Production And Consumption Pattern of Edible Oilseeds And Oils in Selected Rural Areas of Coimbatore

BY

Suganya S.

A THESIS SUBMITTED TO THE AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY) COIMBATORE - 641 043

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN FOOD SERVICE MANAGEMENT AND DIETETICS

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CERTIFIED AS BONAFIDE RESEARCH WORK

SIGNATURE OF HEAD OF THE DEPARTMENT

SIGNATURE OF THE DEAN OF THE FACULTY

SIGNATURE OF GUIDE

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Introduction

I. INTRODUCTION

Fats and oils are classified as lipids and they are important components of human diet with several nutritional and health implications. Edible oils are next to food grains in the Indian diet. The most important source of supply of edible oils are the seeds known as edible oilseeds (Agarwal, 1990).

Oilseeds constitute a high position in Indian agriculture because they are the most widely used and are the essential components in our dietary pattern, providing raw materials to a number of industries and contributing to our Nation's economy. From the nutritional point of view, they are important not only because they provide essential fatty acids but also because of their nutritive value in terms of other nutrients including protein, carbohydrates, minerals and fat soluble vitamins.

India is one of the leading oilseeds producing countries in the world. Oilseeds are the largest group of crops cultivated and account for about 14 per cent of the cultivable area and of the total oilseed produced more than 93 per cent is edible (Gupta, 1986).

The production figures of major oilseeds in India has exceeded 200 lakhs tonnes during 1992-93 (Indian Oil Palm Journal, 1993). In Tamil Nadu the production of oilseeds in 1992 was 2.5 lakh tonnes which falls short of the state's requirement of 3.5 lakh tonnes. The area under important types of oilseeds cultivation in the state was about 11.77 lakh hectares (Kissan World, 1992).

According to the Agricultural Statistics Centre (1994) the area under groundnut production in Coimbatore division for the year 1993-94 was 5400 hectares, with gingelly in about 160 hectares, sunflower and soybean in 182 and 328 hectares respectively.

On the whole it can be observed that the growth rate of production of oilseeds and oil in India has accelerated both due to increase in area and productivity as given by Edible Oil News, 1993.

Although the area under cultivation has increased considerably the progress is still far below the desired level. The cause for this is that oilseeds are cultivated mostly in unirrigated semi-arid areas hence vulnerable to vagaries of nature and more over they are cultivated by small and marginal farmers.

Viswanathan (1992) has given the possible ways to increase the vegetable oil production by maximising the output of conventional oilseeds, increasing the output of unconventional oilseeds such as rice-bran oil, cotton-seed oil, and soybean oil, adoption of innovative production technologies, producing oils from seeds of oil palm then by improving the efficiency of oil milling and blending of groundnut oil with other oils which would take care of the consumer acceptance of its nutty flavour, while ensuring shelf life and nutritional quality.

The seed storage studies conducted at agricultural research station, Kovilpatti, has given that the oilseeds can be stored effectively in gunnies under ordinary conditions of storage and the stored grains should be disposed off before rainy season, because the high humidity during that period will cause incidence of fungus on the seeds (Kissan World, 1990).

Kamaluddin (1993) stated that the oilseeds scenario in the country has undergone a substantial change during past few years. The country is moving away from the scarcity and huge import bills, to an era of self-sufficiency and possibly even export of vegetable oil.

The importance of fats is that it represents the most abundant and widespread class of the lipids occurring in nature. In plants they are particularly abundant in nuts and seeds and they are extracted as vegetable oils like groundnut oil, gingelly oil, sunflower oil, coconut oil etc. which comprises the visible fats commonly consumed in India.

Fat performs the important function of supplying fuel to the body, yields more heat and energy than carbohydrates. It also supplies essential fatty acids (EFA) that cannot be synthesised by the body. It aids formation of fat deposits underneath the skin which exerts insulating effect against excessive heat or cold and protects the important organs from physical injury. Fats also improve the palatability and give a satiety value (Ambika Shanmugam, 1992).

Vinodini (1993) reported that fats and oils are generally used in Indian diet for seasoning purposes along with condiments and spices. Vegetable oils are used by most families and fats like vanaspathi, ghee and butter are consumed by well to do families.

But the consumption of edible oils in India have increased by about 7 g over two decades from 11 g/d to 18 g/d (Economic survey, 1991-92). The per capita consumption of oil in our country is only 6 kg per annum as against the 14 kgs/annum norms recommended by the Indian Council of Medical Research (ICMR) (Kissan World, 1992). While in Tamil Nadu it is stated that the intake of fats and oils is 9 g/day.

According to National Nutrition Monetary Bureau (NNMB, 1979) visible fat consumption by the rural population is predominantly vegetable oil and the animal fat is negligible. The average intake of vegetable oil in the rural diet range between 2-19 g and the mean average was about 10 g/day.

A modest amount of fat should be present in our diets to meet the energy density and essential fatty acid requirements and imparting palatability to diets. Excess intake of fat is generally considered a health hazard. High fat intake especially the saturated fat raises the level of substances called Low Density Lipoproteins (LDL) in the blood and is directly related to the thickening of arteries which is an important risk factor in coronary heart diseases. Vegetable oils contain both the saturated and

polyunsaturated fatty acids (PUFA) and the ratio between them varies with the types of oil while saturated fatty acid tend to increase the serum cholesterol levels, the PUFA have the opposite effect and they helps to lower the serum cholesterol (Narasinga Rao, 1992).

As per the study conducted by OSLO Department of Heart and Life Insurance Companies Institute for Medical Statistics (1986) it was found that reduction in the intake of saturated fats lower the risk of heart attacks. So it does not really matter, how refined it is or how many vitamins it contains, what is important is how saturated it is and the quantity used (The Times of India, 1990).

The diet and health - Implications for reducing chronic disease risk committee on diet and health 1989 concluded that reducing the total fat and saturated fatty acid intake by limiting oils and fried items is likely to lower the rates of chronic diseases.

Lack of knowledge of the dietary requirements and the nutritive value of different foods is the main contributing cause for the widespread occurrence of ill health in the developing countries. The importance of nutrition education as a means for improving the nutrition

of the community in the developing countries, has been increasingly realised during recent years. Nutrition education should be practical and adopted to suit the socio-economic conditions food habits and local food resources. Food and Agricultural Organisation and World Health Organisation have provided technical aid and stimulated co-operation among countries in the field of education in nutrition (Swaminathan, 1991).

The present research was aimed towards studying the production and consumption pattern of edible oilseeds and oil in selected rural areas and imparting education to them on the safe consumption of good quality fat with the following objectives : To

a. Find out the production figures and storage practices of edible oilseeds and oils in the selected areas.

b. Assess the consumption pattern of edible oilseeds and oils in the selected farm households.

c. Study the prevalence of chronic diseases and its relation to fat consumption.

d. Create an awareness about the role of fat in the daily diet and to study its impact.

Review of Literature

II. REVIEW OF LITERATURE

The literature pertaining to the study on "Production and consumption pattern of edible oilseeds and oils in selected rural areas of Coimbatore" was viewed under the following headings.

A. Production figures of edible oil seeds and oils

B. Importance and role of oils and oil seeds in Indian diet

C. Consumption pattern of fats in Indian population

D. Interrelation of chronic diseases and fat consumption

E. Nutrition education and its impact

A. Production figures of edible oil seeds and oil

Gupta (1986) stated that India occupies a strategic position among the major oilseeds producers in the world, next to U.S.A, China and Brazil. Moreover, Indian farmers cultivate almost all kinds of edible and non-edible oilseed crops. Among the major oilseeds groundnut tops the list followed by rapeseed, mustard, gingelly, linseed and castor. The minor oilseeds include safflower, sunflower, soybean, niger and coconut.

Agricultural situation in India (1988) has given the production figures of oilseeds for the year 1985-86 as 10148 thousand tonnes, and that of 86-87 was 10,873.2 thousand tonnes which has increased by 7%.

