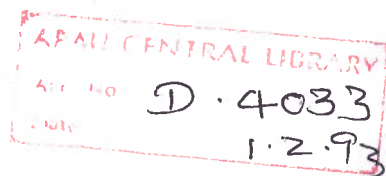


SPICES : CONSUMPTION AND UTILISATION PATTERN OF SPICES IN SELECTED AREAS OF ANDHRA PRADESH

BY

G. SREE DEVI

B.Sc. (H.Sc.)



THESIS SUBMITTED TO THE
ANDHRA PRADESH AGRICULTURAL UNIVERSITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF
MASTER OF SCIENCE
IN THE FACULTY OF HOME SCIENCE

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NOVEMBER, 1992

CERTIFICATE

Ms. G. SREE DEVI has satisfactorily prosecuted the course of research and that the thesis entitled SPICES : CONSUMPTION AND UTILISATION PATTERN OF SPICES IN SELECTED AREAS OF ANDHRA PRADESH submitted in the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part thereof has not been previously submitted by her for a degree of any university.

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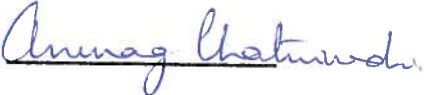
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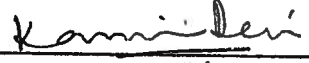
This is to certify that the thesis entitled **SPICES : CONSUMPTION AND UTILISATION PATTERN OF SPICES IN SELECTED AREAS OF ANDHRA PRADESH** submitted in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN HOME SCIENCE** of the Andhra Pradesh Agricultural University, Hyderabad, is a record of the bonafide research work carried out by **Ms. G. SREE DEVI**, under my guidance and supervision. The subject of the thesis has been approved by the Students' Advisory Committee.

No part of the thesis has been submitted for any other degree or diploma. The published part has been fully acknowledged. All assistance and help received during the course of the investigations have been duly acknowledged by the author of the thesis.


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G. SREE DEVI

DECLARATION

I, Ms. G. SREE DEVI, hereby declare that the thesis entitled "SPICES : CONSUMPTION AND UTILISATION PATTERN IN SELECTED AREAS OF ANDHRA PRADESH" submitted to Andhra Pradesh Agricultural University is a result of the original research work done by me. I also declare that any material contained in the thesis has not been published earlier.

DATE: 16-11-1992

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ABSTRACT

Spices apart from providing taste and flavour to the diet are also used as medicine in treating gastro intestinal problems. They are also considered to be important sources of vitamins and minerals. This study was carried out to study the consumption and utilisation pattern, knowledge, attitude and practices regarding use of spices in farm families from high (Guntur) and low (Visakhapatnam) spice producing areas of A.P. Farm families were selected based on the land holding i.e., large, medium, small and landless. Information was collected using a pretested personal interview schedule. The results showed that the spice intake was related to land holding. Spices contributed significantly to iron, riboflavin, carotene, thiamine and vitamin C more so in the diets of landless labourers. Spice intake was affected by production with Guntur showing higher consumption (43.4-66.6 g/c.u/day) than Visakhapatnam (27.6-37.4 g/c.u/day). Intake of spices during different physiological conditions like pregnancy, lactation and menarche showed altered pattern of consumption. Higher incidence of gastro intestinal problems were reported in areas with high consumption.

ABBREVIATIONS USED IN THE STUDY

A.C.U.	-	Adult consumption unit
B.I.S.	-	Bureau of Indian Standard
c.u	-	Consumption unit
<	-	Less than
>	-	Greater than
g	-	Grams
mg	-	Milli grams
ml	-	Milli litres
ug	-	Micro grams
GIT	-	Gastro intestinal tract
ICMR	-	Indian Council of Medical Research
K.Cal	-	Kilo calories
ITC	-	Indian Tobacco Company
M.I	-	Medical intelligence
NNMB	-	National Nutrition Monitoring Bureau
%	-	Per cent
RDA	-	Recommended dietary allowances

INTRODUCTION

CHAPTER I

INTRODUCTION

Spices are strongly flavoured or aromatic vegetable products usually dried and used for seasoning and preserving food stuffs. The flavouring, preservative and antiseptic properties of certain spices are due to the presence of volatile oils. Spices play a very important part in human dietary and although they cannot be classed as foods because of their negligible nutritive value, they give an agreeable flavour and aroma to food and add greatly to the pleasure of eating. Apart from culinary uses, spices are used as flavouring agents in beverages, as active ingredients in ayurvedic medicine, colouring agents in textiles and as important constituents in cosmetic and perfume products. Some have been used since ancient times for sacred offerings, and in certain social and religious customs of oriental countries, spices are to this day commonly used. The crops that produce major spice are pepper, cardamon, ginger, turmeric and chillies and those yielding the minor spices are coriander, cumin, celery, fennel, fenugreek, clove, nutmeg, cinnamon and vanilla (Aiyadurai, 1966).

India is the land of spices. The history of spices in India dates back to the beginning of human civilisation in this country. The first reference on spices is in the Rigveda on horse-radish which is a near relative of mustard and turnip. The Yajurveda mentions the use of black pepper and the Atharvaveda that of turmeric. Many were aware of the origin, growth and use of garlic as well as onion. Valmiki, who wrote Ramayana mentioned a dish called "meat pilaff", in which meat, rice, vegetables and spices were boiled and cooked together. Many flavourants like pepper, saffron, mace and raw mango powder were used in the preparation of foods. King Dasaratha's body was preserved with spice oils and balms, similar to the Egyptian Mummies (George, 1989).

There are a number of spices grown in India. As per the terminology on spices prepared by the Bureau of Indian Standards (B.I.S.), sixty three spices are produced in the country. India produces at present around 2 million tonnes of different spices valued at approximately Rs.35,000 millions and holds first position in the world market. This considerable volume of international trade, amounting to millions of dollars annually, shows the important role of spices in the Indian national economy. Spices are also grown in most of the tropical countries, notably in South and South-East Asia (Pruthi, 1980).

As India is the largest producer of spices, it is also the largest consumer. There is no Indian cuisine without the addition of one or more spices (George, 1989).

Spices are used extensively in 'Ayurveda', the Indian system of medicine, for promotion of life and prevention and cure of diseases like digestive troubles, cough, obesity, elephantiasis, slackening of digestive capacity, asthma, and cold, besides being considered as good diuretic, antiseptic and anthelmintics (Warrier, 1989). It is used singly or in combination with other foods in preparations recommended for treatment of loss of appetite, nausea, vomiting, indigestion, dyspepsia, flatulence, constipation, diarrhoea, diabetes and heart problems. Spices are also widely used for their medicinal properties in the traditional herbal medical systems of China, the Middle East and Western herbal traditions. The market for natural medicines are growing considerably in the West due to the "green" ecological and spiritual movements and the general disenchantment with the side effects of modern drugs. Most of the spices are being incorporated in the carminative, expectorant and antidiarrhoeal mixtures or in ointments, as counter irritants. Some of the products are used in tablets manufacture as binding agents and also in the soap industry (Spice India, 1991).

Studies on the effect of spices on growth and digestibility of nutrients, showed that higher levels of intake of spices than normal, did not have any harmful effect on absorption and retention of nitrogen and fat in experimental animals (George, 1989).

Spices were observed to be good source of many nutrients particularly in the diets of poor rural families. The percentage contribution of spices to the total intake of various nutrients ranged from 1.5 to 14.5% depending upon the nutrient. The contribution of spices towards the intake of calcium, iron and Vit A in the daily diet of the low income families was reported to be considerable (Thimmayamma et al., 1983). The poorest Indian diet lacking in pulse and vegetable and consisting of only a cereal or millet, is accompanied at least by some spice paste or pickle. Thimmayamma et al., (1983) and Madhyastha (1985), observed a direct correlation between cereal intake and spice consumption in urban and rural families.

However, no study carried out so far has documented the actual consumption pattern and knowledge regarding the use in farm families with respect to economic status and of various spices and the relation between spice production and consumption. Hence, this study was planned with the following objectives.

- (1) To obtain data regarding consumption pattern of different spices in farm families belonging to different socio economic status.
- (2) To compare consumption pattern of spices in high and low spice producing areas.
- (3) To collect information on the knowledge and attitude regarding use of spices and their utilisation pattern.
- (4) To estimate the nutrient contribution of spices in the rural diets.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

There are over seventy spices now officially recognised by the International Organisation for Standardization (ISO). According to the ISO (1968, 1972) the term "Spices and condiments" applies to natural vegetable products or mixtures thereof, without any extraneous matter, were used for flavouring, seasoning and imparting aroma to foods; the term applies to the product either in the whole form or in the ground form. These aromatic plants were generally grown in different parts of the world and were known by different names in different languages in different countries (Pruthi, 1980). The review was presented under following headings.

- 2.1 Classification of spices based on the plant parts
- 2.2 Production
- 2.3 Utilisation
- 2.4 Physiological effects of spices
- 2.5 Antimicrobial activity
- 2.6 Health statistics

2.1 CLASSIFICATION OF SPICES BASED ON THE PLANT PARTS

Seeds : Aniseeds, bishop's weed, caraway, celery, coriander, cumin, dill, fenugreek, mustard, pomegranate seeds, parsley leaves, etc.

Berries and capsules : Cardamom, pepper, chillies, pigments (all spices) etc.

Fruits and beans : Vanilla, kokam, pomegranate, tamarind etc.

Rhizomes : Ginger, turmeric etc.

Bulbs : Garlic, onions etc.

Floral parts - stigma : Saffron

Flower buds : Clove

Bark : Cinnamon, cassia etc.

Latex or gum : Asafoetida

Aril of seeds : Mace

Kernels : Nutmeg

Leaves and tender shoots : Curry leaf, mint, coriander, parsley etc.

Generally these floral parts are sun dried or cured before marketing. However, the leaf spices, chillies and ginger are traded also in the fresh stage as vegetables/spices. Turmeric is used raw for most of its medicinal/cosmetic uses (Kunhikrishnan Nair, 1990).

2.2 PRODUCTION

Although spices are cultivated in most of the tropical countries, their production on a commercial scale is confined to a few regions.

Table 1. Spices produced in different regions

Region	Spice produced
South and south east Asia	Black and white pepper, cinnamon, cassia and cardamom
India and Pakistan	Chillies, turmeric and ginger
Tanzania and The Malagasy Republic	Cloves and vanilla
Jamaica	Ginger, pimento
Grenada	Nutmeg
Sierra Leone & Nigeria	Ginger
Seychelles & Ceylon	Cinnamon
Indonesia	Black and white pepper and cassia

Source: Pruthi, 1980.

India grows a number of spices. The more important among them are coriander, chillies, ginger, garlic, turmeric, pepper and cardamom.

Table 2. Production of important spices in India and Andhra Pradesh, 1987-88

Commodity	<u>Production in '000 MT</u>	
	India	Andhra Pradesh**
Coriander	243.00	39.64
Chillies	574.60	245.33
Ginger	135.46	6.64
Garlic	286.70	2.52
Turmeric	294.90	98.92
Pepper	49.23	NA
Cardamom*	105.00	NA

Source: India - Pepper, chillies, ginger, turmeric, coriander and garlic, Directorate of Economics and Statistics, 1987-88.

* Cardamom - Spice Board, Cochin, 1987-88.

** Andhra Pradesh - Season and Crop Report, 1987-88.

Spice Board conducted a domestic survey in Andhra Pradesh regarding area and production of spices. The major spices grown are chillies, turmeric, coriander, garlic, ginger etc. Andhra Pradesh is the home of chilli contributing to almost 1/3rd of the total production in the country. About 30% of the total area and 42% of the production of turmeric in India is from Andhra Pradesh. Similarly, about 30% of coriander production in the country comes from Andhra Pradesh.

In Andhra Pradesh, Chilli is grown mainly in the districts of Krishna, Godavari, Guntur, Prakasham, Karimnagar and Khammam. Turmeric is grown mainly in Nizamabad, Guntur, Cuddapah and Karimnagar districts. Coriander is confined to south districts of the state i.e. Kurnool, Ananthapur, Cuddapah and Medak (Report of domestic Survey, 1990).

Export of spices from India has been encouraging in the last twenty years. In the year 1960-61 the total quantity exported was 45,653 metric tonnes with a value of Rs.16.40 crores. In the year 1986-87 the total export was 82,825 metric tonnes with a value of Rs.282 crores. In 1990-91 the total quantity exported was 97,291 metric tonnes with a value of Rs.238.6 crores (Mariwala, 1990).

2.3 UTILISATION

Available information on spices and condiments deals mostly with productional aspects, medicinal, nutritional properties and their importance in human health (Sreenivasa Murthy et al., 1959 Gopal Rao et al., 1978). Pasricha (1966) reported the consumption of common salt, by the families in low and high socio-economic groups to be 13.5 and 19.5 g respectively. Although direct information on per capita spice consumption in many countries is generally not available, the trends in world consumption may be

assessed roughly by using export statistics of the main producers. The consumption of all spices taken together in grams per capita in individual countries is shown in the table 3. Estimate of all the nine major spices selected are available for only three countries namely, Germany, United Kingdom, and the United States of America. It is not possible to say for the other countries whether the absence of consumption estimates implies an absence of consumption. Although the absolute levels of consumption are not strictly comparable, their trends can be compared, and in fact they show similar pattern in each case (FAO, 1962).

The nature and extent of spice consumption varies from country to country. Enquiries made by the spice trade and manufacturer's associations elicited estimates that the proportions of spices sold directly to the retail trade is about 60% in the United States, 30 to 50% in the United Kingdom and 15% in Germany. Of the remainder, 50% or more is thought to be consumed by the meat processing industry (mostly sausage manufacturers) and the rest is consumed by bakers and by the pharmaceutical and perfumery industries (Common Wealth Secretariat, 1969).

