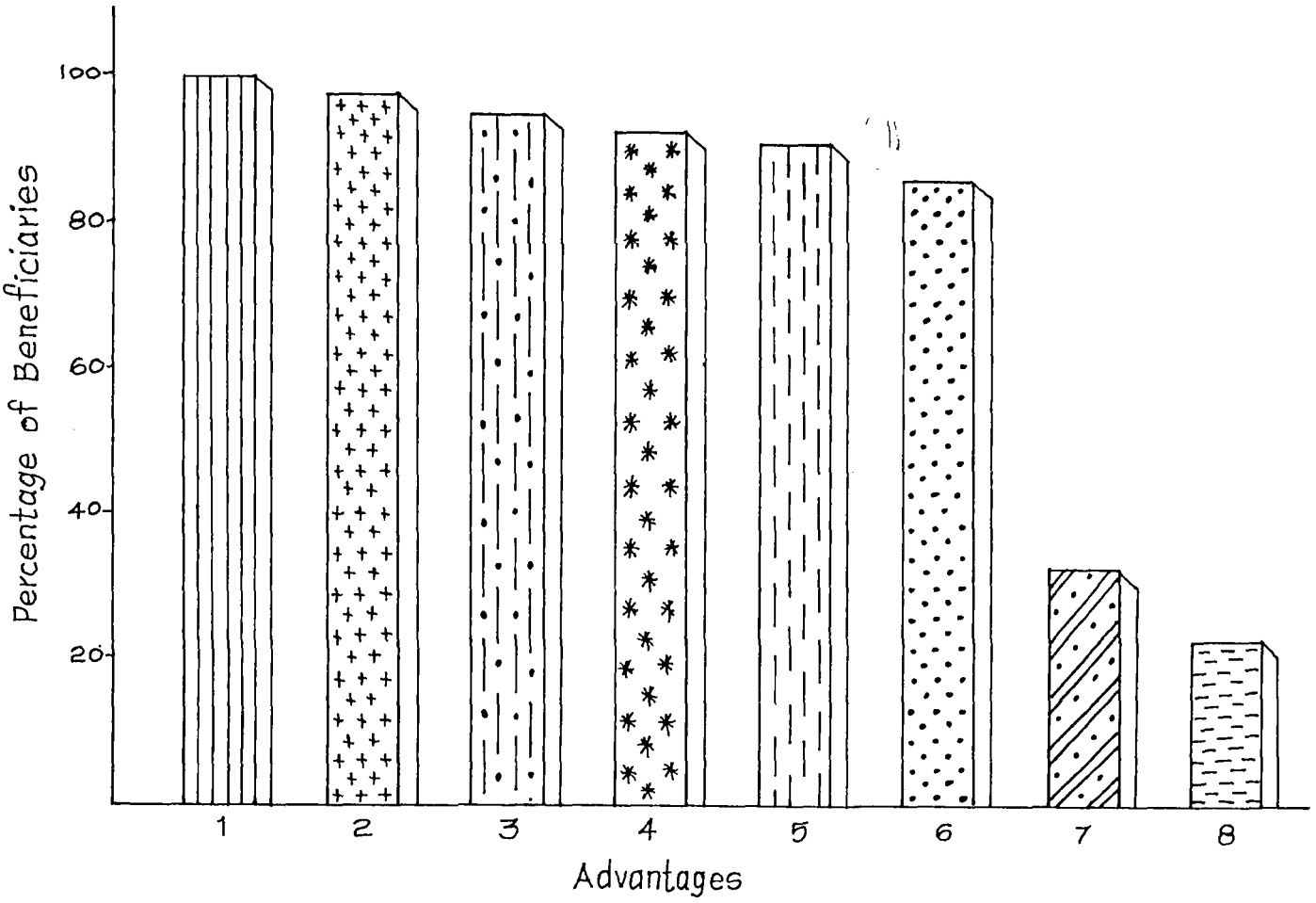


Figure. 4. ADVANTAGES OF USING THE SMOKELESS CHULAHS AND PERCEIVED BY THE HOME MAKERS

Table IV Illustrates the benefits

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of the

~~The~~ smokeless chulahs for the entire village.