The annual report of oil technology mission 88-89 reports the production of oilseeds in India for the year 88-89 as 178.9 lakh tonnes and 89-90 was about 169 lakh tonnes. The production of oilseeds for the year 91-92 was 183 lakh tonnes.

Oilseeds output for 92-93 was estimated by National Dairy Development Bureau (NDDB) as 230 lakh tonnes and that for 93-94 was 240.4 lakh tonnes which has increased considerably.

Cauvery (1992) stated that groundnut is one of the important cash crops. The major groundnut growing states in India are Tamil Nadu, Andra Pradesh, Karnataka, Gujarat and Maharastra. 80% of production and 7.8% of area were under this crop. Among these states the growing of the crop has assumed greater significance in Tamil Nadu.

According to Mahalingam (1992) the Tamil Nadu's potential for the year 92 is given as 2.5 lakh tonnes and that the area under important types of oilseeds in the state is about 11.77 lakh hectares.

The central organisation for oil and trade (COOT) India (1993) estimates the availability of oil from the nine major oilseed crops for the whole year 92-93 as 5.5 million tonnes and from non traditional sources like cotton seed, copra, seeds of forest and tree origin and rice bran as 1.5 million tonnes.

The International Food policy research institute (1990) reported that the demand for edible oil is likely to rise to 9.6 million tonne by 2000 A.D as against the current 7 million tonnes.

Out domestic production at present is adequate to meet the per capita edible oil consumption of 7 kgs, (Swaika, 1993). Bhagwan Dass (1987) has given the plan to boost oilseed output. For this the union agricultural ministry has formulated an integrated strategy for boosting oilseed production. The main thrust of the programme will be on area expansion by various cropping and intercropping

pattern and higher productivity by good and improved quality of seeds.

Kurien (1993) is confident that India will achieve self sufficiency in the production of oilseeds within a couple of years, with mustard crop spreading in north and oil palm being tried in other states. For the first time government has allowed exports of edible oil except groundnut oil in consumer packs of upto 5 kgs. This shows that the country has become self sufficient in edible oils.

Ramachandran **et al.** (1992) has concluded that oil palm as the solution for oil thirsty India, under this it is given that the estimated deficit between demand and production of vegetable oil in India is about one million tonne which may increase to 4-6 million tonnes by 2000 A.D. Shortage of vegetable oil is not only causing a drain on valuable foreign exchange but also it is a challenge to be met making available the minimum requirements.

B. Importance and role of oil and oilseeds in Indian diet

Fats and oils are classified as lipids, and it comprises an important category of nutrients. Oilseeds constitute one of the widely used and essential components in our dietary pattern and provide raw materials to a number

of industry and contributes to national economy (Edible Oil News, 1993).

Fat is an concentrated source of calories which supplies the body with energy and it is a carrier of fat soluble vitamins and it contributes to the flavour and palatability of the diet, it also an important source of essential fatty acids (Ritu Bhatia, 1987).

Dietary fat can be divided into invisible and visible fats. Milk and other foods like eggs, meat, fish, nuts and oilseeds are important sources of invisible fats.

Visible fats are divided into high saturated fatty acid such as coconut oil, ghee and vanaspathi olive oil contains high oleic acid; whereas sesame oil, corn oil, sunflower and safflower oil contains high linoleic acid content and moderate oleic and linoleic acid is present in palmolein and groundnut oil. Rape or mustard oil and soybean oil is rich in Linolenic acid content (Ghafoorunissa, 1994).

Edible oil is an essential commodity, and it is used in the form of raw oil, refined oil, vanaspathi constituting 15-20% of the consumers monthly budget (Viswanath, 1990).

According to the New York Times guide to personal health, only 10-20% of our daily calorie intake should be derived from fats.

The fat content of all the edible oils is the same. The only distinguishing factor of all cooking oils is their degree of unsaturation (Wagle, 1990).

C. Consumption pattern of fats in Indian population

Sunder Rajan **et al.** (1988) stated that in India per capita consumption is very much less than the world's average. The edible oil consumption has been rising annually as 5% per annum. Despite the increased production of vegetable oils in the country, the gap between the demand and supply has been widening due to increase in population and rise in income levels resulting in large imports of vegetable oil, causing a drain on valuable foreign exchange.

The analysis of National Sample Survey (NSS) showed that the per capita consumption expenditure for rural area are low showing a poor standard of living. The consumption levels are low but the per capita consumption expenditure varies not only between rural and urban areas but also across region indicating the inequality in consumption (Economic Times, 1986).

The per capita consumption of oils and fats of India was 11.24 gms/day and that of developed countries was 110.4 gm/day (Kothari, 1990). National Nutrition Monetary Bureau (NNMB) report of repeated surveys (1988-90) has given the consumption of nuts and oilseeds as 1.6% and fats and oils as 1.5% by the rural population and for the urban it was given as 1.5% and 3.1% of nuts and oilseeds and fats and oils respectively.

The ministry of agriculture 1990 has given the average consumption of fats/oils by different groups with adult male as the unit. It has given that the daily consumption of high income middle income and low income groups were 46 gms, 35 gms and 22 gms respectively and that of the rural areas in general was 10 gms/day. Swaika (1994) stated that as our edible oil consumption level at 7 kg/capital is still for below the world average.

D. Interrelation of chronic diseases and fat consumption

Narasinga Rao (1992) pointed out that an adequate amount of fat should be present in our diets to meet the energy density and essential fatty acid requirements and imparting palatability to diets. Excess intake of fat is considered as a health hazard. High fat intake especially of the saturated type exceeding 30-35% of energy leads to

hypercholesterolemia which is an important risk factor in coronary heart diseases. While saturated fatty acid tend to increase serum cholesterol levels increasing the poly unsaturated fatty acid content of diets helps to reduce serum cholesterol.

National Research Council (1989) evidenced that reducing total fat and saturated fatty acid intake is likely to lower the rates of chronic diseases. Dietary fats can also be reduced by limiting intake of fried foods, baked goods containing high levels of fat and spreads and dressings containing fats and oils.

Braganca (1993) stated that saturated fat in the diet not only stimulate the liver's production of bad low density lipoproteins which in turn increases the risk of heart diseases and strokes, but also increase the risk of diabetes and breast cancer. Coconut oil and palm oil are liquid oils which are also high in saturated fatty acids.

The studies have found that southern italians have one of the lowest heart disease rates. In the western world this was attributed to their high usage of olive oil which is rich in mono unsaturated fatty acid (MUFA) experts also advice to reduce the total fat intake and substitute fat

with oils. Such as olive, groundnut, gingelly oil that have a higher MUFA content.

A report in economic times (1989) makes clear that 85 US food companies have stopped palm oil and coconut oil in their products because of health concerns.

A study published in time magazine (1987) witnessed that for every one per cent reduction in the total cholesterol level, there is a 2% reduction in heart disease risk. Nowadays doctors advocate a low fat and low cholesterol regimen beginning at the age of two years.

Abraham Silver **et al.** (1994) conducted a study on plasma lipid effects of 3 common vegetable oils in reduced fat diets of free living adults by comparing the plasma lipid changes due to the PUFA in partial and hydrogenated soybean oil, corn oil and sunflower oil fed in reduced fats and they concluded that PUFA's at 6% of total energy result in clinically relevant plasma cholesterol lowering and that the proportion of PUFA must be an important consideration when planning reduced fat and reduced saturated fat diets.

The Australian Nutrition Foundation (1988) has given the problems associated with high fat diets. The non-

insulin dependent type of diabetes is prevalent in western countries has been linked to both a high fat diet and obesity and Bowel cancer and cancer of the breast and uterus are more prevalent in populations where there is a high fat in the diet.

E. Nutrition education and its impact

The Tab Sanders (1994) has given that the word diet really mean a balanced diet and it is eating normally, with pleasure not guilt and it does not have to result on weight gain but it require a sound knowledge of nutrition.