The ITC market studies (1977 and 1982) on spices carried out a survey of the World market and made

Table 3. Per capita consumption of main spices in selected countries^a

Country	1937- 1939	1951- 1953	1958- 1960	Spices
Canada	141	92	108	Pepper, clove, ginger, nutmeg, mace.
France	64	35	58	Pepper, clove.
Germany	127	69 ^c	108 ^c	All nine selected spices ^b .
India	86	77	74	Pepper, clove, cinnamon, cassia, cardamom, cassia, ginger, capsicum.
Indonesia	219	139	229	Pepper, clove.
Italy	42	18	37	Pepper.
Sweden	161	65	200	Pepper, cardamom.
United Kingdom	129	83	105	All nine selected spices ^b .
United States	212	151	161	All nine selected spices ^b .

Source: FAO, 1962.

a - All values in g.

b - Spices included are capsicum, cardamom, cassia, cinnamon, clove, ginger, mace, nutmeg, pepper.

c - Western Germany only.

an attempt to quantify consumption and segmentise the different sectors of the market. The results obtained were based on discussions with importers and end-users. Total consumption of spices in both developing and industrialized countries was influenced primarily by the size of the population, real income and standard of living, the state of economy, and in particular, culinary and social habits. Per capita consumption - both for all spices as a whole and for individual spices. Spice consumption varied widely from one area to another within even individual countries. Among the industrialized countries, it was found that the industrial (i.e. food processing) and the retail sector are the principal users of spices.

Spices are used in most segments of the food industries in industrialized markets, particularly in the processing of meat, fish, vegetable products, soups, bakery goods, and other prepared and convenience foods. In most cases the meat industry is by far the largest user of a wide range of spices. Pepper is the principal spice used in the meat industry. The consumption of spices in the non-food industries, such as the pharmaceutical and perfumery sectors, is not, in general appreciable and is unlikely to have any significant effect on overall demand.

Pepper outranks all other spices in household consumption, although nutmeg, cinnamon (Cassia), paprika and vanilla are also fairly widely used in homes.

Although the retail sector is still important in industrialized countries, the amount of spices channelled through grocery stores and super-market have tended to decline. This is because of the reduction in the preparation of meals at home. In industrial countries, the institutional sector accounts for some 10 per cent of total spice usage.

Consumption pattern of spices in developing countries is almost wholly confined to households and restaurants. Industrial usage is minimal since the food processing industry is either absent or in its infancy. Spices are bought in whole or ground form in the case of the Middle East and North Africa in "Sonks". Grinding and packing facilities are being established at a rapid pace - particularly in India.

Certain spices predominate in certain regions or countries. Indonesia absorbs over 80,000 tonnes of cloves in the 'Kretek' cigarette industry. In the Middle East, particularly in Saudi Arabia cardamom is the principal spice used in the preparation of 'Gahwa offa'. Large quantities of turmeric are used in Iran to colour

rice, while in Yemen and Saudi Arabia significant amounts of ginger are utilized in tea and in the preparation of meat dishes.

Finally, in both industrialized and developing countries, social habits, particularly those of cooking and eating are the main determinants of the over-all levels of percapita consumption of spices.

Among the countries producing spices, consumption with the exception of the Indian sub-continent, is generally low. India, without doubt, is the world's largest producer and consumer of spices.

The National Nutrition Monitoring Bureau (1976-88) of India has surveyed the intake of spice and condiments in the dietaries of urban and rural areas of ten different states of India. The consumption pattern of total spices and condiments over the years in the ten states is given in table 4.

Although the intake of spices and condiments varied widely in the different states, the pattern of consumption over the years remained the same for each state. The four South Indian States of Andhra Pradesh, Tamil Nadu, Kerala and Karnataka had the highest consumption of spices, followed by Maharashtra and Orissa. Very little amount of spices were consumed in the northern states of Uttar Pradesh, Madhya Pradesh, Gujarat and West Bengal. (NNMB, 1976-1986 and 1988).

Table 4. Intake of spices and condiments in ten states of India.

	(g/cu/day)							
State	1976	1977	1978	1979	1980	1981	1982	1988
Andhra Pradesh	23	24	17	26	18	19	16	19
Gujarat	4	2	4	4	5	1	3	12
Karnataka	27	23	30	21	21	28	18	27
Kerala	14	16	15	13	21	NS	18	16
Madhya Pradesh	9	5	4	10	NS	NS	NS	5
Maha-rashtra	12	13	16	12	NS	15	9	12
Orissa	NS	NS	9	13	9	6	5	14
Tamil Nadu	20	21	23	25	21	23	15	15
Uttar Pradesh	1	1	1	3	3	4	NS	--
West Bengal	5	3	2	4	4	4	4	--

NNMB (1976 - 1988)

NS = Not Surveyed.

Thimmayamma et al., (1983) studied the intake of various types of spices and condiments by the families according to socio-economic status. In their survey the most commonly used spices and condiments were dry and/or green chillies, tamarind, salt, turmeric, with little quantities of coriander, cumin, mustard and fenugreek seeds with or without asafoetida, garlic and ginger. Use of dry and or green chillies was mostly in the powder or

paste form along with salt in 1:1 ratio. Similarly, garlic and ginger was also used in the paste form, prepared and kept ready usually for a week. However, in rural areas it was significantly lower than both the income groups in urban area. About 55 per cent of rural families were observed to be mainly dependent on dry and/or green chillies, tamarind, salt and turmeric, while only 17 per cent made use of garlic and ginger additionally.

The mean intake of various types of spices and condiments in different socio economic groups is given in table 5.

Table 5. Mean intake of spices and condiments according to socio-economic status of families in Hyderabad

Intake (g/c.u/day)	Socio-economic groups		
	Urban >Rs.500pm	Urban <Rs.500pm	Rural Area
Dry Chillies	2.8	2.8	4.1
Green Chillies	1.4	2.3	3.7
Tamarind	8.7	8.0	12.0
Salt	8.3	10.2	7.6
Turmeric	0.2	0.4	0.6
Coriander Seeds	0.1	0.5	0.1
Cumin & Fenugreek	0.6	0.5	0.3
Garlic and Ginger	0.3	0.5	2.6

Source: Thimmayamma et al., (1983)

Rural group consumed more amounts of dry chillies, green chillies, tamarind, coriander seeds, turmeric, garlic and ginger, as compared to that of the two income groups in the urban area. In the same study, the relationship between the cereal intake and that of spices and condiments was found to be positively correlated in all the socio economic groups. However, no significant correlation was observed between the total intake of pulses, vegetables and flesh foods on one hand and the intake of spices and condiments on the other, thus indicating that among these families, especially in the rural areas, cereal based diet was predominant.

Similar observations were made by Madhyastha (1985). In his survey carried out in urban and rural areas of Mysore. He showed that chillies and turmeric were found to be the main sources of spices for 80 per cent of the urban population and 95% of the rural population. Rural people were observed to consume more quantity of spices, particularly chillies, when compared to urban people who consumed more varieties of spices. Though the total spice consumption was more in the rural population some spices like cardamom and clove were not consumed by poor families in these areas. The mean intake of major spices observed in this study is given in table 6.

Table 6. Consumption of major spices in urban and rural population in Mysore

Spices	Urban		Rural	
	A [*]	B ^{**}	A [*]	B ^{**}
Black Pepper	0.47	0.59	0.56	0.58
Dry Chillies	0.77	0.84	5.17	6.16
Green Chillies	2.18	2.55	13.60	16.35
Garlic + Ginger	0.92	1.06	0.89	1.05
Turmeric	0.63	0.73	0.75	0.92

Source : Madhyastha (1985)

A^{*} - Family income more than Rs. 250 per month.
B^{**} - Family income less than Rs. 250 per month.

Black pepper was found to be the least consumed spice among the major spices, while green chillies was observed to be the highest consumed. Turmeric appeared to be an indispensable spice for rural and urban families in Andhra Pradesh. In this study a positive correlation between the intake of spices and that of cereals was observed especially in the urban population.

Uma Nageswara Rao (1988) in *...* assessed the per capita consumption pattern of spices in Hyderabad. The average per capita consumption of spices was observed to be 9.5 g. The most commonly consumed spices were red chillies, garlic, coriander, turmeric and cumin. Most housewives believed spices to help in digestion, particularly ajowan, cumin, coriander and

fennel seeds. During lactation, increased intake of spices was observed particularly of garlic. Spices were believed to cure indigestion especially ajowan, fennel seeds and dry ginger, while black pepper was believed to help in the cure of common cold.

2.4 PHYSIOLOGICAL EFFECTS OF SPICES

2.4.1 Effect on Gastrointestinal tract and Digestive secretions

Blumberger and Glatzel (1965), reported the effects of paprika and chilli on the salivary secretion. Salivary secretion increased 50 percent after paprika and 200 percent after chilli, as compared with the rate for rice without condiments. Despite the increase in salivary volume, there was also an increase in amylase activity by 1.5 folds after paprika and 4.5 folds after chilli consumption. The mucin content (neuraminic acids and hexosamine) of saliva after intake of rice alone increased to three fourths the value for normal saliva; after paprika it decreased slightly but there was a 1 to 5 fold increase after intake of chilli. On the basis of increased flow and salivary activity after rice without condiments, the amylase activity increased over the normal resting value 5 folds after paprika, and 24 folds after chilli. The stimulatory effect exerted by paprika disappeared quickly after the meal was finished.

Glatzel (1968) studied both salivary secretion and amylase activity of various spices given in diets. Citron, curry powder, red pepper and mustard increased amylase activity, but neuraminic acid and hexosamine concentrations remained unchanged.

Schneider et al., (1956), reported the effect of spice ingestion. (1) They observed that Cinnamon, mace, thyme, sage, paprika, and caraway seed administered to peptic ulcer patients under treatment with an ulcer diet, interval feedings, antacids, and antispasmodics, did not appear to alter the healing time of the ulcer in relatively large amounts with food three times daily over a period of two weeks to five months. (2) Often no untoward symptoms such as heartburn, aftertaste, belching or epigastric distress occurred if the spices were taken on an empty stomach. This applied to all spices studied. (3) Black pepper and cloves produced epigastric symptoms in patients with inactive duodenal ulcers who ingested the spices with meals, but who were not maintained on the usual ulcer regimen. (4) Black pepper, chilli, cloves, mustard seed, and probably nutmeg were considered as gastric irritants. (5) Black pepper and chilli pepper, which produced symptoms, also induced the most hyperemia and edema of the gastric mucosa observed gastroscopically. Thyme and mustard acid produced gastric erythema. (6) The uropepsin excretion was not altered by spice ingestion.

Zaidi and Mukherji (1958) studied the significance of the mucus barrier in the prevention of histamine induced ulceration. Mucus was produced in Guinea pigs by using capsicum as an irritant. The greater the production of mucus, the less was the degree of ulceration.

Mukherji et al., (1961) studied the effect of Curcuma longa on the gastric secretion in rats. There was an increase in mucin content of the gastric juice. It has been suggested that beneficial effect of curcumin as a therapeutic agent in gastric disorders may be due to its mucus stimulatory effect.

The effect of red chilli powder on gastric mucosal barrier and acid secretion was studied by Desai et al., (1977). The results showed that red chilli powder (1.6g/hour) significantly increased acid secretion in control subjects and patients with duodenal ulcer. The red chilli powder also increased motility of stomach as indicated by greater pyloric loss. According to the authors, the fact that red chilli powder broke the gastric mucosal barrier, supported the suggestion that gastric erosion due to consumption of excess of spices could be an important cause of explained haematemesis in the tropics.

Normal and non-duodenal ulcer groups did not respond significantly to red chilli in the test meals

(Johnson, 1978). Duodenal ulcer patients responded maximally to red chilli, significantly greater than to the test meal without red pepper or to histalog. It was concluded that red pepper should probably be avoided in the diet of duodenal ulcer patients in Ethiopia.

According to Giriya (1983) chillies when taken with food stimulated secretion of saliva which helped in digestion of starch or cereal foods. The "burning" or "growing" sensation after taking too much of hot food is known to many of us. The foods containing lot of chillies could cause irritation and secretion of acidic gastric juices which would trigger peptic ulcers, characterized by pain and discomfort in the upper central abdomen. Such persons should avoid spicy food as it would aggravate this condition.

The acetone - extracts of Zingiber officinale, which contains essential oil and pungent principles, caused an increase in the secretion of bile (Miki et al., 1985). It was reported that 6-gingerol and 10-gingerol were mainly responsible for the cholagogic effect of ginger.

Desai et al., (1985) studied the effect of black pepper and asafoetida on the DNA content of gastric aspirates. Results suggested that asafoetida, commonly

used as a seasoning agent in Indian food, damages the human gastric mucosa as assessed by its effect on the rate of exfoliation of surface epithelial cells.

Agarwal et al., (1988) reported the histopathological studies on toxicity of chilli in Syrian golden hamsters. He reported that diarrhoea was observed in many hamsters given chilli and gastric ulcer was observed in one which received the same treatment for 11 months.

Kang et al., (1988) observed the effect of chilli ingestion on macroscopic gastroduodenal mucosal damage in healthy subjects and showed that chilli ingestion did not result in macroscopic gastroduodenal mucosal damage.

2.4.2 Effect on Blood Sugar

Monserenusorn and Glinsukon (1978) studied the inhibitory effect of capsaicin on in vitro intestinal glucose absorption. The results suggested that higher concentrations of capsaicin may reduce the ATP content of the intestinal mucosa and thus inhibit glucose transport, partly by inhibiting the production of mitochondrial ATP.

Chang et al., (1980) studied the effect of garlic on carbohydrate metabolism and lipid synthesis in rats on a control diet, containing 1% cholesterol and

46.8% sucrose as the only source of carbohydrate or the control diet plus garlic. The results suggested that garlic reduced lipid synthesis and influenced glycogen metabolism in the liver of rats. (The hypoglycemic effect of garlic seems associated with the increase in insulin concentration).