TABLE IV

BENEFITS OF SMOKELESS CHULAHS FOR THE VILLAGE

S.No.	Benefits	Percentage stating (N=100)
1.	Improvement in the health status of the people	86
2.	Improvements in the environmental sanitation	76
3.	Cost of the chulah within the reach of the village	75

It was heartening to note that the homemakers could perceive the long term benefits of introducing the smokeless chulahs inthe entire village community. This is a positive trend.

Figure 4 depitts the advantages of using smokeless chulahs.

2. Changes in fuel consumption:

The responses with regard to the fuel consumption while using ordinary chulah and smokeless chulah were elicited and the mean fuel consumption per day was calculated taking into account the number of members in the household. Table V shows the changes in fuel consumption

TABLE V

CHANGES IN FUEL CONSUMPTION AFTER USING THE SMOKELESS CHULAH

S.No.	Details	Percentage stating N=100
1.	More fuel consumption in smokeless chulah	55
2.	Less fuel consumption in smokeless chulah	20
3.	No change at all	25

The opinions were varied. The fact that a majority pointed out that smokeless chulah consumed more fuel reguires further probe and more scientific studies on fuel consumption. The difference was to the tune of .5 kg per head per day.

3. Changes in time consumption for cooking :

Table VI gives the view points of the homemakers on the time consumption for cooking, using smokeless chulah as against that while using ordinary chulah.

TABLE VI

TIME CONSUMPTION FOR COOKING WHILE USING SMOKELESS CHULAH Vs ORDINARY CHULAH

S.No.	Details	Percentage stating (N=100)
1.	More time in smokeless chulah	48
2.	No change at all	30
3.	Less time on smokeless chulah	22

That 48 percent viewed that smokeless chulah consumed more cooking time again requires further studies on scientific basis. The time difference saving was 5 to 15 minutes.

The opinions on the fuel consumption and time consumption for cooking reveal that practically the homemakers were never taught about the correct use of the smokeless chulah which would ultimately defeat the purpose the scheme . Imaking use of the greater thamnal efficiency and two pot seats.

D. Problems encounted in the Use of Smokeless Chulahs:

Table VII and figure 5 points out the problems experienced by the homemakers in using the smokeless chulahs.

TABLE VII

PROBLEMS FACED BY THE HOMEMAKERS IN THE USE OF SMOKELESS CHULAHS

S.No.	Problems faced	Percentage stating (N=100)
1.	Excessive consumption of fuel	51
2.	Water seepage along the exhaust pipe	16
3.	Difficulty in keeping the vessels on the second pot seat	7
4.	Difficulty in using big vessels	5
5.	Construction defects in placing the smokeless outlet	4

The fact that 51 percent homemakers complained of excessive consumption of fuel in the smokeless chulahs needs further probe and detailed fuel consumption studies.