Nutrition education is a process which assists the public in applying knowledge from nutritional science and the relationship between diet and health to their food practices (Gillespie, 1992).

He has also given that it is a deliberate effort to improve the nutritional well-being of people by assessing the multiple factors that affect food choices, educational methodologies and the messages to the publics being reached and evaluating results. It can help individuals to develop a knowledge of good nutrition, and thereby promote selection of nutritionally adequate diets.

Lampathey (1988) has stated that nutrition and health education aims in the improvement of health knowledge, by modifying the attitudes and influence health related behaviour in order to reduce mortality and morbidity.

National conference on preventive medicine in United States of America defines health education as a process that informs, motivates and helps people to adopt and maintain healthy practices and life styles, advocates environmental changes as needed to facilitate this goal and conducts professional training and research to the same end (Park and Park, 1991).

Johnson **et al.** (1987) has defined the process of nutrition education as the teaching of validated correct nutrition knowledge that promote the development and maintenance of positive attitudes, eating nutritious foods that contribute to the maintenance of personal health, well being and productivity.

A voluntary agency in its rural medicare has included the nutrition health education as one of their main programme called sangham, and in health education activities

education regarding nutrition and balanced diet is given in the project villages (Natarajan, 1983).

Singleton (1994) stated that nutrition educators have made much progress in educating families about food and its relationship to health, but many families who hear these health messages are not able to make the necessary changes to incorporate them in to their life styles.

He has given that poverty is one of the many risk factors that place families at risk for engaging in poor health and nutrition behaviours.

It is associated with an increased risk for developing diseases like heart diseases, obesity, high blood pressure and diabetes mellitus. These chronic diseases are more prevalent in poor communities where stress levels are high and access to health care is low.

Marie **et al.** (1994) conducted a study to investigate the relationship between food related attitudes and food consumption in 36 older women during a four day period and concluded that food related attitudes varied according to food group and the amount consumed.

Patricla **et al.** (1994) studied the role of awareness of dietary fat intake as a possible factor in the process of dietary behaviour change on 1507 adult subjects and concluded that improving dietary fat intake awareness should be given priority as a first step in healthy diet promotion strategies.

Maryam **et al.** stated that inorder to attain optimal retention of nutrition education imparted the message structure of the educational sessions should contain fewer and less complex messages.

Nutrition education involves both imparting nutrition information and developing client's motivation to use the information in their life patterns. The educator should evaluate the learning process in terms of both the client's progress and the educator's effectiveness. If the education given is effective, the client will put the information into practice as a new habit or as a modification of old one (Clara, 1986).

Methodology

III. METHODOLOGY

The experimental procedure pertaining to the study on "Production and Consumption Pattern of Edible Oilseeds and Oil in Selected Rural Areas of Coimbatore", comprised of the following aspects:

A. Selection of area and sample

B. Conducting the study

1. Selection of the tool
2. Collection of data
3. Studying the food consumption pattern of the selected subjects in relation of fat consumption.
4. Imparting nutrition education and evaluating its impact

A. SELECTION OF AREA AND SAMPLE

The investigator selected the Thondamuthur block located in the city of Coimbatore to conduct the study. From this block three villages namely Devarayapuram, Thenamanallur and Madampatti were selected due to the leading production of oilseeds and these villages were indicated as V_1, V_2 and V_3 respectively.

A sample of 180 farm households producing oilseeds were selected, 60 from each village was taken. The criteria

for selection being production of oilseeds, easy accessibility, and co-operation rendered by the farm population.

A sub samples of 30, ten from each village were taken to study the food consumption pattern. These samples includes people suffering with diseases like diabetes mellitus, hypertension, obesity and heart diseases.

B. CONDUCTING THE STUDY

1. Selection of the tool

Interview method was selected to collect information for the study, because it helps to get first hand information in face to face contact from the informant (Gupta, 1991). Two interview schedules were constructed to obtain the data required for the study. Interview schedule refers to a form of questionnaire which is filled in by the researcher or the interviewer himself, who sits with the informant and fills in the form. (Satyanarayana, 1984)

Interview schedule Ia as shown in appendix I included the details regarding family background, socio-economic status, production, storage, and consumption pattern of edible oilseeds and oil, prevalence of diseases like diabetes mellitus, blood pressure, obesity and heart

diseases. This schedule was pretested with ten samples to find out the drawbacks. Based on the results of the pretest the schedule was modified and finalised. The interview schedule Ib as shown in Appendix II was used to conduct the 24 hour recall dietary survey. The diet and health committee 1989, has defined twenty four hour recall method as the method in which the respondents report the types and amounts of foods they consumed over the previous twenty four hour period.

Interview schedule II as given in appendix III was formulated to assess the knowledge of the subjects with chronic diseases about food consumption, mainly fats and oils in relation with diseases before giving nutrition education and the impact of the education given was evaluated by using the same schedule.

2. Collection of data

The selected hundred and eighty farm households were approached during their leisure time to create rapport and the needed informations were collected using the interview schedule Ia which includes their family background, socio-economic status, production, storage and consumption pattern of edible oilseeds and oil and the prevalence of diseases.

3. Studying the food consumption pattern of the selected subjects in relation to fat consumption

The food consumption pattern of a sub sample of 30 subjects, ten from each village with chronic disease was studied using a 24 hour recall method, with the help of the Interview Schedule Ib to assess the relation of fat consumption to disease prevalence.

From the twenty four hour recall dietary survey, the nutritive value of the foods consumed was calculated using the ICMR Table (1994)

4. Imparting nutrition education and evaluating its impact

The awareness of the subjects with Chronic diseases regarding their disease condition and food consumption pattern with special emphasis to the consumption of fats and oils and its relation to the prevalence of diseases was studied using the interview schedule II.

The nutrition education was imparted to the subjects through the use of visual aids such as posters and charts. The education was given once in 15 days for a period of one month. The impact of which was evaluated using the same interview schedule II after the completion of the nutrition education sessions.

Results and Discussion

IV. RESULTS AND DISCUSSION

The results of the study on "Production and Consumption Pattern of Edible Oilseeds and Oils in Selected Rural Areas of Coimbatore" are discussed under the following headings.

A. Background information of selected farm households

B. Production and storage of oilseeds and oils in selected rural areas

C. Consumption pattern of oilseeds and oils of selected families

D. Prevalence of diseases and fat consumption pattern

E. Nutrition education and its impact

A. Background information of selected farm households

Background information of the selected families from three different villages namely, Devarayapuram, Thenamanallur and Madampatti, indicated as V_1, V_2 and V_3 were studied to identify the standard of living and information was collected from female members of the selected households and it includes details regarding age, their educational status, number of members, monthly income

and area of land possessed by the family. The age group of the respondents of the selected households are shown in Table I.

Table I

Age distribution of the selected respondents

Village	Age group of the respondents											
	Below 20		21-30		31-40		41-50		50 and above		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
V_1	3	5	17	29	20	33	18	30	2	3	60	100
V_2	4	7	18	30	26	43	12	20	-	-	60	100
V_3	8	13	17	29	20	33	12	20	3	5	60	100
Total	15	25	52	88	66	109	42	70	5	8	180	300

The above table shows that among the 180 respondents from the three selected villages 66 of them are in the age group of 31-40 years. It is observed that all the respondents in this age group are housewives constituting the majority of the selected population.

It is also observed that the least number of respondents five in number in the selected villages are in the age group of 51 years and above and 15 are below 20 years.

Educational status of the respondents

Education plays a very important role in the all round development of the individual and family members. The food habits, which is influenced by a number of factors include education, economic level of the community, availability and cost of foods and social and cultural practical (Swaminathan, 1991). The following Table II gives the educational status of the respondents.