Madar (1984 and 1989) investigated the effect of fenugreek as a source of dietary fibre on glucose tolerance in control and diabetic rats. Results showed that fenugreek reduced postprandial hyperglycemia in diabetic rats. This has been attributed to a delayed emptying of the stomach and delayed absorption of glucose in the small intestine.

The antidiabetic effect of fenugreek seed and its fractions was studied by Ribes et al., (1984). Fenugreek seeds exhibited antidiabetic effect in diabetic dogs. Results indicated that the effective antidiabetic principles of these seeds were present in the defatted part. It was also seen that the chronic treatment with defatted fenugreek had an influence on the response to oral glucose tolerance test and modified not only the blood glucose level but also the pancreatic hormone level. The hyperglycemic peak was clearly reduced.

Sharma (1986 and 1987) studied the effect of fenugreek seeds and leaves on blood glucose and serum insulin responses in their human subjects. The results showed that the degummed seeds and leaves had little effect on blood glucose levels. Fenugreek seeds when given for 21 days to diabetics showed significant improvement in plasma glucose and insulin responses and reduced the 24-hour urinary glucose output and serum cholesterol concentration. As fenugreek was rich in lysine it was recommended that, after removal of the bitter factor, it could be used to replace pulses in the diet of diabetis.

2.4.3 Effect on Metabolic Rate

Henry et al., (1986, 1987) studied the effect of spiced food on metabolic rate. A total of 1 Asian and 11 white subjects all accustomed to eating special foods, had their resting metabolic rate (RMR) measured on 4 separate occasions, and then ate a meal without or with 3gm chilli sauce and 3gm mustard sauce. Oxygen consumption was measured for 5min, 15min and 180min. The mean RMR was 233ml O₂/min. Meal with spice gave significantly greater metabolic rate throughout the postprandial period than did the meal alone.

In another study on the effect of ginger on metabolic rate, Henry et al., (1987) found no significant difference in the increase in metabolic rate between the

breakfast without and with ginger sauce, indicating that ginger has no additional effect on metabolic rate.

2.4.4 Effect on Fat and Cholesterol Metabolism

Sambaiah et al., (1978) studied the effect of red pepper and capsaicin on fat absorption in rats. Their results consistently indicated a pronounced lipotropic activity for red pepper and natural or synthetic capsaicin. Since the extent of lowering of fat deposition in liver in case of whole red pepper was almost the same as its equivalent of capsaicin, it was concluded that the lipotropic activity of the former may almost entirely be ascribed to its capsaicin component. The elevation of serum lipids suggests that it mainly acts by favouring lipid transport. They also observed a significant lowering of liver cholesterol which accompanied the lowering of liver lipids in rat fed high fat vegetable protein diets.

Results of two separate experiments conducted by Gujral et al., (1978) on weanling rats revealed the cholesterol lowering property of ginger oleoresin. Intragastric or oral administration of ginger oleoresin significantly lowered serum and hepatic cholesterol and significantly increased fecal cholesterol excretion from the control values. The level of beta lipoprotein fraction of lipoproteins increased and that of alpha-lipoprotein fraction decreased in hyper cholesterolemia,

but the levels reverted back to that of control in response to ginger oleoresin. In ginger oleoresin fed groups, since the increases and decreases in hepatic cholic acid corresponded directly with hepatic cholesterol levels and the fecal cholesterol excretion was significantly high, it was suggested that the mechanism by which ginger oleoresin restrained elevation in serum and hepatic cholesterol levels in hypercholesterolemia was the impairment in cholesterol absorption.

The effect of dietary garlic and onion on serum lipid profile in the Jain community was studied by Sainani et al., (1979). The study indicated that routine consumption of onion and garlic in the diet seems to have a beneficial effect in maintaining the serum lipids at low and normal levels.

Sambaiah and Satyanarayana (1980) studied the hypocholesterolemic effect of red pepper and capsaicin. They reported that red pepper or an equivalent amount of its active principle 'capsaicin' fed along with cholesterol containing diets to female albino rats, prevented significantly the rise in liver cholesterol and bile acids. Red pepper feeding also partially prevented the rise in serum cholesterol levels. The authors suggested that the hypocholesterolemic effects of red pepper, turmeric, curcumin and ginger, reported

earlier, was due to the common vanillyl moiety present in the respective active principles i.e. capsaicin, curcumin and gingerol.

Kritchevsky et al., (1980) studied the influence of garlic oil on cholesterol metabolism in rats. In their study they reported that rats fed on garlic oil exhibited lower serum and liver triglyceride levels than did controls. Slight reduction in body and liver weights were also observed. Using liver slices they found a 17 per cent demuntion in conversion of acetate to cholesterol in rats fed 416 mg/day of garlic oil for five weeks.

Chang and Johnson (1980) studied the effects of various garlic preparations on lipid synthesis in rats and reported slight reductions in body and liver weights and lower serum and liver cholesterol levels. Rats fed 2 percent garlic for 24 days converted 27% less 14 c-acetate to cholesterol than did controls.

Chi et al., (1982) studied the effect of garlic on lipid metabolism in rat fed cholesterol or lard. They reported that garlic decreased very-low-density lipoprotein (VLDL) cholesterol and increased high-density lipoprotein (HDL) cholesterol. It also increased the excretion of the neutral sterol in rats. Garlic at 2% was similarly effective on lipid metabolism as at 4%.

Bhat et al., (1984) in a study reported that the intragastric administration of 50mg of curcumin (125mg/kg body weight) or 1.5mg capsaicin (3.75mg/kg body weight) per rat increased the bile secretion rate, the effect of capsaicin being more pronounced. The output of cholesterol and bile acids in bile was higher only in rats forcefed with 100mg curcumin. Feeding 7.5 or 1.5mg percent capsaicin or 0.2 or 0.5% curcumin in the diet for four weeks did not alter the bile secretion but significantly increased the total bile acids output. The results suggested that the active principles stimulated bile forming function of the liver and the conversion of cholesterol to bile acids, the latter being independent of their hydrocholagogenic property.

Sun (1984) studied the effect of garlic, spring onions, mushrooms, soybean, prawns, chives, walnuts, groundnut and fish on hyperlipidemia in men and reported that high-density lipoprotein cholesterol in total cholesterol increased from 24.7 to 31.3% and low-density lipoprotein cholesterol decreased from 61.8 to 49.2%. Treatment was effective in 93.3% of patients with hypercholesterolaemia and in 57.1% of patients with hypertriglyceridemia.

Bhat et al., (1985) investigated the influence of fenugreek and ginger on the secretion and composition of bile in rats. The intragastric administration of fenugreek or dietary feeding of ginger and fenugreek

caused a hydrocholagoguic effect. Feeding these two spices in the diet significantly increased the total bile acid output. The excess bile salt excretion was mainly due to the increased production of taurodeoxycholic acid and taurocholic acid. The result indicated that fenugreek and ginger stimulate the bile forming function of the liver and also the conversion of cholesterol to bile.

Agerwala and Pant (1986) studied the effect of ajowan on serum lipids and cholesterol. They found that ajowan when fed at 1 percent level of the diet for 4 weeks to normal rats had a hypocholesterolemic, hypotriglyceridemic and hypophospholipidemic effect from the first week itself. The serum cholesterol binding reserve and high density lipoprotein levels on the other hand, showed an increase in the corresponding periods.

Srinivasan et al., (1986) studied the influence of chillies and spice mixture feeding on liver, serum and carcass lipids of rats. Results showed that food intake, final body weight, lean body weight and adipose tissue weight were not affected by different treatments. Liver weight but not its lipid content and carcass lipids showed an increase only with 1.58% spice mixture. All diets decreased serum total very-low-density lipoprotein and low-density lipoprotein and triglycerides.

Nitiyanant et al., (1987) studied the effect of dried garlic powder extract and water soluble garlic on cholesterol, triglyceride and high density lipoprotein levels in blood. Feeding 7gm fresh garlic daily for 5 months to 9 hyperlipaemic subjects, showed that in the 1st 3 months serum cholesterol increased but returned to baseline values by 5 months. Increase was perhaps due to the regression of atherosclerotic lesions, or to the unrestricted dietary intake of the subjects. There was a gradual decrease in serum triglycerides and a significant increase in high- density lipoprotein cholesterol.

Sharma (1989) in his study on hypocholesterolemic agents stated that fenugreek seeds administered at 60, 30 and 15 per cent levels for 20 days to hypercholesterolemic subjects, reduced serum cholesterol and triglyceride levels. Almost similar effect was seen on lipids in diabetic subjects.

2.5 ANTIMICROBIAL ACTIVITY

Several spices, particularly garlic, ajowan, black pepper, cinnamon, nutmeg, cloves, ginger, cumin, caraway and asafoetida are being used extensively in Indian dietary and in the Indian system of medicine for correcting a variety of intestinal disorders and are

also believed to possess antimicrobial action (Pruthi, 1980). Several studies were conducted to test the antimicrobial activity of many of the commonly used spices.

Sreenivasamurthy et al., (1960) studied the effect of garlic on the growth of yeasts and molds. They reported that garlic acted as a fungistatic agents at lower concentrations, whereas at higher concentrations, it worked as a fungicidal agent.

The effect of turmeric on the growth rate and acid production by some intestinal bacteria was examined by Bhavanishankar and Sreenivasamurthy (1978). It was found that while turmeric suppressed the growth and acid production by lactobacilli, it slightly stimulated the growth and acid production by streptococci and Escherichia Coli. It was concluded that turmeric could alter the intestinal microflora by inhibiting or enhancing the growth of different intestinal bacteria, the minimum concentration of turmeric necessary to bring about the effect on bacterial growth, was 0.5%.

In a review of the antimicrobial and therapeutic action of garlic, Sreenivasamurthy et al., (1983), made several remarks. They stated that the antimicrobial action of crushed garlic was mainly due to the presence of allicin. The other antimicrobial factors known to be present in garlic were allistatin-I,

allistatin-II, scrocinine and heat stable factors developed during storage of garlic extract at elevated temperature. Hence garlic extracts containing these antimicrobial principles were used for preserving meat and meat slurry. Garlic extract inhibited the activity of many sulphhydryl enzymes as well as germination of certain bacterial spores. Feeding garlic extract to albino rat had been found to considerably lower than total bacterial count, coliform count and anaerobic bacterial count of the caeca, which would have some influence on the health of the animals. This would explain partly the rationale behind using garlic in the treatment of bacillary dysentery. Since it was known that garlic extract inhibits certain disease causing organisms, it was used in the treatment of many infectious diseases, such as leprosy, bronchial pneumonia etc.

Bhavanishankar and Sreenivasamurthy (1985) studied the effect of curcumin at various levels on gas formation by *Clostridium perfringens* of intestinal origin. Gas formation decreased gradually as the curcumin concentration increased and there was no gas when curcumin concentration was 0.05%, the level at which bacterial growth was inhibited completely. Curcumin did not inhibit gas formation when extra iron was provided in the medium, making evident that curcumin inhibited gas formation through binding of iron.

However, the amount required for inhibition of gas formation in vivo was three times more than the amount required for inhibition of gas formation in vitro.

In a study by Shashikanth et al., (1986) the caecal microflora of rats fed raw garlic diet was considerably reduced when compared to the rats fed with boiled garlic. No antimicrobial activity was found in boiled garlic extract, instead there was a stimulatory effect on the growth of total Streptococci and 5 to an extent on the coliforms. This stimulatory activity was later identified by the same authors to be due to the presence of glutamyl acidic peptides present in garlic. It was concluded that boiling garlic bulbs as practised in the culinary practices and Ayurvedic medicinal system would destroy its antimicrobial activity.

Lau (1989) studied the detoxifying, radio-protective and phagocyte enhancing effect of garlic. He reported that garlic had properties which inhibit growth of pathogenic microbes and certain cancer cells, enhance host resistance and protect from toxic exposure.

Srivastava et al., (1989) carried out studies on ginger and rheumatic disorders and reputed that ginger was useful in rheumatic disorders. Several patients with such disorders reported relief from pain and associated symptoms when given ginger.

Vijaysethi (1991) studied the effect of adding spice extracts and flavouring compounds like ginger juice, curry leaf extracts, eugenol, cinnamaldehyde along with other spices and their essential oil to tomato juice and showed that these spices preserved the tomato juice and its products and were liked by majority of the people. They showed the inhibiting effect of these spices on microbial spoilage.

2.6 HEALTH STATISTICS

Table 6a. Incidence of GIT problems in Guntur and Visakhapatnam districts

Disease	Guntur	Visakhapatnam
Amoebiasis	40942	27969
Ulcers	3473	2809
Gastritis and duodinitis	10455	2954
Medical Intelligence data (1985)		

According to M.I. data (1985) incidence of GIT problems were comparatively high in Guntur.

MATERIALS AND METHODS

CHAPTER III

MATERIALS AND METHODS

This study was taken up to compare the consumption and utilisation pattern of spices in high and low spice producing areas of A.P. The methodology followed was phased into 5 parts as follows:

- 3.1 Selection of district
- 3.2 Selection of sample
- 3.3 Development of schedule
- 3.4 Collection of data
- 3.5 Statistical analysis

3.1 SELECTION OF DISTRICTS AND VILLAGES

According to the season and crop report of A.P. (1987 - 1988) Guntur district was found to be high and Visakhapatnam the low spice producing areas with a production of 83412000 tonnes and 21372000 tonnes respectively. Spice production figures of different districts are presented (Appendix I). Hence these areas were selected because they represented high and low spice producing areas (Fig.1). In each district 3 villages around the Regional Agricultural Research Station (RARS) having comparatively higher production of

Fig1: LOCALE OF THE STUDY (ANDHRA PRADESH STATE)



Visakhapatnam
(Low spice
producing area)



Guntur
(High spice
producing area)

spices namely Ravella, Ponnekallu and Medikonduru in Guntur and Juttada, Munagapaka and Botlapudi in Visakhapatnam district were selected for the study.