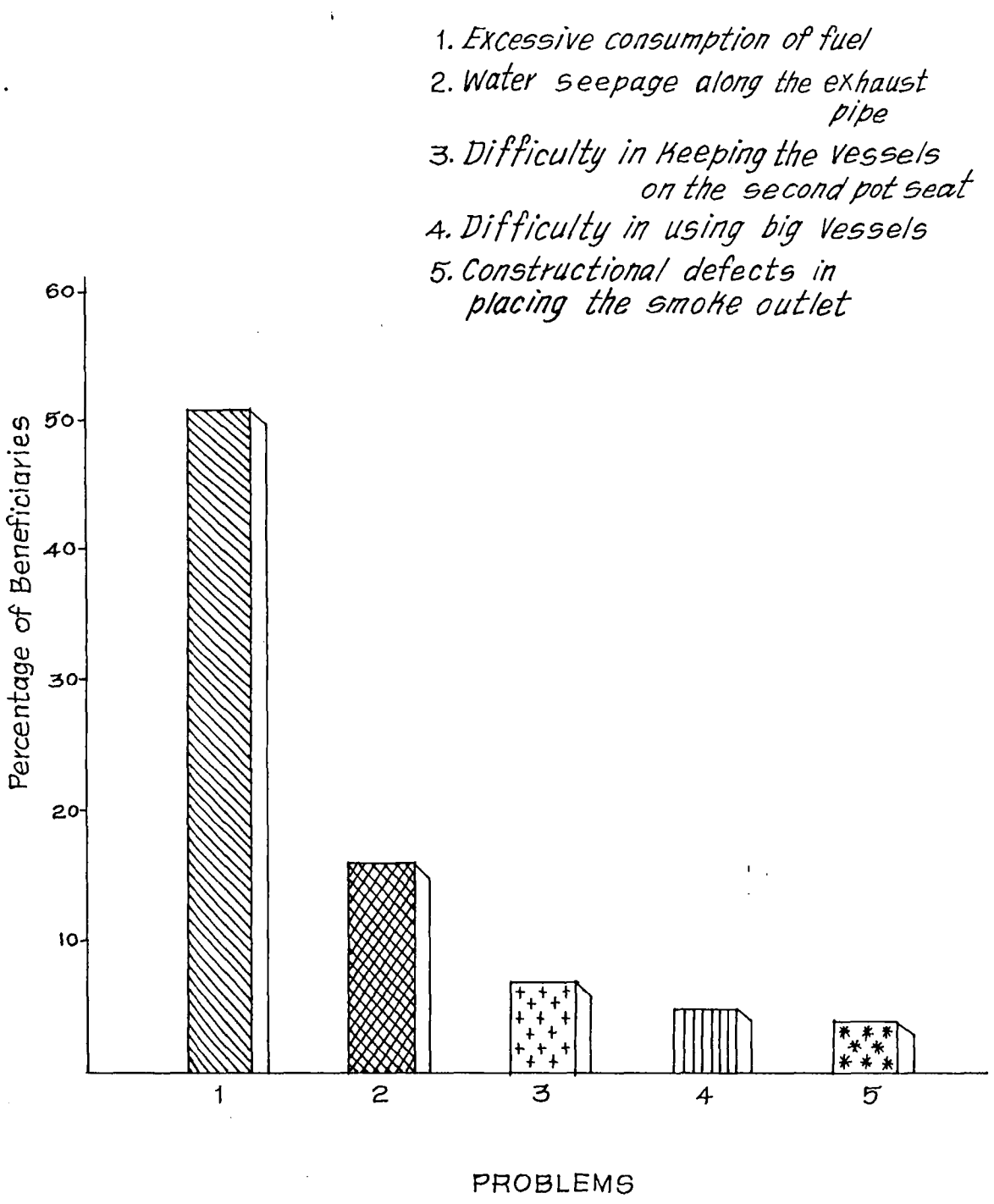

Figure.5. PROBLEMS FACED BY THE HOME MAKERS

The other problems pertained to the technical defects which also require detailed investigation and rectification by the officials concerned.

E. View points of the Non-users of the Smokeless Chulahs:

The fifty non-users of the smokeless chulahs were questioned as to why they did not use the new device. While six homemakers did not install the chulah 44 installed them but did not use them at all. Table VIII gives their responses.

TABLE VIII

REASONS FOR NOT USING THE SMOKELESS CHULAHS

S.No.	Reasons for not using the smokeless chulahs	Percentage stating (N=44)
1.	Smokeless chulah requires more fuel	41
2.	Cooking in smokeless chulah consumps more time	36
3.	Maintenance of the smokeless chulah would be difficult	23

The homemakers feared that the use of the smokeless chulahs would lead to more fuel and time consumption and maintenance of the device would be difficulties. This proves that there was no follow up at all on the part of the officials. These homemakers need to be properly educated to overcome the fear and anxiety.