Table II

Educational status of the respondents

Village	Educational status of the respondents											
	Primary school		Middle school		High school+ Higher secondary		Higher education UG*		PG**		Illiterates	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
V_1	12	20	20	33	8	13	1	2	1	2	18	30
V_2	11	18	22	37	10	17	-	-	-	-	17	28
V_3	18	30	20	33	8	13	2	3	-	-	12	20
Total	41	68	62	103	26	43	3	5	1	2	47	78

* - Undergraduate

** - Post graduate

Among the selected 180 respondents 62 studied up to studied up to middle school constituting 20% in village V_1 18% in V_2 and 30% in village V_3.

Illiteracy was prevalent among respondents and only in two villages four respondents are graduates with three undergraduates and one post graduate.

Number of members in the family

The number of members in the selected families were studied to find out the family size is given in the following Table.

Table III

Number of members in the family

Number of members in the family	Village			N = 180
	V_1	V_2	V_3	Total
2 - 4	16	6	22	44
4 - 6	24	27	20	71
6 - 8	14	23	11	48
> 8	6	4	8	18
Total	60	60	60	60

The above table shows that of the selected families a majority of 71 families had four to be members, whereas six to eight members were in 48 families and there were 44 families with two to four members.

It is also noted that only 19 families had more than eight members.

Family income of the selected farm households

According to Indian housing board (1992) the income level has been divided into different groups as low income group (LIG) with monthly income of Rs.1050 to 2250 and middle income group (MIG) with Rs.2250 to 3650 as their monthly income and the high income group (HIG) with Rs.3650 and above as family income. The main income of the selected households is from agriculture which is given in Table IV.

Table IV

Monthly income of the selected households

Village	Income group of the respondents (N=180)							
	LIG		MIG		HIG		TOTAL	
	No.	%	No.	%	No.	%	No.	%
V_1	26	43	15	25	19	32	60	100
V_2	13	22	17	28	30	50	60	100
V_3	8	13	19	32	33	55	60	100
Total	47	26	51	28	82	46	180	300

The above table shows that majority of the families in village V_1 belongs to the low income group,

whereas in V_2 and V_3 number of families were in high income group.

Among the selected 180 families from three villages, 51 families belong to the middle income group and 82 families belong to high income group.

Type of farmers in the selected households

The area of land possessed by the selected farmers is the basis for differntiating the categories of the farmers. According to small farmers development Agency (1989). Farmers having '0' to '1' hectares are considered as marginal farmers and small farmers are those who possess one to two hectares of land, medium farmers possess 2 to 4 ha. and large farmers with above 4 hectares of land. The type of farmers of the selected households are given in the Table V.

Table V

Type of farmers in the selected households

Village	Income group of the respondents							
	Marginal		Small		Medium		Large	
	No.	%	No.	%	No.	%	No.	%
V_1	24	40	25	41	10	17	1	2
V_2	16	27	19	32	19	32	6	10
V_3	14	23	18	30	20	33	8	13
Total	54	90	62	103	49	82	15	25

Among the selected families only 15 families belongs to large farmers having more than 4 hectares of land. A majority of 62 families fall under the category of small farmers possessing 1-2 hectares of land and this was followed by marginal farmers holding less than 1 hectare of land.

B. Production and storage of oilseeds and oils in selected rural areas

The details regarding the area of land under production of oilseeds, amount of oils produced, uses of by product, period of storage oilseeds and oil method of selling and place of marketing are discussed below.

Area under production of oilseeds

Sugatha (1992) reported that in Tamil Nadu groundnut is the kingpin of all the other oilseeds and the area under groundnut cultivation for the year 1992 was abut 10.16 lakh hectares. In India coconut is the most popular palm grown and about 9.7 billion nuts are produced annually by utilising 1.54 million hectares of land.

The area under cultivation of different oilseeds was studied in the selected villages and it is given in Table VI.

Table VI

Land under production of oilseeds

Area of land in (acres)	Types of oilseeds produced (N=180)														
	Coconut			Gingelly			Groundnut			Soyabean			Sunflower		
	V_1	V_2	V_3	V_1	V_2	V_3	V_1	V_2	V_3	V_1	V_2	V_3	V_1	V_2	V_3
0.5-2.5	20	22	18	15	4	2	14	3	7	3	4	-	3	12	11
2.5-4.5	14	10	8	2	7	1	26	4	10	1	1	3	7	11	8
4.5-6.5	5	4	6	-	1	-	8	6	4	-	-	-	1	3	6
6.5-8.5	-	-	1	-	-	-	4	3	7	-	-	-	-	1	3
Total	39	36	33	17	12	3	52	16	28	4	5	3	11	27	28

The above table depicts that of the 180 families selected, 108 families were producing coconuts which was the highest among all the oilseeds. But the maximum area used for the cultivation in all the three villages is 0.5 to 2.5 acres, except one family in V_3, none of the families utilised more than 6.5 acres for cultivating coconut.

Next comes the groundnut production, where 96 families are cultivating are cultivating it in their lands,

and the area occupied by the majority of the families for cultivating groundnut is found to be 2.5 to 4.5 acres.

Gingelly is cultivated by 32 families only whereas it is encouraging to note that 66 families cultivated sunflower and a majority of them utilised only 0.5 to 2.5 acres. Soyabean was produced only by 12 families covering not more than 4.5 acres. The production of oilseeds is diagramatically represented in Fig.1.

Amount of oilseeds produced

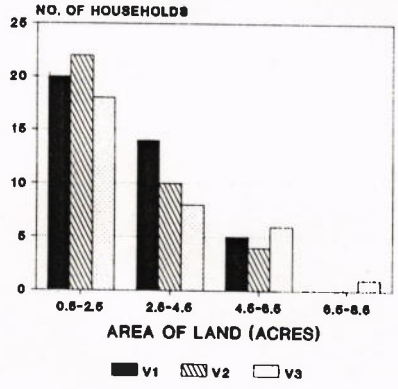
The information was collected from the selected respondents regarding the average yield of different oilseeds per acre. This shows that the yield of coconut/acre was 7000 nuts/year, groundnut was 700 kg, whereas gingelly and sunflower were 500 kg and soyabean was found to be 400 kg/acre.

Reasons for producing oilseed crops

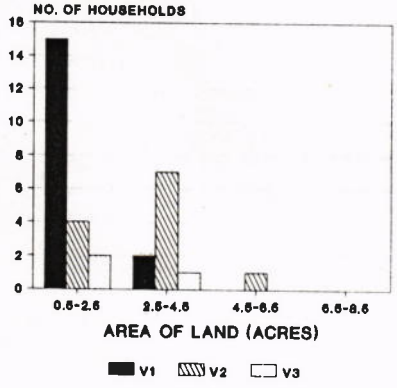
The reasons for producing oilseeds crop in their land are assessed and it is given in the Table VII.