3.2 SELECTION OF THE SAMPLE

Sample selection was based on the land holding i.e. large (more than 10 acres), medium (5 to 10 acres), small (0 to 5 acres) and land less labourers (0 acres). From each group 25 families were selected purposively (the scheme of selection is given in Fig. 2).

3.3 DEVELOPMENT OF SCHEDULE

A pretested personal interview schedule was used to elicit the information on spice consumption and utilisation patterns. Broadly the survey schedule consisted of the following parts:

Part I : General information, land holding, family composition and other particulars like age, sex, literacy level, occupation and income.

Part II : Frequency of food consumption and diet survey.

Part III: Consumption pattern of spices.

Part IV : Knowledge, Attitude and Practice regarding use of spices.

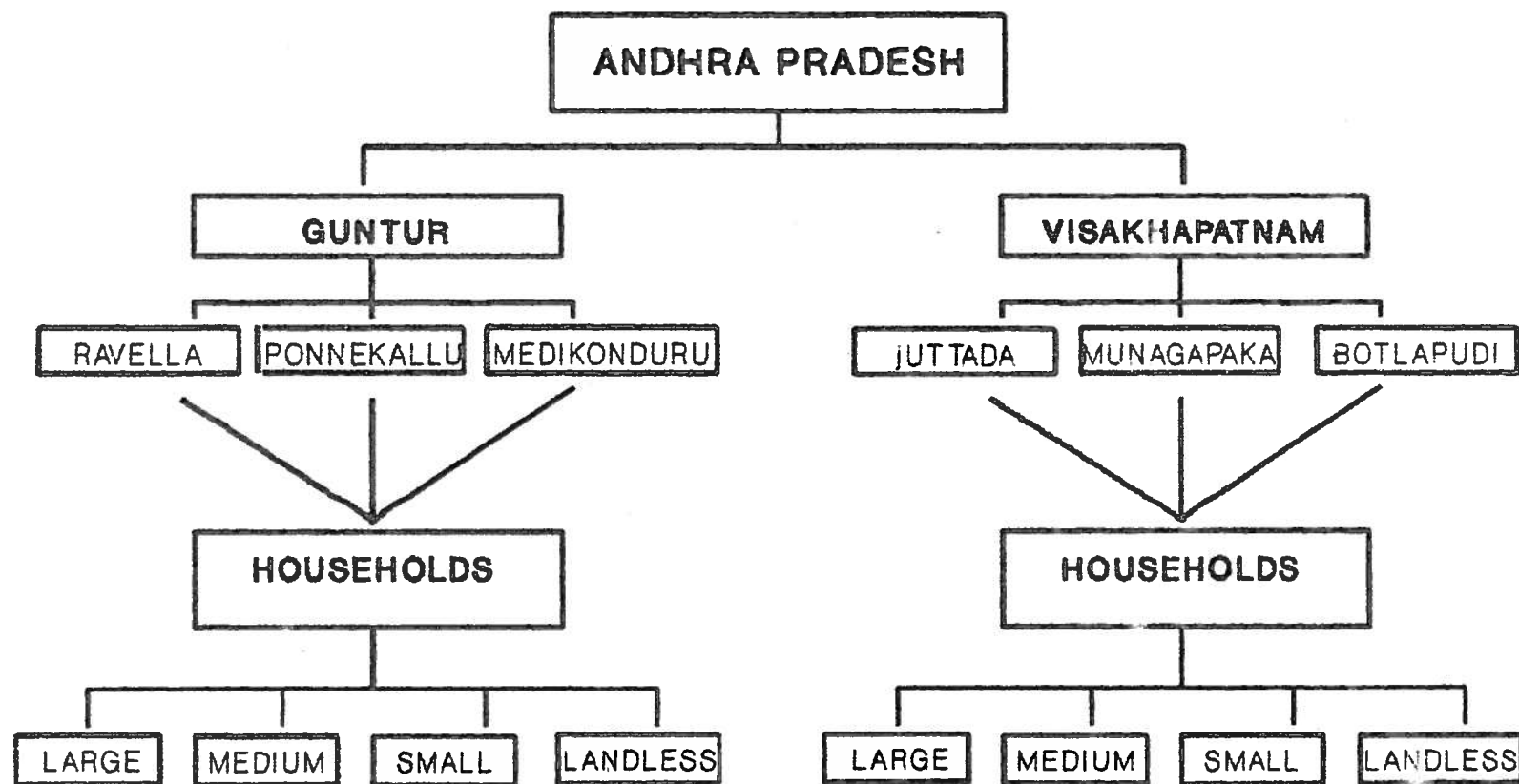


FIG.2. SCHEME OF SELECTION OF THE SAMPLE

The schedule was pretested in 35 families in Cuddapah district, reconstructed and used for the survey (Appendix II).

3.4 COLLECTION OF DATA

Preliminary visits to villages were made in order to establish rapport with rural families and explain the purpose of visit. Information using the personal interview schedule was obtained from 25 families in each category of land holding from the home maker.

3.5 STATISTICAL ANALYSIS

The data collected was subjected to statistical analysis for test of significance using critical difference.

RESULTS

CHAPTER IV

RESULTS

The findings of the study on consumption and utilisation pattern of spices are presented under the following heads.

4.1 General information.

4.2 Food and nutrient intake

4.3 Utilisation pattern of spices

4.4 Knowledge attitude and practices regarding use of spices.

4.1 GENERAL INFORMATION

One hundred households from each district were surveyed. The sample consisted of 25 families each from large, medium, small farm families and landless labourers.

Age wise distribution of the population surveyed is presented in table 7.

Table 7. Age wise distribution of the population (%)

Characteristics (years)	Guntur				Visakhapatnam			
	Large	Med- ium	Small	Land- less	Large	Med- ium	Small	Land- less
> 20	61.5	70.2	66.0	57.9	54.3	58.9	53.4	44.4
12 - 19	22.0	16.5	10.4	17.9	28.4	22.6	24.8	16.5
5 - 12	11.3	9.9	7.5	17.9	7.4	8.9	13.5	18.2
3 - 5	4.5	2.5	6.6	6.3	6.2	5.6	4.5	13.9
1 - 2	--	0.9	5.7	--	2.4	1.6	2.2	1.7
0 - 12 months	0.7	0.6	3.8	--	1.3	2.4	1.5	5.2

The data showed a population structure which was predominantly young, with there being no difference between either districts or the land holdings.

Population characteristics of the two districts are presented in table 8.

Table 8. Population characteristics

Characteristics	Guntur				Visakhapatnam			
	Large	Med-ium	Small	Land-less	Large	Med-ium	Small	Land-less
Number of families	25	25	25	25	25	25	25	25
Total population covered	131	121	106	95	162	124	133	115
Total males %	51.1	47.9	50.9	53.7	55.5	55.6	56.4	42.6
Total females %	48.9	52.1	49.1	46.3	44.5	44.4	43.6	57.4
Average family size	5.0	4.0	4.0	3.0	6.5	5.0	5.3	4.8

Population characteristics did not show any significant difference ($P > 0.05$) between the districts of the land holding. Family size appeared to be bigger in large farm families than in others.

The educational status of the population in Guntur and Visakhapatnam is presented in table 9.

Table 9. Educational status of the population (%)

Character- istics	Guntur				Visakhapatnam			
	Large	Med- ium	Small	Land- less	Large	Med- ium	Small	Land- less
No edu- cation	20.7	28.1	33.0	49.5	33.4	27.4	41.3	67.0
Read and write	5.3	6.6	12.3	4.2	--	6.8	8.3	1.7
Primary education	30.5	33.9	22.6	33.7	25.3	29.0	26.4	25.2
Secondary education	29.8	19.8	27.4	10.5	18.5	23.3	16.5	6.1
College education	13.7	11.6	4.7	2.1	22.8	17.7	7.5	--
Profes- sional education	--	--	--	--	--	1.6	--	--

The data showed that educational status was related to land holding in both the districts. The level of education and per cent of education population increased with the increase in the land holding.

The per cent of families involved in different occupations are presented in table 10.

Table 10. Occupational characteristics of the population (%)

Characteristics	Guntur				Visakhapatnam			
	Large	Med-ium	Small	Land-less	Large	Med-ium	Small	Land-less
Agriculture	100.0	100.0	100.0	--	100.0	100.0	100.0	--
Caste occupation	--	4.0	8.0	2.0	--	4.0	--	4.0
Agriculture labour	--	--	80.0	80.0	--	--	32.0	92.0
Non-agriculture labour	--	--	--	20.0	--	--	4.0	--
Service	--	4.0	--	--	12.0	20.0	8.0	--
Trade	8.0	--	--	--	4.0	--	--	--
Business	8.0	--	--	--	4.0	4.0	4.0	4.0

Agriculture was the main occupation and the main source of income of all the farm families in both the districts. Contrarily small farm families and landless labourers worked as agriculture and non-agriculture labour for their livelihood. Large and medium farm families also had secondary source of income like trade, business or public/private service.

4.2 FOOD AND NUTRIENT INTAKE

4.2.1 Food intake

The food intake pattern of the population in Guntur district is presented in table 11.

It was observed that diets of the people, irrespective of land holding was predominantly cereal based. Family with higher legume intake, consumed less quantity of vegetable and vice-versa. Consumption of green leafy vegetables, roots and tubers, fruits, nuts and oil seeds and fleshy foods were well below the recommended levels in all the farm families more so in landless families. Milk intake was well above the recommended level, except in the landless families. Intake of only cereals, legumes, vegetables, sugar and spices appeared to be effected by land holding. Intake of other food items was independent of land holding.

The food intake pattern of the population in Visakhapatnam district is presented in table 12.

The diet in Visakhapatnam too was predominantly cereal based. While the consumption of cereal increased with the decreased in land holding, the intake of foods like milk, other animal foods, oil, sugar and jaggery decreased with the decrease in the land holding. However, consumption of roots and other vegetables was

Table 11. Food intake pattern of Guntur district
(g/c.u/day)

Food group	ICMR recommended allowances	Large	Medium	Small	Landless
Cereals	475	377.6 $\pm$ 90.8	355.2 $\pm$ 53.8	355.4 $\pm$ 83.7	431.5 $\pm$ 78.1
Legumes	80	26.6 $\pm$ 36.5	31.0 $\pm$ 23.9	35.7 $\pm$ 29.3	44.3 $\pm$ 34.6
GLV	125	14.2 $\pm$ 25.4	10.7 $\pm$ 23.3	10.9 $\pm$ 34.6	9.5 $\pm$ 23.7
Roots and tubers	100	37.6 $\pm$ 23.7	24.4 $\pm$ 19.5	43.4 $\pm$ 37.9	42.5 $\pm$ 25.6
Other vegetables	75	101.6 $\pm$ 71.2	74.7 $\pm$ 53.9	48.4 $\pm$ 15.1	48.4 $\pm$ 63.9
Fruits	30	8.2 $\pm$ 25.5	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Nuts and oilseeds	-	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Milk and milk products	100	311.9 $\pm$ 114.2	257.1 $\pm$ 118.8	232.7 $\pm$ 156.7	99.8 $\pm$ 11.7
Egg	30	3.6 $\pm$ 12.8	4.7 $\pm$ 14.5	0.0 $\pm$ 0.0	11.8 $\pm$ 28.9
Meat/poultry	30	8.0 $\pm$ 35.8	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Fish		0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Oil	40	29.1 $\pm$ 7.7	23.4 $\pm$ 12.5	18.6 $\pm$ 9.8	24.0 $\pm$ 14.1
Sugar/jaggery	40	32.8 $\pm$ 16.4	24.2 $\pm$ 14.2	30.1 $\pm$ 37.8	13.7 $\pm$ 5.1
Spices/condiments	-	43.4 $\pm$ 11.0	52.5 $\pm$ 30.7	66.6 $\pm$ 21.8	62.5 $\pm$ 16.3