F. Suggestion to improve and popularise Smokeless Chulahs:

Table IX gives the suggestions of the respondents to improve the smokeless chulah.

TABLE IX

SUGGESTIONS TO IMPROVE THE SMOKELESS CHULAH

S.No.	Suggestions	Percentage of homemakers (N=100)
1.	Size of the chulah shouldbe bigger or smaller depending upon the needs of the home-makers	66
2.	Smoke outlet pipe (Chimney) should be properly constructed	51

It is obvious that the homemakers did not prefer a standard size of the chulah. Modification have to be done in size, depending upon the needs of the family. Farther more, the constructional defects need to be rectified.

To the question as to whether you discuss about the smokeless chulahs with other homemakers both who had adopted and those who had not adopted, 78 percent respondents answered in affirmative. Table X gives the details of the points for disucssion.

TABLE X

DISCUSSION WITH OTHER HOME MAKERS

S.No.	Details	Percentage stating (N=78)
I.	With thosewho had constructed smokeless chulahs:	
	a. General information about smokeless chulah	50
	b. Advantages and disadvantages of using smokeless chulah	15
	c. Fuel consumption in the smokeless chulah	13
II.	With those who did not adopt smokeless chulahs:	
	a. Motivating them to adopt smokeless chulah	29
	b. Exploring as to why they did not adopt	28
	c. Advantages of the device	21

The discussions were on possitive lines and indicated the great concern the rural women had on eliciting others view points.

Ninety five percent homemakers opined that smokeless chulahs have to be popularised in the villages. Their specific suggestions to do this are as given in the Table XI.

TABLE XI

SUGGESTIONS OF THE HOME MAKERS TO POPULARISE SMOKELESS CHULAHS

S.No.	Suggestions	Percentage stating(N=95).
1.	Giving proper advertisement	44
2.	Discussion with others	37
3.	Explaining about smokless chulah	24
4.	Posters and charts	14
5.	Demonstration	2

These suggestions are worth consideration by all those concerned with finding solutions for the energy crisis.

Summary and Conclusion

V SUMMARY AND CONCLUSION

The study on the Outcomes of Introduction of Smokeless Chulahs in the rural households was carried out with 150 homemakers drawn from nine villages of Thondamuthur Panchayat Union using the interview technuque. The major findings of the study are as follows:

1. There was no definite basis for the selection of the beneficiaries. The Rural Welfare Officers who were assigned with this task somehow reached their targets fixed.

2. The expenditure on fuel varied from five to 27 per cent of the family food expenditure.

3. A large majority of 95 percent homemakers installed the smokeless chulahs without making any alternations in the kitchen. They had spent only a meagre sum of Rs. 10 to 15 towards masonary work, as the smokeless chulahs were supplied free of cost.

4. The advantages of using the smokeless chulahs were well understood by the homemakers, the

major ones being freedom from smoke, clean cooking place, reasonable cost, saving in fuel and reduction in the time spent on cooking and cleaning. Better environmental sanitation leading tto improved health conditions was the major outcomes for the villages community as perceived by the homemakers.

5. However, the homemakers were not fully satisfied with the fuel consumption and time expenditure in the use of the smokeless chulah. Infact, there were statements that the fuel consumption and cooking time while using the smokeless chulahs were more when cmmpated to that in the ordinary chulahs (.5 kg per head per day and 10-15 minutes respectively).

Further probe is essential on these two major issues, based on scientific fuel and time consumption studies. The homemakers must be trained in mangerial skills in food preparation and must be educated to realise the full benefits of the smokeless chulahs.

6. Certain technical defects with regard to the chimney and the size of the pot seats were reported which also require immediate attention, if the programme has to succeed.