Fig. 1. LAND UNDER PRODUCTION OF OILSEEDS

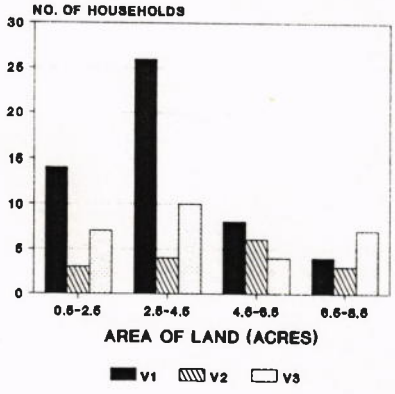
COCONUT



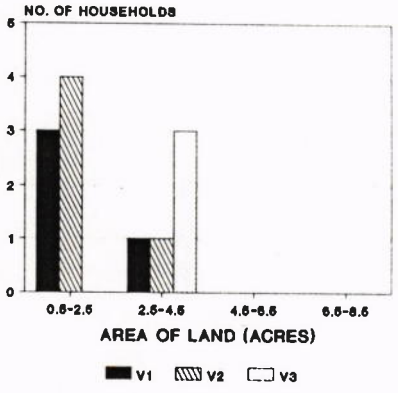
GINGELLY



GROUNDNUT



SOYABEAN



SUNFLOWER

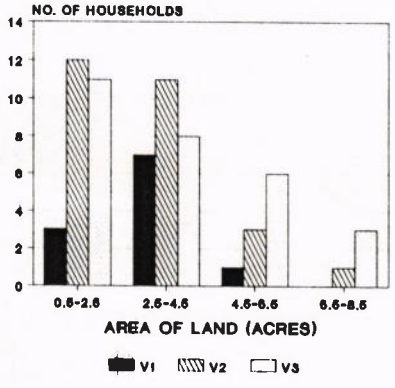


Table VII

Reason for producing oilseeds

Village	Reasons for producing oilseeds (N=180)									
	Profitable		Suitable		Quick yield		Continuous		No idea	
	No.	%	No.	%	No.	%	No.	%	No.	%
V_1	18	30	25	41.6	6	10	8	13	3	5
V_2	13	22	18	30	15	25.4	4	7	10	16
V_3	13	22	19	31.6	16	26.6	4	7	8	13
Total	44	74	62	103	37	62	16	27	21	34

The table depicts that the majority of 62 families producing oilseeds due to the suitability of soil condition. It is clear from the table that the profitability was also the other reason for cultivating oilseeds.

Only 16 families has given the reason as continuous yield which is suitable only for coconut cultivation, whereas 21 families could not give any reason for selecting oilseeds for the cultivation in their land. Amount of oil produced per year. Production of oil by the selected households.

Hudson (1987) stated that groundnut oil is a highly valued stable oil and it is ideal for frying. While sunflower oil is used mostly as a cooking oil which has good

keeping properties and it is a major component of margarines, and it is high in polyunsaturates and low in cholesterol with implied health benefits.

The type and amount of oil produced per year by the selected families was found out and is discussed in the following table, and it is represented diagramatically in Fig.2.

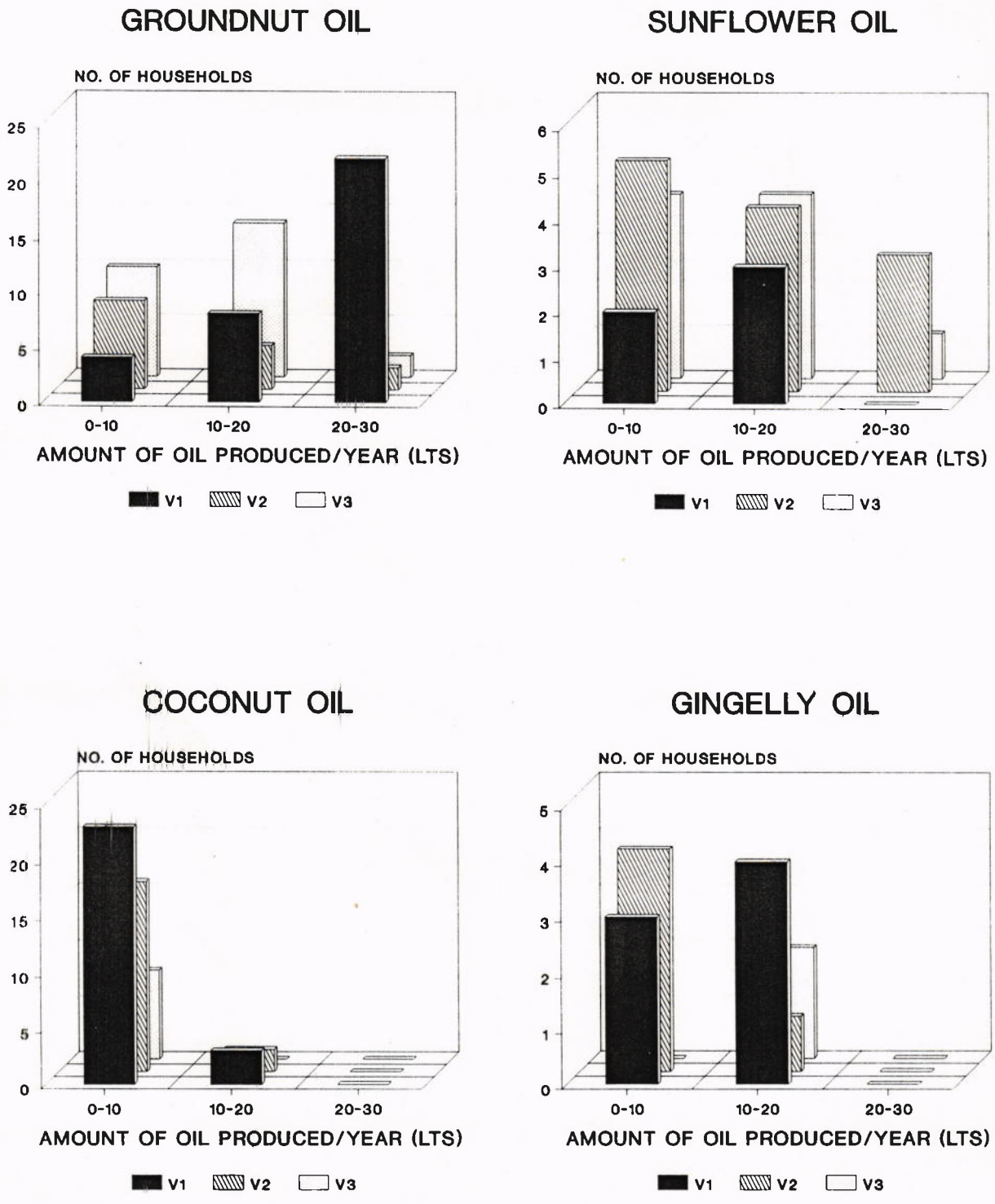
Table VIII

Production of oil by the selected households

Amount oil produced/ year (in lts)	Types of oil produced (N=180)															
	Groundnut				Sunflower				Coconut				Gingelly			
	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total
0-10	4	8	10	22	2	5	4	11	23	17	8	48	3	4	-	7
10-20	8	4	14	26	3	4	21	11	3	2	-	5	4	1	2	7
20-30	22	2	2	26	-	3	1	4	-	-	-	-	-	-	-	-
Total	34	14	26	74	5	12	9	26	26	19	8	53	7	5	2	14

The table shows that four different oils were produced by the selected households. Groundnut oil was produced by 74 families which was the highest among the different oils produced and it was followed by coconut oil produced by 53 families.

Fig. 2. PRODUCTION OF OIL BY THE SELECTED HOUSEHOLDS



Regarding the amount of oil, 20-30 l of groundnut oil was produced by a majority of 26 families. Rest of the oil was produced in less quantity by the selected families. It was noted that less than ten litres of coconut oil was produced by 48 families. All the families extracted oil by giving it to the oil mills as they don't have any facilities for extracting oil at home. The extraction of oil in the mill is shown in Plate I.

Storage of oilseeds and oils

The information collected regarding the period of storage of oilseeds and oils produced by the selected household are given in Table IX.

Table IX

Storage of oilseeds and oils

Amount of oil produced (in lts)	Types of oil produced											
	2-4 months				4-6 months				6-8 months			
	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total
Groundnut Seeds	-	-	-	-	9	6	5	20	13	10	6	29
Oil	4	8	10	22	8	5	16	29	22	1	-	23
Sunflower Seeds	-	-	-	-	2	6	4	12	-	17	9	26
Oil	2	6	5	13	3	5	3	11	-	2	1	3
Coconut Oil	4	2	-	6	4	3	2	9	18	16	6	40
Gingelly Oil	4	3	-	7	2	2	2	6	1	-	-	1

Plate I. Extraction of oil in the oil mill

The table shows that only groundnut and sunflower are stored as seeds apart from oil which is stored for household use. Coconut and gingelly are stored only as oil, while soyabean was marketed as seed as soon as it was harvested.