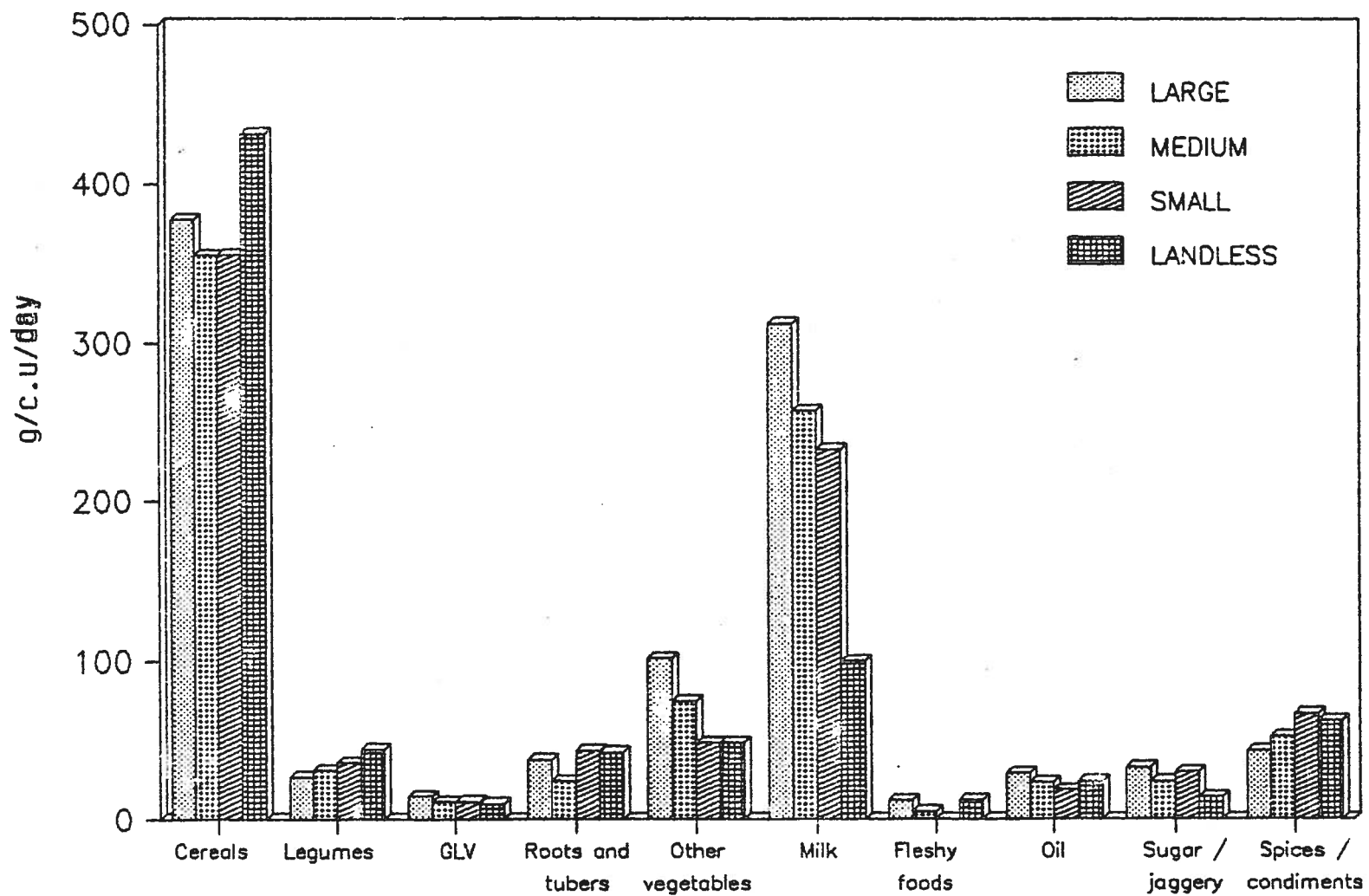


Fig.3: Food intake pattern of Guntur district

Table 12. Food intake of Visakhapatnam district

(g/c.u/day)

Food group	ICMR recommended allowances	Large	Medium	Small	Landless
Cereals	475	377.8 $\pm$ 115.6	395.8 $\pm$ 79.5	505.3 $\pm$ 93.9	480.0 $\pm$ 84.2
Legumes	80	25.0 $\pm$ 21.0	23.7 $\pm$ 18.7	18.3 $\pm$ 19.0	26.7 $\pm$ 21.0
GLV	125	11.5 $\pm$ 31.6	6.8 $\pm$ 24.8	0.0 $\pm$ 0.0	9.3 $\pm$ 24.2
Roots and tubers	100	41.4 $\pm$ 57.8	47.1 $\pm$ 37.0	31.6 $\pm$ 27.2	45.5 $\pm$ 31.8
Other vegetables	75	47.8 $\pm$ 63.2	52.0 $\pm$ 55.0	85.0 $\pm$ 62.0	90.8 $\pm$ 71.6
Fruits	30	0.0 $\pm$ 0.0	10.2 $\pm$ 16.6	0.0 $\pm$ 0.0	8.6 $\pm$ 15.91
Nuts and oilseeds	-	6.25 $\pm$ 22.8	6.2 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Milk and milk products	100	220.0 $\pm$ 75.2	130.3 $\pm$ 69.3	117.1 $\pm$ 73.3	73.0 $\pm$ 51.4
Egg	30	5.0 $\pm$ 15.4	10.0 $\pm$ 18.4	5.6 $\pm$ 13.7	3.5 $\pm$ 11.2
Meat/poultry	30	53.8 $\pm$ 56.3	12.5 $\pm$ 28.6	14.6 $\pm$ 36.0	0.0 $\pm$ 0.0
Fish		0.0 $\pm$ 0.0	8.0 $\pm$ 25.5	5.8 $\pm$ 26.0	6.3 $\pm$ 28.0
Oil	40	24.0 $\pm$ 9.8	22.1 $\pm$ 5.4	20.7 $\pm$ 7.7	16.1 $\pm$ 8.7
Sugar/jaggery	40	17.8 $\pm$ 12.4	22.9 $\pm$ 7.1	23.4 $\pm$ 9.0	23.0 $\pm$ 31.0
Spices/condiments	-	30.7 $\pm$ 15.1	27.6 $\pm$ 11.7	34.7 $\pm$ 16.4	37.4 $\pm$ 15.3

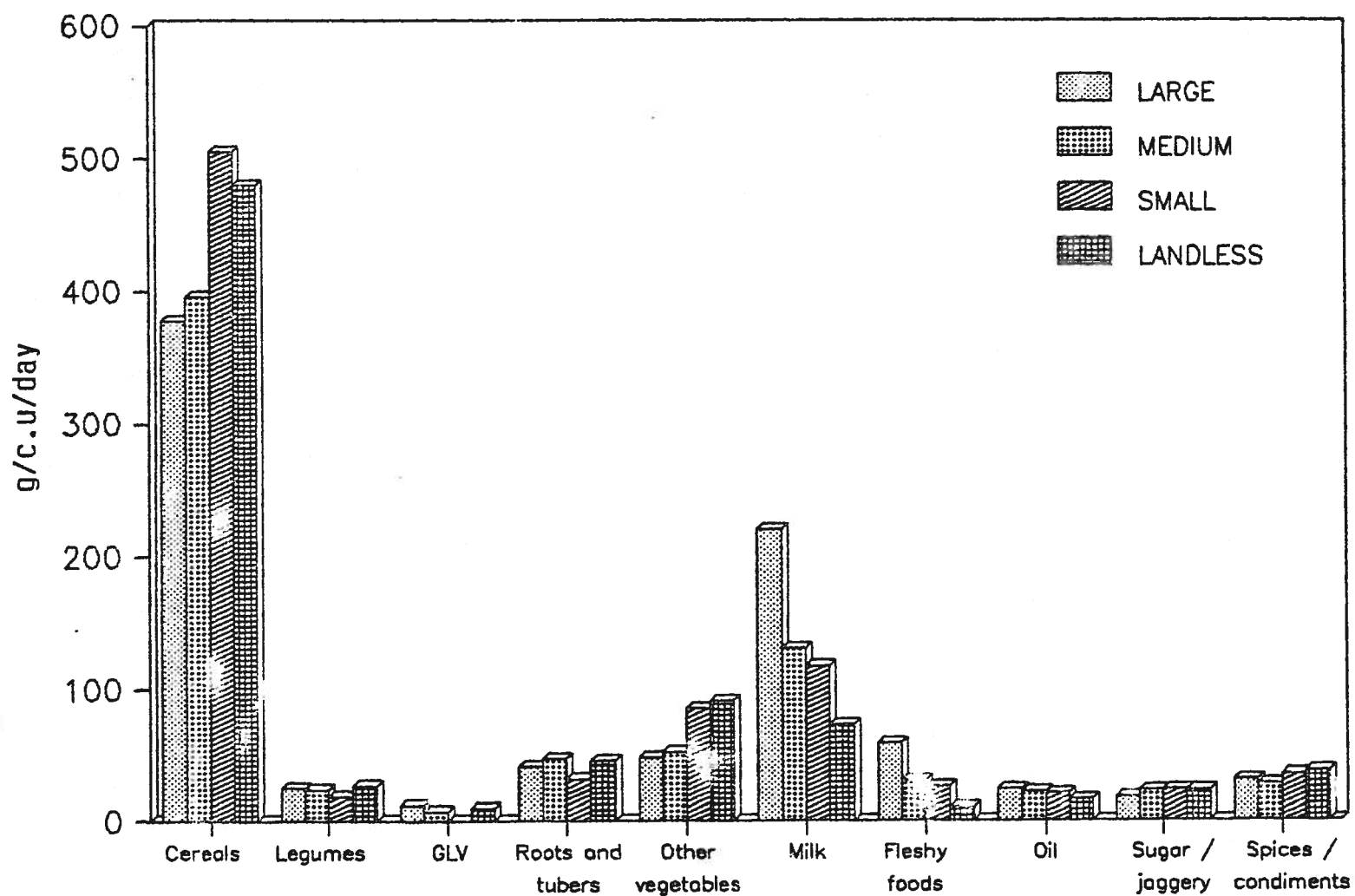


Fig.4: Food intake pattern of Visakhapatnam district

higher in landless families. It was observed that intake of all foods was much below the recommended allowances more so in landless category.

Spices and condiments intake of Guntur and Visakhapatnam districts are presented in table 13 and 14.

The data presented in (tables 13 and 14) showed that consumption of red chillies, green chillies, tamarind, salt and onions was significantly ($P < 0.05$) more than other spices. Large farm families consumed significantly ($P < 0.05$) less quantity of spices, than other farm families. Landless labourers consumed more quantity of spices in both the districts particularly chillies. Intake of spices was significantly ($P < 0.05$) high in Guntur than in Visakhapatnam.

4.2.2 Nutrient intake

Nutrient intake of Guntur district is presented in table 15.

Nutrient intake data showed that energy (91-100%), protien (95-105%), calcium (189-236%) and thiamine (129-151%) of RDA. Intake was adequate or nearly adequate. Contrarily, intake of iron (48-56%), riboflavin (41-51%), carotene (29-47%) and vitamin C (73-78%) of RDA and was less than the requirement in all

Table 13. Intake of spices and condiments in Guntur district

	(g/C.U/day)			
	Large	Medium	Small	Landless
Number of families	25	25	25	25
Average C.U	5.2	4.6	4.0	3.6
Onion	9.2 $\pm$ 4.0	11.5 $\pm$ 7.7	15.3 $\pm$ 7.1	16.3 $\pm$ 3.9
Green chillies	6.7 $\pm$ 2.4	9.6 $\pm$ 9.1	12.2 $\pm$ 5.6	14.8 $\pm$ 8.5
Tamarind	6.7 $\pm$ 2.4	9.6 $\pm$ 9.1	12.2 $\pm$ 5.6	14.8 $\pm$ 8.5
Salt	6.2 $\pm$ 1.7	7.5 $\pm$ 6.2	9.2 $\pm$ 3.3	8.3 $\pm$ 2.5
Dry chillies	5.1 $\pm$ 1.3	5.8 $\pm$ 2.5	6.2 $\pm$ 1.6	9.0 $\pm$ 2.7
Turmeric	1.9 $\pm$ 2.3	1.1 $\pm$ 0.6	1.3 $\pm$ 0.5	1.4 $\pm$ 0.4
Coriander	1.3 $\pm$ 0.3	1.4 $\pm$ 0.4	1.6 $\pm$ 0.8	0.0 $\pm$ 0.0
Mustard	1.1 $\pm$ 0.4	1.5 $\pm$ 0.8	1.5 $\pm$ 0.8	2.1 $\pm$ 1.0
Garlic	1.0 $\pm$ 0.5	1.4 $\pm$ 1.0	1.1 $\pm$ 0.9	0.5 $\pm$ 1.0
Ginger	1.0 $\pm$ 0.5	1.3 $\pm$ 0.8	1.1 $\pm$ 1.0	0.5 $\pm$ 1.0
Cinnamon	0.9 $\pm$ 0.5	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Pepper	0.5 $\pm$ 1.1	0.2 $\pm$ 0.2	0.2 $\pm$ 0.2	0.1 $\pm$ 0.0
Cardamom	0.5 $\pm$ 1.9	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Clove	0.4 $\pm$ 1.8	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Cumin	0.4 $\pm$ 0.1	0.6 $\pm$ 0.3	0.5 $\pm$ 0.3	0.0 $\pm$ 0.0
Fenugreek	0.2 $\pm$ 0.3	0.3 $\pm$ 0.3	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0

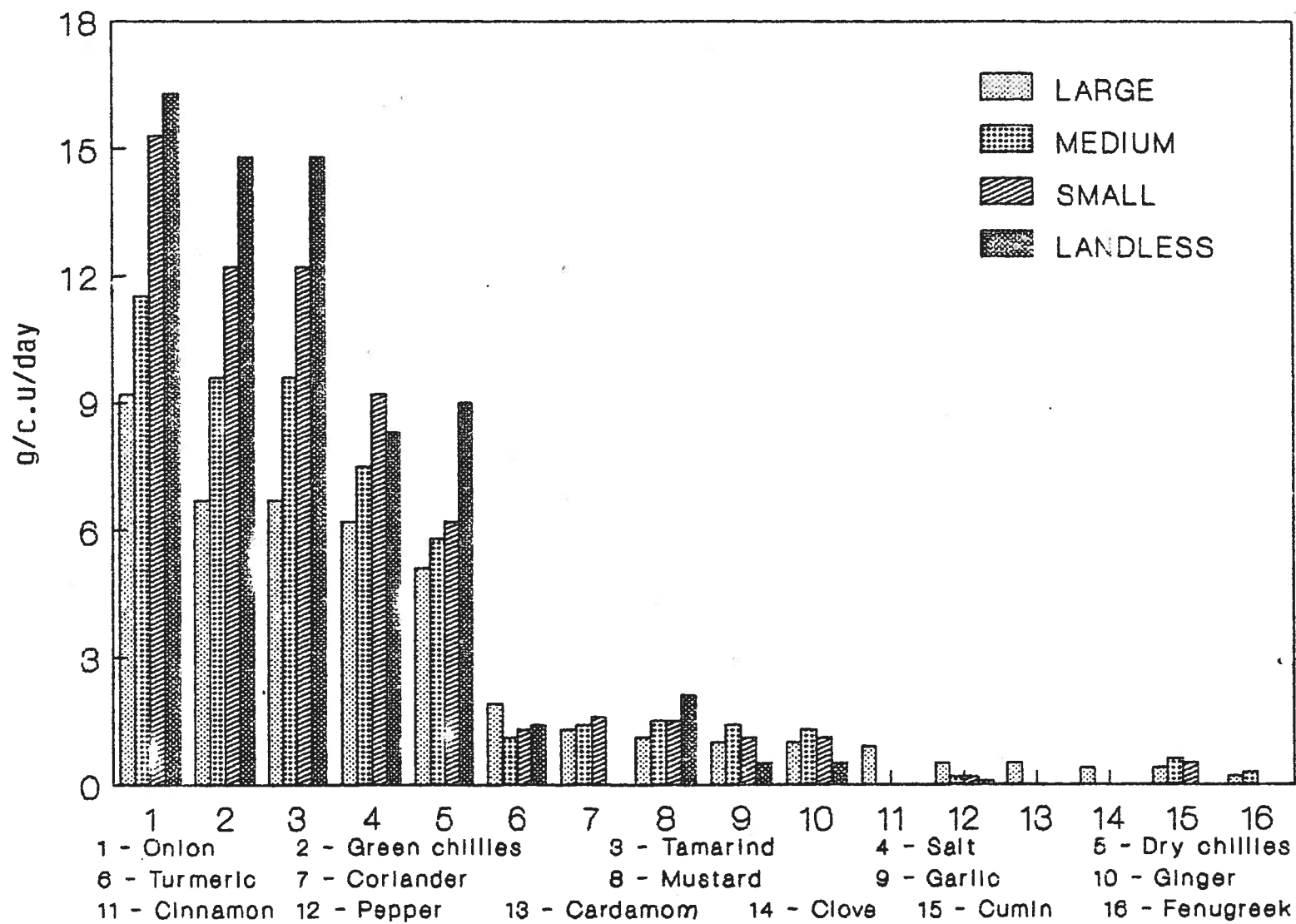


Fig.5: Intake of spices and condiments In Guntur district

①. 4033
1.2.93Table 14. Intake of spices and condiments in Visakha-
patnam district