7. The 50 homemakers who had received the smokeless chulahs but never used them expressed their fears about more fuel and time consumption as well as maintenance difficulties. This again needs investigation, and these homemakers have to be given training in the proper use of the device so that they may be convinced to use the same.

The 'Missing link' in the smokeless chulah programme is the education component. Unless training and education are incorporated in the programme, the very purpose would be defected leading to enormous wastage of national resources. If the challenge of energy crisis, has to be met in the realisense, the grassroot level machinery has to be geared to look into all details and rectify the defects immediatly.

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Appendices

APPENDIX I

SRI AVINASHILINGAM HOME SCIENCE COLLEGE FOR WOMEN

COIMBATORE - 641043.

INTERVIEW SCHEDULE TO ELICIT INFORMATION ABOUT THE VIEW POINTS OF THE USERS OF THE SMOKELESS CHULAH.

Name of the Village :

Date of interview:

Panchayat :

Name of the investigator:

I. General Information:

1. Name of the interviewee:

2. Name of the Head of the family :

caste :

Religion :

Address :

3. Occupation of the Head of the family:

4. Type of family:

Joint ☐ Nuclear ☐

II. Family Background:

S.No.	Name of the family members	Sex	Relation ship to the head of the family	Age	Education	Occupation	income per month.

III. Income - Expenditure Pattern.

INCOME

S.No.	Sources of income	Amount permonth Rs.Ps.	Annual income Rs. Ps.
1.	salaries/wages from main source		
2	Income from subsidiary sources		
	a. land		
	b. Rent		
	c, Interest		
	d. cattle		
	e. others (Specify)		
	Total (1+2).		

Expenditure:

S.No.	Items of Expenditure	Amount per month Rs.	Ps.

IV. General details regarding the house:

1. Tyep of owhership

Owned [ ] Rented [ ]

Total nukber of rooms in the house.

2. Type of the kitchen

spparate [ ] Part of any room [ ]

3. Location of the cooking place

Ground level [ ] Raised level [ ]

V. Details about the smokelesschulahs.

1. What type of chulah had you used before using the smokeless chulah?

2. From whom did you come to know about the smokeless chulah?.

3. Since Howlong are you using the smokeless chulah?

4. From where did you buy the smokeless chulah?.

owned ☐ Panchayat union ☐

How much did you spend for the construction of the chulah?.

a. Money spent by the panahayat union

b. Money spent by you.

5. How long did you wait to get the chulah.

6. Did you get any training on the utilisation of the chulah?

Yes ☐ No. ☐

If yes, give details.

7. Did you make any modifications in the kitchen for the use of the smokeless chulah?

Yes ☐ No ☐

If yes, what changes did you do?.

8. Information on fuels.

S.No.	Types of fuel	Amount of fuel in kg. ordinary chulahs	Amount of fuel in kg. Smokeless chulahs	Reasons for use.
1.	Fire wood			
2.	Dung cake			
3.	Coconut shells and fibres			
4.	Kerosene			
5.	Any other (Specify)			

9. Meal preparation, ~~time of preparation per day~~.

S.No.	Type of meals	Time of preparation Morning	After noon	Night	Total time taken for cooking hours/minutes. ordinary	Smokeless

10. Time taken for cleaning utensils perday.

S.No.	Total time taken for cleaning utensisl perday H/M.		
	Smokeless chulah	Ordinary chulah	Differences

11. What are the advantages of using the smokeless chulahs?

a. For your household

b. For the entire village.

12. What are the problems encountered in the use of smokeless chulahs?.

13. What are your suggestions to improve the smokeless chulahs?

14. Do you discuss about the smokeless chulahs with other homemakers who had adopted the smokeless chulah?

15. Do you disucss about the smokeless chulahs with other homemakers who had not adopted the smokeless chulah?

16. What are your suggestions to popularise the smokeless chulahs?.