Coconut oil was stored for more than six months whereas sunflower and gingelly oil are stored. For a period of two to six months by majority of the families. But his difference is not prominent in the case of groundnut oil stored by the selected families. It is also noted that oilseeds are stored for a longer period than oil.

Gunny bags were used for storing the groundnut and sunflower seeds. These bags were placed one above the other away from the wall. Regarding the storage of oil plastic and tin containers are used by the selected families. The storage of oilseeds and oils are shown in Plate II.

Uses of by-product

The by-product produced while extracting oil was utilised in different ways by the selected families. A majority of 90 families utilised the oil cake as cattle feed while only 21 families used it as fertiliser, and the rest of the 56 families sold it for cash.

Plate II. Storage of oilseeds and oils

Method of selling oilseeds

The selected families were marketing only oilseeds by means of direct selling and by involving brokers and agents, whereas oil produced was utilised only for household purposes. The information collected indicates a majority of 136 families followed direct selling method as to avoid commission to the middle men. The rest of the 44 families sold the seeds with the help of brokers and agents. The marketing of oilseeds was done within and outside their place depending on their convenience and profitability.

C. Consumption pattern of oilseeds and oils of selected families

The informations related to the consumption of different edible oils and oilseeds and the frequency of consumption of fried foods by the selected farm households from the three selected villages were collected and discussed in the following table.

Consumption of oil by the selected households

The amount of oil consumed by the selected families is given in the Table X.

Table X

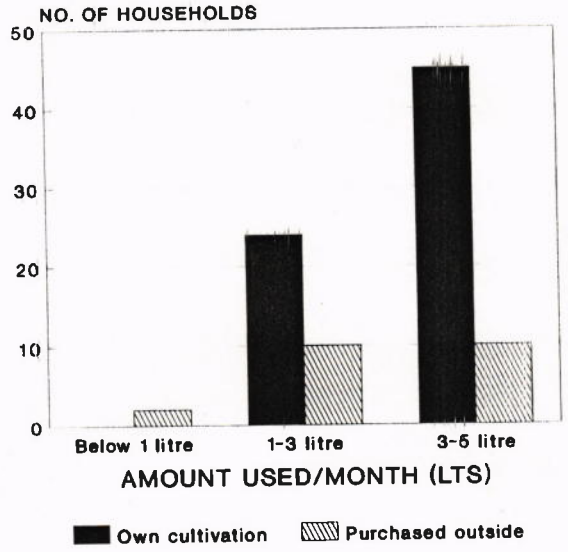
Consumption of oil by the selected households

Source consumption and amount used/ month (in lts)	Types of oil used by the households															
	Groundnut				Sunflower				Coconut				Gingelly			
	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total
Below 1lt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Own cultivation	-	-	-	-	1	-	2	3	-	1	2	3	2	2	-	4
Purchased outside	-	-	2	2	3	2	2	7	3	2	1	6	1	2	-	3
1-3 lts																
Own cultivation	10	4	10	24	3	5	4	12	2	-	2	4	3	3	2	8
Purchased outside	3	3	4	10	1	4	4	9	-	-	1	1	1	-	1	2
3.5 lts																
Own cultivation	24	10	11	45	2	7	3	12	-	-	-	-	2	-	-	2
Purchased outside	1	7	2	10	-	1	-	1	-	-	-	-	-	-	-	-
Total	38	24	29	91	10	19	15	44	5	3	6	14	9	7	3	19

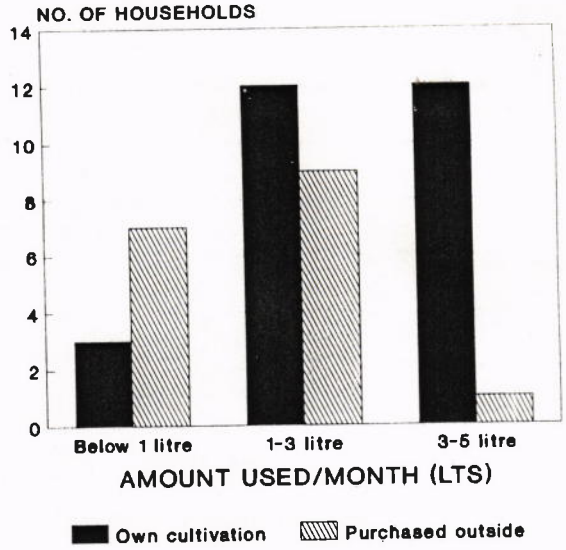
It is clear from the table that the groundnut oil was widely used for cooking by 91 families, while only 14 families used coconut oil for cooking which is a rich source of saturated fat. In general a large number of about 55

Fig. 3. CONSUMPTION OF DIFFERENT OILS BY THE SELECTED HOUSEHOLDS

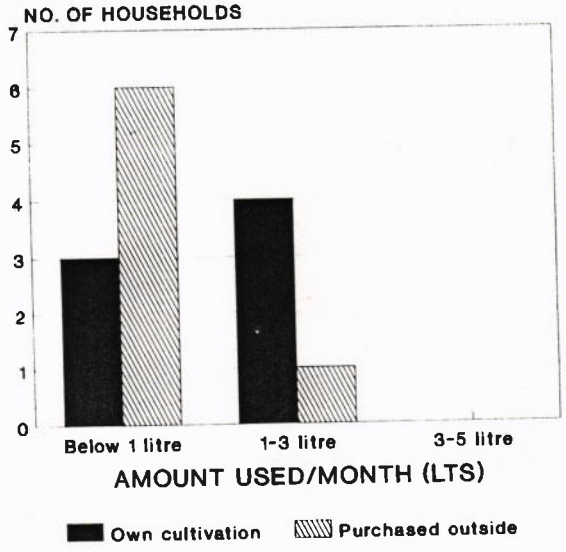
GROUNDNUT OIL



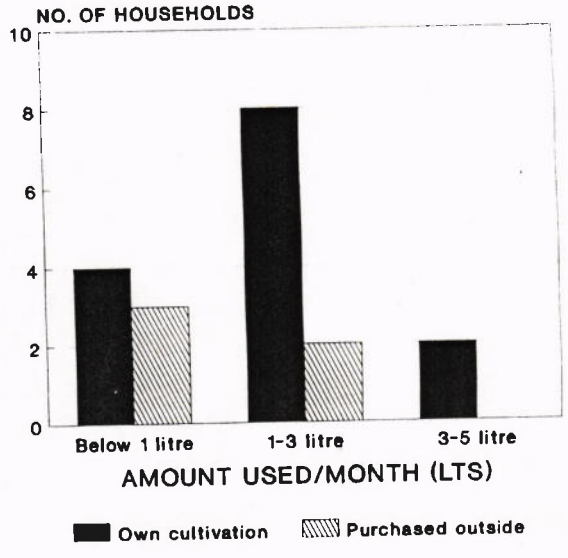
SUNFLOWER OIL



COCONUT OIL



GINGELLY OIL



families consumed three to five litres of groundnut oil as against 13 families consuming sunflower oil. Among the selected families a majority of the family utilised the oil produced from their own cultivation and the consumption pattern is represented in (Fig.3).

Factors considered for purchasing oil

The quality of oil depends on brand, cost and the purpose. For which it is purchased. The information regarding the factors considered, while purchasing oil by the selected families is given in the following table.

Table XI

Factors considered while purchasing oil

Village	Factors considered by the selected families			
	Cost	Brand	Purpose	Total
V_1	33	20	18	71
V_2	36	18	14	68
V_3	36	12	16	64
Total	95	50	38	183

The table shows that 95 families considered the cost while purchasing oil, whereas only 50 families looked for brand, while 38 families had mentioned about purpose which was given the least importance.

Consumption of oilseeds

The oilseeds mainly consumed in the selected villages were groundnut, mustard and coconut. The amount of oilseeds consumed by the families is given in the following table.