(g/C.U/day)

	Large	Medium	Small	Landless
Number of families	25	25	25	25
Average C.U	6.4	5.0	5.1	3.9
Onion	8.2 $\pm$ 4.5	9.4 $\pm$ 4.6	7.1 $\pm$ 4.2	6.2 $\pm$ 3.3
Dry chillies	4.2 $\pm$ 0.8	5.4 $\pm$ 2.0	5.4 $\pm$ 3.3	8.5 $\pm$ 2.8
Tamarind	5.8 $\pm$ 3.0	7.2 $\pm$ 3.8	8.2 $\pm$ 5.0	7.6 $\pm$ 3.4
Salt	4.2 $\pm$ 0.8	6.0 $\pm$ 2.6	6.2 $\pm$ 2.6	8.6 $\pm$ 3.0
Coriander	2.7 $\pm$ 4.1	1.7 $\pm$ 0.6	2.0 $\pm$ 1.4	0.0 $\pm$ 0.0
Mustard	1.2 $\pm$ 2.2	0.6 $\pm$ 0.2	0.8 $\pm$ 1.0	0.9 $\pm$ 0.2
Turmeric	1.1 $\pm$ 0.5	1.4 $\pm$ 0.8	0.8 $\pm$ 1.2	2.1 $\pm$ 3.5
Pepper	0.8 $\pm$ 2.2	0.5 $\pm$ 0.3	0.7 $\pm$ 1.3	0.5 $\pm$ 0.2
Fenugreek	0.8 $\pm$ 0.5	0.6 $\pm$ 0.3	0.6 $\pm$ 0.3	0.7 $\pm$ 0.3
Green chillies	0.7 $\pm$ 1.3	1.7 $\pm$ 3.0	1.1 $\pm$ 1.9	2.6 $\pm$ 4.3
Garlic	0.7 $\pm$ 0.8	1.1 $\pm$ 0.7	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Ginger	0.6 $\pm$ 0.7	1.1 $\pm$ 0.7	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Cumin	0.4 $\pm$ 0.1	0.6 $\pm$ 0.3	0.6 $\pm$ 0.3	0.0 $\pm$ 0.0
Cinnamon	0.4 $\pm$ 0.1	0.2 $\pm$ 0.2	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Clove	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0
Cardamom	0.0 $\pm$ 0.1	0.1 $\pm$ 0.0	0.0 $\pm$ 0.0	0.0 $\pm$ 0.0

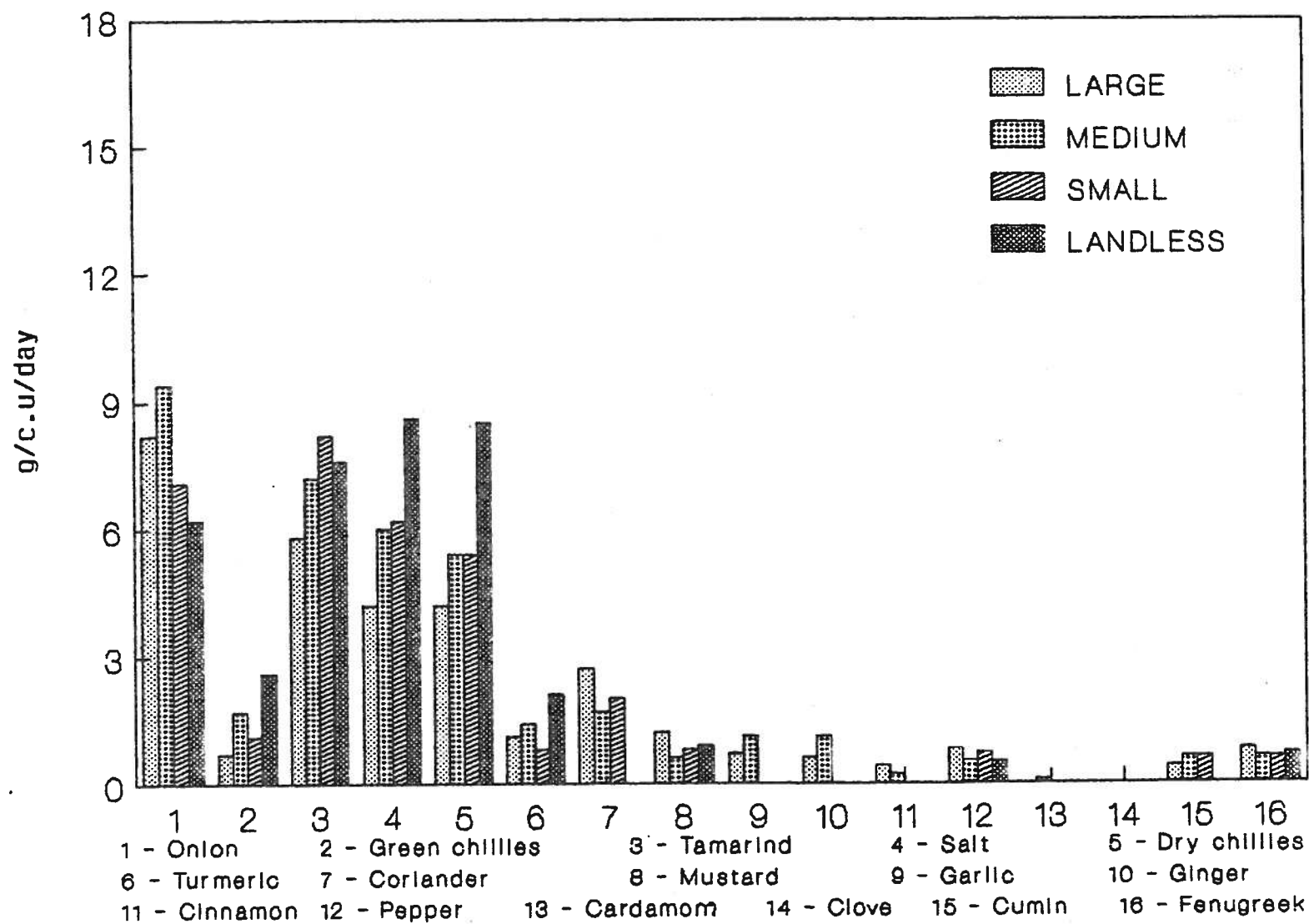


Fig.6: Intake of spices and condiments In Visakhapatnam district

Table 15. Nutrient intake of Guntur district per day

Nutrient	Recommended nutrient intake	Large	Medium	Small	Landless
Calories (K.cal)	2350	2509+416 (107)	2213+383 (94)	2129+458 (91)	2275+462 (97)
Protein(g)	60	63.4+15.8 (105)	57.8+ 9.5 (96)	57.3+9.8 (95)	63.2+13.5 (105)
Calcium(mg)	400	946+254 (236)	805+261 (201)	757+340 (189)	506+102 (127)
Iron (mg)	28	14.3+2.9 (51)	13.4+2.3 (48)	13.4+2.3 (48)	15.6+2.4 (55.7)
Thiamine(mg)	1.2	1.57+0.38 (131)	1.55+0.24 (129)	1.55+0.28 (129)	1.81+0.31 (151)
Riboflavin(mg)	1.4	0.65+0.15 (46)	0.61+0.15 (44)	0.58+0.28 (41)	0.72+0.14 (51)
Caroteen (ug)	2400	1122.3+498.9 (47)	935.5+613.3 (39)	849.5+613.3 (35)	702.7+486 (29)
Vitamin C(mg)	40	42.9+22.0 (108)	31.4+18.9 (78)	28.8+24.2 (73)	28.8+18.3 (73)

The values presented in parenthesis represent per cent nutrient adequacy

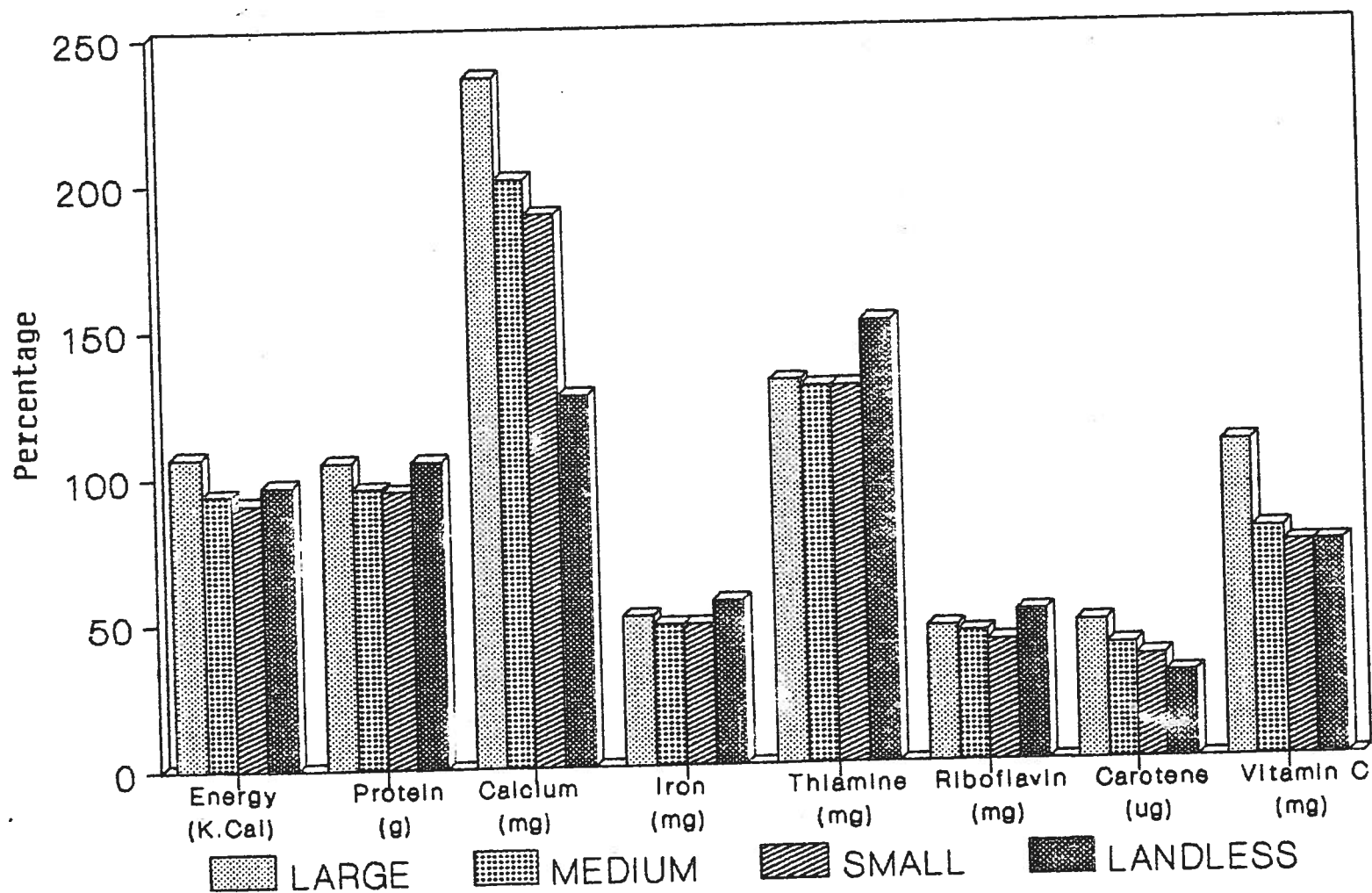


Fig.7: Per cent nutrient adequacy of Guntur district

the families. Vitamin C was above the recommended amount only in large farm families (108%). Land holding does not show a uniform influence on the nutrient intake pattern.

Nutrient intake of Visakhapatnam district is presented in table 16.

The trend in the nutrient intake in Visakhapatnam district was similar to Guntur wherein intake of energy (94-109%), protein (102-116%), calcium (112-191%) and thiamine (100-143%) was more than the RDA. However, low intakes of iron (51-94%), riboflavin (49-51%), carotene (21-35%) and vitamin C (71-87%) were seen in all the families irrespective of the land holding. Here too no set trend between nutrient intake and land holding could be observed.

Nutrient contribution of spices in the total diet in Guntur and Visakhapatnam are presented in table 17 and 18.

Spices contributed considerably to micro-nutrients like iron (16-24.3%), riboflavin (16-17.2%) and vitamin C (27-80%) rather than to macronutrients like calories and proteins. It was observed that contribution of spices to 26-80 per cent of the vitamin C requirement was mainly by green chillies. 11 to 17 per cent of the riboflavin requirement, 16 to 24 per cent of iron requirement, 5 to 11 per cent of calcium

Table 16. Nutrient intake of Visakhapatnam district per day

Nutrient	Recommended nutrient intake	Large	Medium	Small	Landless
Calories (K.cal)	2350	2267+501 (96)	2213+302 (94)	2561+431 (109)	2430+391 (103)
Protein (g)	60	69.5+16.4 (116)	61.2+10.9 (102)	68.9+10.9 (115)	64.1+10.8 (107)
Calcium (mg)	400	764+202 (191)	515+15.9 (129)	539+184 (135)	449+122 (112)
Iron (mg)	28	14.3+3.6 (51)	14.5+2.1 (52)	16.3+2.4 (58)	26.2+2.1 (94)
Thiamine (mg)	1.2	1.6+0.3 (136)	1.5+0.2 (126)	1.7+0.5 (143)	1.2+0.2 (100)
Riboflavin (mg)	1.4	0.68+0.18 (49)	0.65+0.14 (46)	0.71+0.11 (51)	0.71+0.11 (51)
Carotene (ug)	2400	849.0+703.7 (35)	637.2+541.4 (27)	493.3+181.6 (21)	623+52.2 (26)
Vitamin C(mg)	40	28.3+21.9 (71)	30.6+23.4 (77)	22.2+9.9 (56)	34.9+23.7 (87)

The values in parenthesis represent per cent nutrient adequacy.

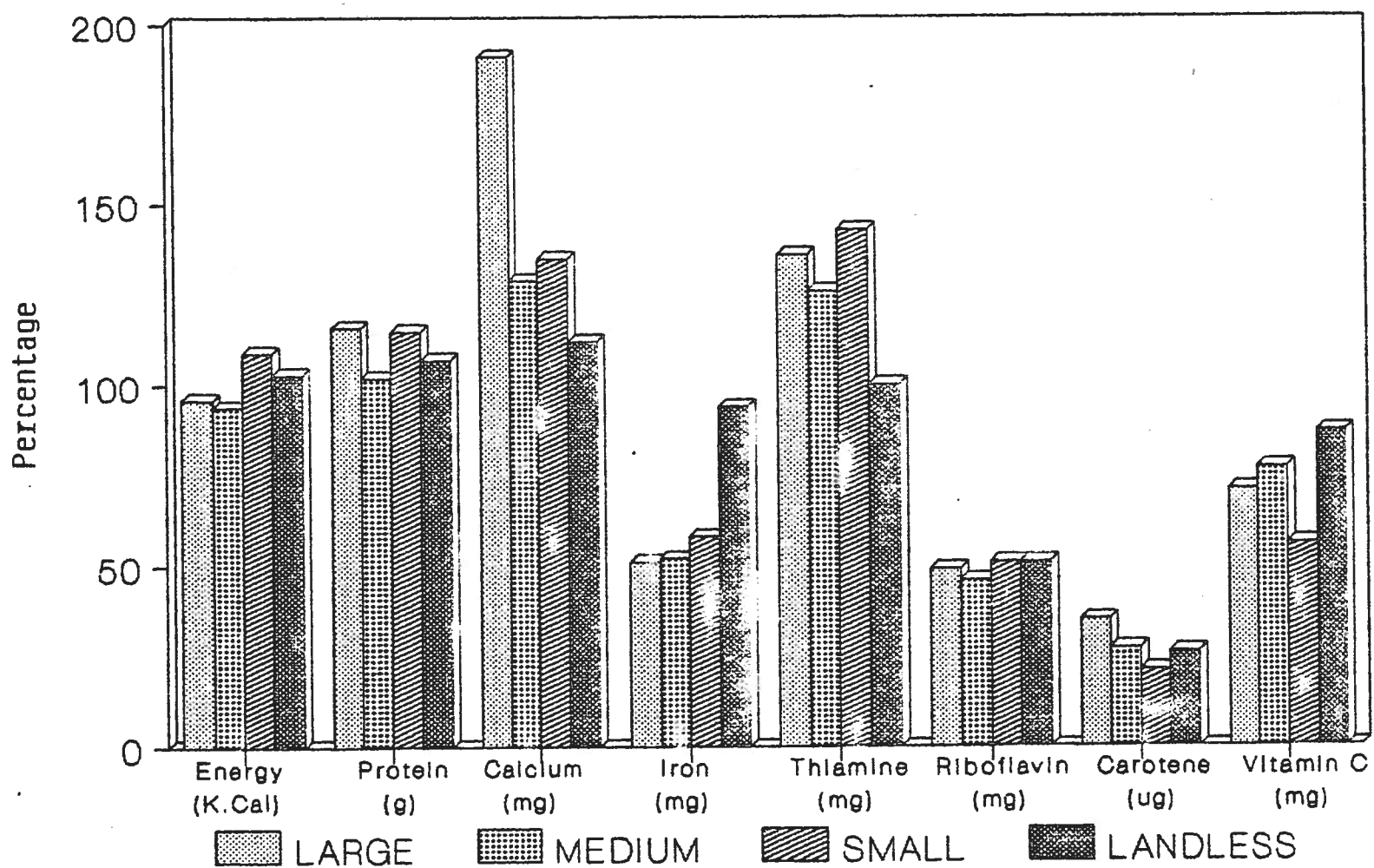


Fig.8: Per cent nutrient adequacy of Visakhapatnam district

Table 17. Nutrient contribution of spices in Guntur district

Category	No. of families, C.U.	Nutrient source	Energy K.cal.	Protein g	Calcium g	Iron mg	Thiamine mg	Riboflavin mg	Carotene ug	Vitamin C mg
Large	25	From total diet	2509+416	63.4+15.8	946+254	14.3+2.9	1.6+0.4	0.7+0.2	1122.3+499.0	42.9+22.0
	5.2	From spices and condiments	62.8+16.6	2.20+0.5	49.8+18.0	2.3+0.7	0.1+0.0	0.1+0.0	57.9+17.2	11.5+3.1
		% contribution	2.5	3.5	5.3	16.2	5.1	10.7	5.2	26.8
Medium	25	From total diet	2213+383	57.8+9.5	805+261	13.4+2.3	1.6+0.2	0.6+0.2	935.5+613.3	31.4+18.9
	4.6	From spices and condiments	72.3+38.4	2.54+1.2	54.4+26.6	2.8+1.7	0.1+0.1	0.1+0.1	65.3+30.2	15.4+11.6
		% contribution	3.27	4.4	6.8	20.8	6.5	14.7	7.0	49.1
Small	25	From total diet	2129+458	57.3+9.8	757+340	13.4+2.3	16.0+0.3	0.6+0.1	849.5+613.3	28.8+24.2
	4.0	From spices and condiments	80.4+21.9	2.7+0.7	61.3+10.6	3.3+1.0	0.1+0.0	0.1+0.0	72.4+20	18.9+6.6
		% contribution		4.7	8.1	24.3	7.1	17.2	8.5	65.7
Landless	25	From total diet	2275+462	63.2+13.5	506+102	15.6+2.4	1.8+0.3	0.7+0.1	702.7+486	28.8+18.3
		From spices and condiments	78+23.4	2.9+0.9	54.8+75.7	2.9+1.0	0.1+0.0	0.1+0.0	66.6+22.5	23.1+1.6
		% contribution	3.4	4.6	10.8	18.8	7.7	15.3	9.5	80.2

requirement, 5 to 8 per cent of thiamine requirement and 5 to 9.5 per cent of carotene requirement was met by the spices (Fig.9). The lower the land holding, greater was the nutrient contribution by the spices in Guntur.

Like in Guntur, in Visakhapatnam also spices contributed mainly to micronutrients rather than to macronutrients (table 18). It was observed that 14-23 per cent of vitamin C requirement, 13 to 14 per cent of iron requirement, 7 to 9 per cent of calcium requirement, 7 to 12 per cent of carotene requirement and 6 to 9 per cent of riboflavin requirement was met by spices (Fig.10). Here too, lower the land holding, greater was the nutrient contribution by spices in the diet.

4.3 UTILISATION PATTERN OF SPICES

Utilisation pattern of spices was studied by using parameters like frequency of consumption, types of spices consumed, consumption of spices in different physiological conditions and illness.

Frequency of spice consumption showed that spices and condiments like dry and/or green chillies, tamarind, salt, onion with little quantities of cumin, turmeric and mustard were used daily. Coriander, ginger, garlic and pepper were used 2 to 3 times in a week. Fenugreek, cloves and cardamom were used once a week.

Table 18. Nutrient contribution of spices in Visakhapatnam district

Category	No. of families, C.U.	Nutrient source	Energy K.cal.	Protein g	Calcium g	Iron mg	Thiamine mg	Riboflavin mg	Carotene ug	Vitamin C mg
Large	25	From total diet	2267+501	69.5+16.4	754+202	14.3+3.6	1.6+0.3	0.7+0.2	849.7+703.7	28.3+21.9
		From spices and condiments	56.9+34.1	2.1+1.2	50.9+39.9	1.8+1.1	0.1+0.0	0.04+0.0	58.7+52.5	4.1+1.6
		% contribution	2.5	3.0	6.6	12.8	4.3	5.9	6.9	14.4
Medium	25	From total diet	2213+302	61.2+10.9	54.5+15.9	14.5+2.1	1.5+0.2	0.7+0.1	637.2+181.6	30.6+23.4
		From spices and condiments	59.8+22.7	2.1+0.7	46.1+16.5	2.1+1.0	0.1+0.0	0.1+0.0	52.7+19.5	6.1+4.2
		% contribution	2.7	3.5	18.2	14.3	5.3	7.7	8.3	19.9
Small	25	From total diet	2561+431	68.9+10.9	68.9+10.9	16.3+2.4	1.7+0.3	0.7+0.1	493.3+181.6	22.2+9.9
		From spices and condiments	63.3+35.4	2.2+1.2	2.2+1.2	2.3+1.3	0.1+0.0	0.1+0.0	58.2+33.2	5.0+2.7
		% contribution	2.5	3.1	9.4	14.1	4.1	7.0	11.8	22.7
Land less		From total diet	2430+391	64.1+10.8	449+122	16.2+2.1	1.7+0.2	0.7+0.1	623+522	34.9+23.7
		From spices and condiments	61.6+27	2.3+0.9	40.9+16.8	2.1+1.1	0.1+0.0	0.1+0.0	46.6+17.7	8.0+5.6
		% contribution	2.5	3.5	9.1	13.0	8.5	8.5	7.5	23.0