Table XII

Consumption of oilseeds

Types and amount of oilseed used per month	Source of consumption (N=180)							
	Own cultivation				Purchased outside			
	V_1	V_2	V_3	Total	V_1	V_2	V_3	Total
Groundnut (in gms)								
100-250	6	3	5	14	2	1	2	5
250-500	11	6	11	28	1	3	-	4
Above 500	13	5	9	27	4	1	3	8
Mustard (in gms)								
Below 100	-	-	-	-	16	30	30	76
100-250	-	-	-	-	40	30	28	98
250-500	-	-	-	-	4	-	2	6
Coconut (in nos)								
8-10	16	6	8	30	7	4	18	22
10-15	10	12	10	32	12	18	18	26
15-20	11	8	15	34	2	12	24	36

The table indicates that mustard was not cultivated in their lands and it was only purchased from outside and 98 families used 100-250 g /month as it is used only for seasoning purpose.

As coconut is used in different preparation about 70 families used more than 15 nos per month which was obtained from their land and also it was purchased from outside.

With regard to groundnut more than 250 gms are utilised by 55 families from their own cultivation as against 12 families purchased from outside.

Intake of fried foods

Gopalan **et al.** (1994) stated that the frequency of oil consumption influence the elevation of cholesterol in blood whereas the oil frequently consumed in smaller amount has been shown to cause less elevation of blood cholesterol content as composed to consumption of the same total daily fat at one time of the day.

The frequency of fried foods intake per week was studied and is given in the following Table.

Table XIII

Frequency of fried foods intake/week

Food items prepared	Frequency of preparation / week								
	V_1			V_2			V_3		
	Once	Twice	>twice	Once	twice	>twice	Once	twice	>twice
Poori	28	12	-	22	13	-	20	9	-
Snacks	22	5	-	30	2	-	26	4	-
Papad	24	16	14	15	18	15	31	10	9

The oil consumption is increased only by preparing fried items and consuming it.

The table shows that papad was prepared more than twice a week by the selected families in all the three villages whereas a majority of the families prepared poori and snacks once in a week.

D. Prevalence of diseases and their food consumption pattern

Chronic diseases related to diet present a major public health problem throughout the world. 'Fat' one of the strongest links of diet to disease is the relationship between diets high in fat particularly saturated fat and heart diseases (Herald of health, 1994).

Prevalence of diseases among the selected target group

The information on the prevalence of chronic diseases such as diabetes, hypertension, obesity and heart disease among family members were collected and presented in Table XIV.

Table XIV

Prevalence of diseases among the farm families

Village	Number of persons with disease								
	Diabetes		Hypertension		Obesity		Heart disease		Total
	M	F	M	F	M	F	M	F	
V_1	4	3	3	2	-	-	-	-	12
V_2	4	5	2	4	-	1	-	-	16
V_3	5	1	5	3	-	-	-	1	15
Total	13	9	10	9	-	1	-	1	43

From the table it is clear that among the 43 persons who were affected by diseases, of which 22 and 19 had diabetes and hypertension respectively and one was obese and one had heart disease since these diseases are found to be chronic, diet plays an important role in controlling these diseases. There is not much difference in prevalence of diseases between the selected villages.

Food consumption pattern

Among the 43 persons in three villages who had diabetes and hypertension, 30 samples, ten from each village were selected in which 18 diabetics and 12 hypertensives were taken to study the consumption pattern by 24 hours recall method.

Nutrient intake of hypertensive subjects

Table presents the nutrient intake of 12 hypertensives.

Table XV
Nutrient intake of hypertensive subjects

	Nutrients intake per day				
	Calories Kcal	Cho g	Protein g	Fat g	Fibre g
Male					
1	2425	365	54	65	9.2
2	2259	288	47	70	11.5
3	1940	190	51	56	13.7
4	1998	220	40	58	12.3
5	1945	182	54	54	15.1
6	2125	286	38	62	11.2
Female					
1	2005	286	52	61	12.3
2	1920	230	42	56	8.2
3	1880	218	50	50	8.7
4	2430	246	53	65	14.7
5	2120	296	54	62	12.3
6	2321	241	55	63	13.8

From the above table it is very obvious that the fat content of the diet was very high as against the ICMR recommendation of 20 gm fat for adults. This may be due to the inclusion of oil, milk, curds and coconut in their diet. By reducing the fat intake, protein and carbohydrate rich foods may be included for the required distribution of calories from proximate principles. The prevalence of diseases may be attributed to the high intake of fat. As evidenced by Rao (1992) high fat intake especially of the saturated type exceeding 30-35% of energy leads to hypercholesterolemia which is an important risk factor in coronary heart disease.

Nutrient intake of diabetics

The nutrient intake of diabetics were shown in the following table.

Table XVI

Nutrient intake of diabetics

	Nutrients intake per day				
	Calories Kcal	Cho g	Protein g	Fat g	Fibre g
Male					
1	2585	259	51	56	9.0
2	1897	237	48	54	8.5
3	1972	236	47	56	9.5

Table XVI (contd.)

	Nutrients intake per day				
	Calories Kcal	Cho g	Protein g	Fat g	Fibre g
Male					
4	2635	272	60	72	12.0
5	1980	250	40	56	10.0
6	2125	252	41	76	11.7
7	2275	260	42	78	13
8	2566	257	45	68	15
9	2015	251	40	54	12.2
10	2365	251	44	56	13.0
11	1989	235	42	50	8
Female					
1	1925	180	46	62	7
2	1944	192	44	68	8
3	2301	230	58	75	13
4	1933	223	35	69	15
5	2015	240	38	71	14.2
6	1883	238	48	63	10
7	2590	248	42	78	12

The fat intake of both male and female diabetics were ranging from 50 to 75 g per day which is 2-3 times greater than the ICMR recommendations similar to the hypertensive patients, NRC 1989 evidenced that the rate of chronic diseases can be lowered by reducing total fat and saturated fatty acid intake. Except 3 persons the protein intake was considerably lower than the ICMR recommendation ranging from 40-51 g in males, 42-46 g in females. Here also attention should be given to improve the proper distribution of calories from protein, carbohydrate and fat. As far as the fibre content of the diet is concerned, it was 8-15 g which is found to be satisfactory.

E. Nutrition education and its impact

The nutrition education was given to the 43 subjects with chronic diseases to stress the importance of diet control in terms of foods allowed liberally and foods to be restricted. In order to assess the impact of education knowledge of the patients were studied after giving education.

The knowledge of the samples before and after nutrition education are given in the table below.

Plate III. Giving nutrition education

Table XVII

Knowledge of the selected subjects before and after giving education

Diet restriction	Knowledge of the selected subjects			
	Before education		After education	
	M (n=23)	F (n=20)	M (n=23)	F (n=20)
Foods rich in sodium				
Pickles	6	4	14	12
Pappad	-	-	19	18
Greens	2	-	16	13
Foods low in sodium				
Potato	4	3	16	18
Cereals	-	-	19	12
Fruits (amla, guava)	-	-	14	10
Foods allowed liberally for diabetes				
Raw vegetable salad	8	4	17	13
Greens preparation	9	3	18	15
Lime juice with salt	-	-	20	9
Foods restricted for diabetics				
Sweets	13	11	17	18
Fried foods	6	8	16	13
Ghee	8	4	19	13
Cholesterol rich foods				
Egg yolk	4	3	21	18
Cream	4	3	19	16
Butter	8	4	15	9

Table XVII (Contd.)

Diet restriction	Knowledge of the selected subjects			
	Before education		After education	
	M (n=23)	F (n=20)	M (n=23)	F (n=20)
Foods rich in fat				
Fried foods	8	4	14	15
Curds	3	2	18	17
Whole milk	4	5	21	13
Saturated fat rich sources				
Coconut oil	2	-	15	9
Dalda	-	-	16	11
Butter	-	-	17	13
Unsaturated fat rich oil				
Groundnut oil	3	2	14	12
Gingelly oil	-	-	19	16
Sunflower oil	6	4	21	18

The knowledge before nutrition education was not very satisfactory. The subjects were not aware of the normal blood pressure and blood sugar level even after the education was given. But they are aware of foods rich in sodium, low in sodium and foods rich in fat and cholesterol and also the foods to be allowed and restricted for disease condition after education. The knowledge on saturated and unsaturated fats had been considerably increased after nutrition education. Thus the education given by using posters and charts had found to be effective in improving the knowledge on nutrition aspect.

Summary and Conclusion

V. SUMMARY AND CONCLUSION

India occupies a strategic position among the major oilseeds producers in the world next to U.S.A, China and Brazil. Oilseeds produced in the country were mostly used for oil extraction. The present study "Production and Consumption Pattern of Edible Oilseeds and Oils in Selected Rural Areas of Coimbatore", was conducted to study the production figures and storage of edible oilseeds and oils in the selected areas, and to assess the consumption pattern of oilseeds and oils in the selected farm households. The prevalence of chronic diseases and its relation with the fat consumption was also studied. About the role of fat in daily diet and importance of diet restrictions awareness was created among the persons affected with diseases through nutrition education.

For conducting the study Thondamuthur block was selected in which three villages namely Devarayapuram, Thenamanallur and Madampatti were taken based on the leading production of oilseeds. From each village 60 Farm households constituting 180 who were producing oilseeds were selected. The samples were interviewed individually by using a pretested interview schedule to elicit details regarding family background. Socio-economic status and the production, storage and consumption pattern of edible oilseeds and oils.

The prevalence of diseases among the selected families were identified and 30 subsamples were selected among them, to study the food consumption pattern using 24 hours recall method. The persons with diseases were given nutrition education about the importance of diet restriction and role of fat in the daily diet, and the education imparted was evaluated.

The results of the study are presented as follows:

1. The background information of the selected families revealed that, maximum number of respondents were in the age group of 31-40 years, constituting the housewives population, and their educational status was mostly upto 8th standard, with comparatively less number of respondents who have entered high school. Among the selected families 46% were high income families and among the 180 selected farm households a majority of them were small farmers holding 0-1 hectares of land.
2. The production figures gathered for the different oilseeds indicates that coconut was produced by 108 families but groundnut was cultivated in larger area of land, when compared to that of soybean, gingelly and sunflower. Sunflower is recently gaining importance, whereas gingelly and soyabean production were

considerably low. Suitability of soil condition and profitability were the important reasons mentioned by the selected farmers, for cultivating oilseeds in their land.

Different types of oils such as groundnut, sunflower, coconut and gingelly oil were produced only for their household use.

3. Regarding the storage, gunny bags were used for storing groundnut and sunflower seeds whereas coconut and gingelly was stored only as oil in plastic and tin containers. The oilseeds produced were sold by means of direct selling and also through brokers and agents to different places depending on their convenience and profitability.

4. Groundnut oil was widely used for cooking by 50% of the selected families, while 24% utilised sunflower oil 8% used coconut oil which is a high source of saturated fatty acids, and 11% families used gingelly oil which was mostly obtained from their own cultivation. Regarding the consumption of oilseeds groundnut, coconut and mustard were used by the selected families.

5. Among the selected samples 43 were found with the chronic diseases. Diseases such as diabetes,

hypertension, was more prevalent among the farm population when compared to that of obesity and heart disease.

6. The food consumption pattern of 30 subsamples constituting 18 diabetics and 12 hypertensive subjects were studied to find out the nutrient intake which revealed that their fat intake was very high due to the intake of more amount of cooking oil nearly 30-33 g/day, coconut, milk and curds.

7. The knowledge of the subjects with the diseases, regarding foods to be consumed in relation to their health condition was assessed before and after nutrition education with the help of interview schedule II. The education was given using visual aids, such as pesters and charts at an interval of 15 days for a period of one month and the impact was evaluated.

This showed that the samples have gained knowledge after education about saturated and unsaturated oil, fat and cholesterol rich foods, and foods allowed liberally and to be restricted for persons with diabetes and hypertension.

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Appendices

APPENDIX - I

INTERVIEW SCHEDULE - Ia

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN (DEEMED UNIVERSITY) COIMBATORE - 43

Name of the Block :

Village :

1. Name of the Interviewee :
2. Age :
3. Education :
4. Occupation :
5. Community :
6. Address :

7. Type of the family : Joint/Nuclear
8. Annual Income :
9. Family Background :

Sl. No.	Name of the family members	Relationship to the head of the family	Age in yrs.	Educa-tion	Occupa-tion	Monthly Income

10. Land Holding Pattern : Area of Land Possed by the family

11. Type of oilseed produced

	Area under cultivation	Amount produced per yr.
a. Groundnut		
b. Gingelly		
c. Coconut		
d. Sunflower		
e. Soyabean		
f. Others if any		

12. Reason for producing a particular oilseed :

13. Oilseeds produced are sold :

14. Oil production : Yes/No

If yes, Name of oil Produced :

Amount of oil produced/ year :

Frequency of extraction :

Oil cake usss :

15. Period of time inbetween production & Marketing :

Oil seeds :

Oil :

16. Place in which marketing done :

17. Method of marketing :

Direct selling/Brokers or agents

Wholesale/Retail

18. Storage is followed :

Oilseeds :

Oil :

19.

Items stored	Period of storage	Purpose of storage	Structure in which it is stored

20. Considerations for effective storage :

21. Details regarding consumption of oil and oilseeds

Oil & Oilseeds	From own cultivation	Brought from outside	Amount used per month (Lts)
Groundnut oil			
Gingelly oil			
Sunflower oil			
Palm oil			
Coconut oil			

Oil & Oilseeds	From own cultivation	Brought from outside	Amount used per month (Lts)
Refined oil			
Groundnut			
Coconut			
Gingelly			
Mustard			

22. While purchasing oil for household use the points considered are :

Name of the oil :

Brand :

Cost :

Purpose for which it is used :

Other factors if any :

23.

Food items used for Frying	Frequency of preparation/ week	Type of oil used	Amount used

24. Does any of your family member suffer from the following diseases : Yes/No

    If yes indicate :

    a. Diabetes Mellities
    b. Blood pressure
    c. Obesity
    d. Heart discage

25. Indicate the Relationship:

    Age :

    Sex : Male/Female

APPENDIX - II

INTERVIEW SCHEDULE - Ibo

24 Hour Recall Dietary Survey

Name of the Interviewee: Age:

Name of the disease present: Sex: M/F

DATE & S.NO.	TIME OF THE DAY	FOOD ITEMS CONSUMED	
		COOKED WEIGHT (G)	RAW EQUIVALENTS (G)
	EARLY MORNING		
	BREAK FAST		
	MID-MORNING		
	LUNCH		
	TEA-TIME		
	DINNER		

APPENDIX-III

INTERVIEW SCHEDULE-II

1 . Normal Blood pressure of the individuals

-120/80

-60/110

-120/160

2. The normal Blood Sugar level is

- 80-120
- below 80
- above 120

3. Identity foods rich in sodium

- greens
- pickles
- pappad

4. Identify foods low in sodium

- potato
- fruits
- cereals

5. Identity the foods to be avoided in diabetes mellitus

- Sugar, sweets
- fried foods
- Ghee

6. Foods liberally allowed for diabetes mellitus includes

- raw vegetable salad
- Greens preparation
- Lime juice with salt

7. Food with high chlosterol content are

- egg yolk
- cream
- butter

8. Identify the foods rich in fat

- fried foods
- curds
- whole milk

9. Saturated fat is present in

- coconut oil
- dalda
- butter

10. Unsaturated fat is present in

- ground nut oil
- gingelly oil
- Sunflower oil