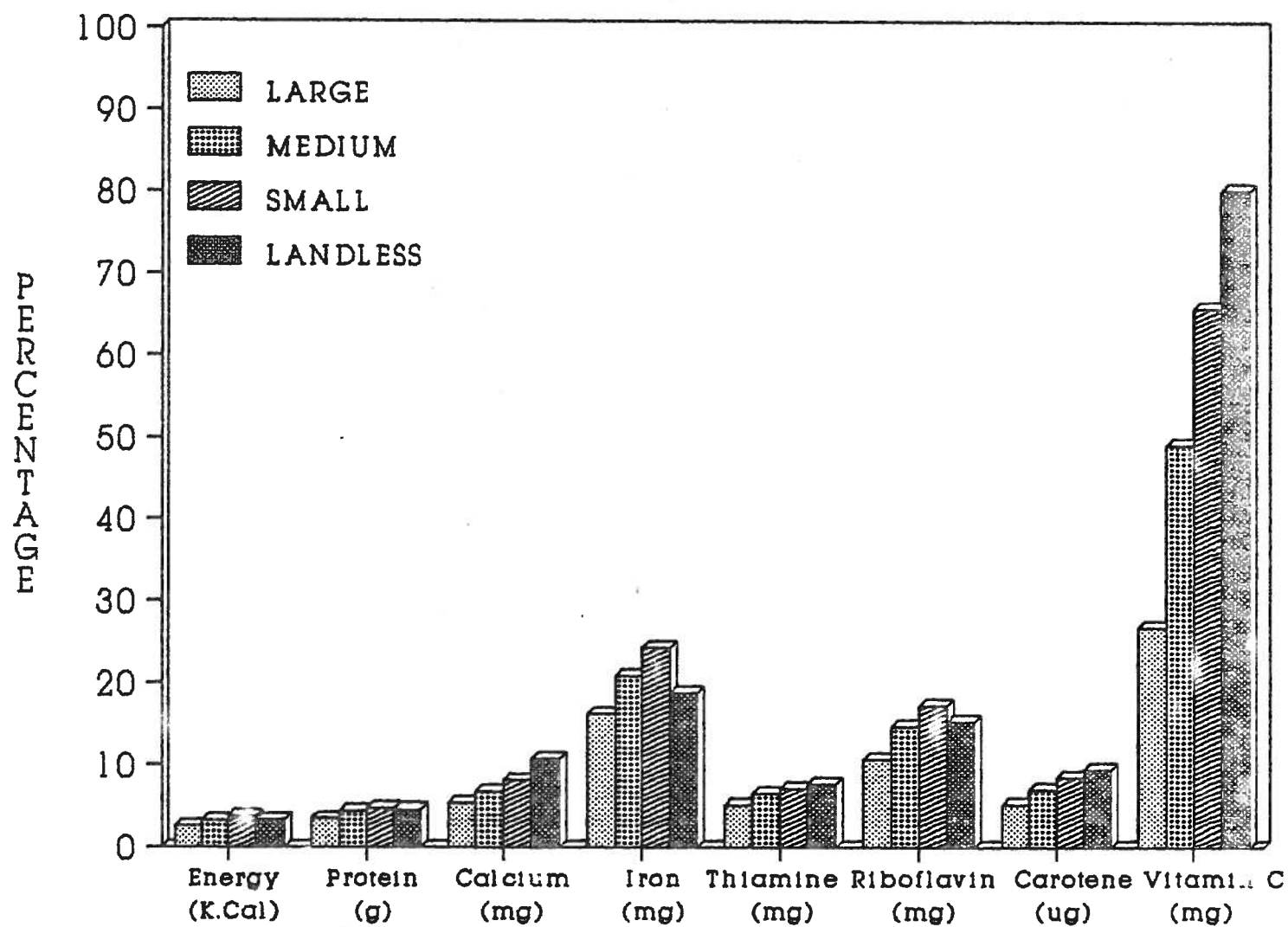


Fig.9: Per cent nutrient contribution from spices in Guntur district

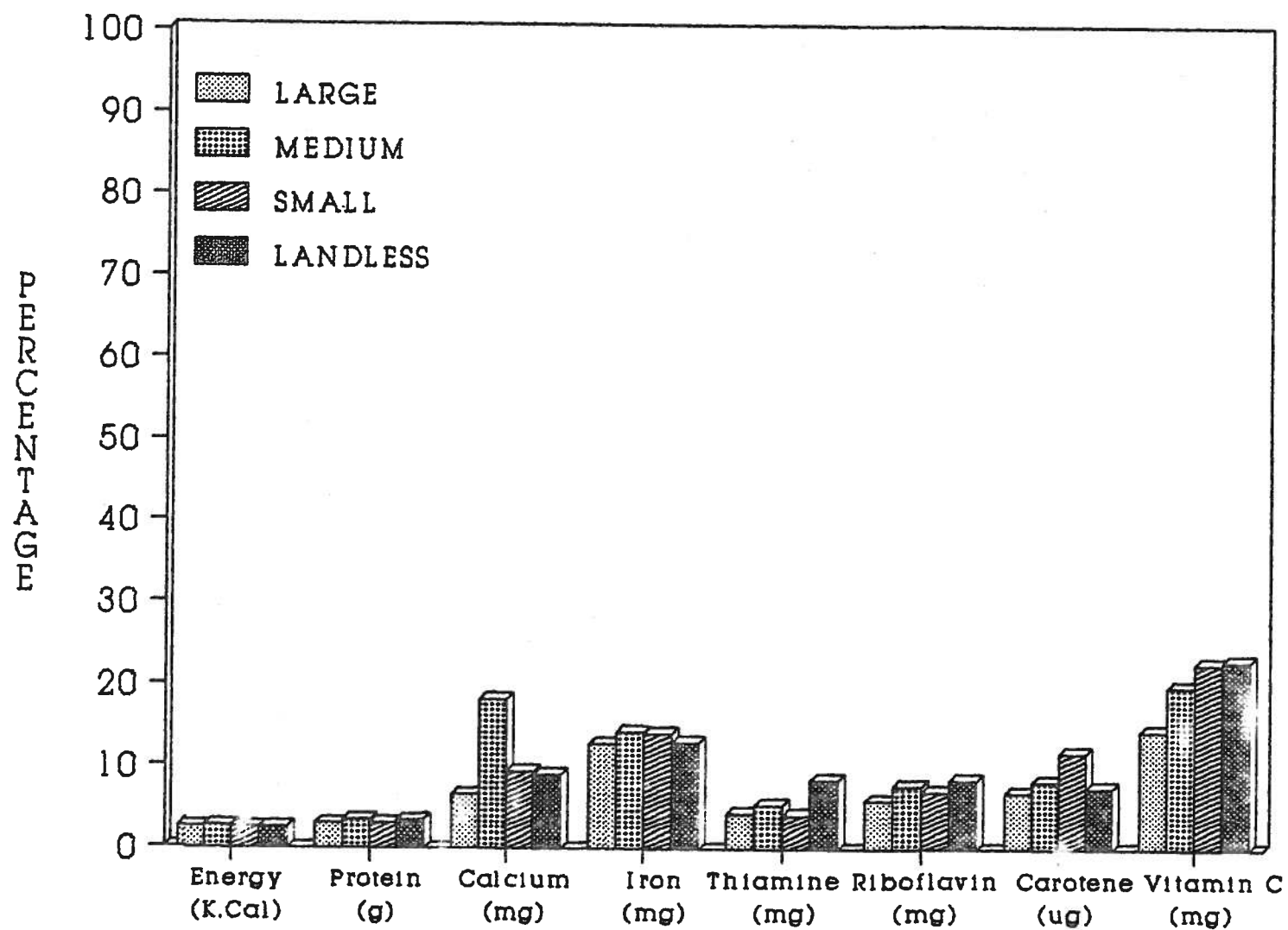


Fig.10: Per cent nutrient contribution from spices in Visakhapatnam district

While consumption of green chillies was frequent and high in Guntur, fenugreek was consumed more frequently in Visakhapatnam. Consumption of ginger, garlic, cardamom and cloves was related to landholding, with landless families consuming low amounts of these spices than other farm families.

Percentages of families using various spices are presented in table 19.

A large variety of spices were consumed by large and medium farmers. It was observed that 90-100 per cent of the large and medium farmers used chillies, tamarind, salt, turmeric, coriander, cumin, onion, cardamom, cloves, pepper and mustard regularly, and small and landless farm families used only chillies, tamarind, salt, turmeric, onion, and mustard regularly. Use of spices like garlic, ginger, pepper, coriander, cardamom, cloves, cumin were high in large and medium farm families and less in small and landless families.

Use of spices in special conditions in Guntur and Visakhapatnam is presented in the tables 20 and 21 respectively.

During pregnancy, use of chillies and salt was decreased both in Guntur and in Visakhapatnam. In addition to these spices intake of mustard was also reduced in Visakhapatnam. The diet of the lactating

Table 19. Per cent families using various spices in the two districts.

Per cent families	Guntur				Visakhapatnam			
	Large	Medium	Small	Landless	Large	Medium	Small	Landless
90 - 100	1,2,3,4, 5,6,10, 11,12,13, 14	1,2,3,4,5, 6,8,9,10, 14	1,2,3,4, 10,14	1,2,3,4,10, 14	1,2,3,4,5, 6,7,10,13, 14,15	1,2,3,4,5, 6,7,10,14, 15	1,2,3,4,5, 6,7,10,14, 13	1,2,3,4,10, 14
80 - 90	8,9,15	13,15	5,6	13	11,12	8,9,11, 12,13		
70 - 80	---	---	8,9	---	---	---	---	---
60 - 70	---	7,11	---	---	---	---	---	---
50 - 60	---	---	13	---	8,9,16	---	---	7,13
< 50	7,16	12,16	15,16	5	---	---	8,9,11,12	5,6,15
< 25	---	---	7,11,12	6,7,8,9,11, 12,15,16	---	16	15,16	8,9,11,12, 16

Note:- 1 = Chillies; 2 = Tamarind; 3 = Salt; 4 = Turmeric; 5 = Coriander seed; 6 = Cumin;
7 = Fenugreek; 8 = Garlic; 9 = Ginger; 10 = Onion; 11 = Cardamom; 12 = Cloves;
13 = Pepper; 14 = Mustard; 15 = Cinnamon; 16 = Omum.

Table 20. Use of spices during special conditions in Guntur district.

Category	Pregnancy	Lactation	Menarche	Infancy
Large	Chillies ↓ Salt ↓	Chillies ↑ Garlic ↑ Onion ↑ Asafoetida ↑	Chillies ↓	Chillies ↓ Salt ↓
Medium	Chillies ↓ Salt ↓	Chillies ↑ Garlic ↑ Onion ↑ Asafoetida ↑	Chillies ↓	Chillies ↓ Salt ↓
Small	Chillies ↓	Chillies ↑ Garlic ↑ Onion ↑ Asafoetida ↑	Chillies ↓	Chillies ↓ Salt ↓
Land less	Chillies ↓	Chillies ↑ Garlic ↑ Asafoetida ↑ Onion ↑	Chillies ↓	No change

Note : ↑ = Increase
↓ = Decrease

Table 21. Use of spices during special conditions in Visakhapatnam.

Category	Pregnancy	Lactation	Menarche	Infancy
Large	Chillies ↓ Salt ↓↓ Mustard ↓	Chillies ↑ Coriander ↑ Cumin ↑ Garlic ↑ Asafoetida ↑ Onion ↑	All spices avoided	Chillies ↓ Salt ↓ Other spices ↓
Medium	Chillies ↓ Salt ↓ Mustard ↓	Chillies ↑ Coriander ↑ Garlic ↑ Asafoetida ↑ Onion ↑	All spices avoided	Chillies ↓ Salt ↓ Other spices ↓
Small	Chillies ↓ Salt ↓ Mustard ↓	Chillies ↑ Coriander ↑ Cumin ↑ Garlic ↑ Onion ↑	All spices avoided	Chillies ↓ Salt ↓ Other spices ↓
Land less	No change	Chillies ↑ Coriander ↑ Cumin ↑ Garlic ↑ Onion ↑	All spices avoided	No change

Note : ↑ = Increase
↓ = Decrease

women in both the districts had more than normal amounts of chillies, garlic, onion and asafoetida. In Visakhapatnam additional amounts of coriander and cumin were also given. At menarche also, while the girls were given diets with lower amounts of spices in Guntur, in Visakhapatnam, spices were avoided totally from the diet. Infants were generally given diet with lower amounts of salt, chillies and other spices.

Spice consumption during illnesses is presented in table 22.

The number of spices used for the treatment of different illnesses were more in Guntur than in Visakhapatnam. Cold, cough, other gastro intestinal problems, like vomiting, diarrhoea, stomach pain, were treated mostly by spices than with any other medicine. While pepper, dry ginger, salt and turmeric were used for treating cold and cough, coriander, omum, cumin, clove and garlic were used for curing GIT problems.

4.4 KNOWLEDGE, ATTITUDE AND PRACTICES

Both in Guntur and Visakhapatnam 70 and 80% of families respectively opined that spices were good for health. Responses elicited on the therapeutic use of spices in Guntur is presented in the table 23.

Seventy five per cent of housewives indicated use of turmeric during skin infections, cold and cough.

Table 22. Spice consumption pattern during illnesses.

District	Cold/ Cough	Vomiting	Diarrhoea	Heart problems	Eye/Worm/Jaundice/ Typhoid/Boils/Measles	Stomach pain	Body pains
Guntur	Pepper ↑ Dry- Ginger ↑ Salt ↑ Turmeric ↑	Coriander seeds ↑ Omum ↑ Cumin ↑ Cloves ↑	Fenugreek ↑ Chillies ↓	Fenugreek ↑ Ginger ↑	Chillies ↓	Omum ↑	Pepper ↑ Ginger ↑
Visakhapatnam	Pepper ↑ Dry- Ginger ↑ Turmeric ↑	Garlic ↑	Chillies ↓	Fenugreek ↑ Ginger ↑	Chillies ↓	Omum ↑	Garlic ↑

Note : ↑ = Increase
↓ = Decrease

Table 23. Knowledge regarding therapeutic values of spices in Guntur.

Spice	% response	Therapeutic use
Turmeric	75	To prevent skin infections, cold and cough
Garlic	35	Relief from body pains and facilitate digestion
Ginger	80	Relief from nausea, vomiting, stomach pain and heart problems
Fenugreek	50	For diarrhoea and heart problems
Ajowan	75	For stomach pain
Pepper	100	For cold and cough

Garlic was used by 25 per cent of the housewives for relieving body pains. Ginger was used by 80 per cent of the families for treating nausea, vomiting and stomach pain. During diarrhoea, fifty per cent of the families gave fenugreek seeds. Ajowan was used by fifty per cent of the population for the treatment of stomach pain. Pepper was used by hundred per cent of the housewives for the treatment of cold and cough.

Responses elicited on the therapeutic use of spices in Visakhapatnam is presented in the table 24.

Turmeric was used by 100 per cent of the housewives to prevent infections, cold and cough. 50 per cent of the housewives used garlic for the treatment of body pains and indigestion. Eighty per cent of the population used ginger for the treatment of nausea, vomiting, stomach pains, ajowan was used by 80% of the population for curing stomach pains. Pepper was used by all for cold and cough. Even for heart problems spices like fenugreek and ginger were used.

Non nutritional use of spices showed that hundred per cent of the families in both the districts used turmeric for decorating the doors and for conducting poojas. Ninety per cent of married women in Visakhapatnam applied turmeric on their faces as cosmetic. This was considered sacred and auspicious.

Table 24. Knowledge regarding therapeutic values of spices in Visakhapatnam.

Spice	% response	Therapeutic use
Turmeric	100	To prevent skin infections, cold and cough
Garlic	50	Relief from body pains and ails in digestion
Ginger	80	Relief from nausea, vomiting, stomach pain and heart problems
Fenugreek	30	For heart problems
Ajowan	80	Relief from stomach pain
Pepper	100	For cold and cough

Attitudes regarding the use of spices in both the districts are presented in table 25.

Spices were used mostly for imparting taste, flavour and colour to the food. Other uses indicated their importance as digestives, anti-infectives and preservatives.

Responses regarding use of spices during the last decade showed that 80 and 70 per cent of the population in Guntur and Visakhapatnam districts respectively had decreased the use of spice in the daily diet in the last ten years.

Most of the families (80%) prepared spice powders at home and only twenty per cent of the population in Visakhapatnam purchased them from shops.

In Guntur district consumption of pickles was high. Though use of pickles had decreased during the last decade in both the districts, the varieties of pickles prepared had increased in both the districts. The main difference between the two districts was that in Visakhapatnam the housewives prepared pickles only once in a year, while in Guntur pickles were prepared as and when they were required. However some pickles like mango, tomato were prepared once in a year.

The survey also revealed that 60 per cent of the families in Guntur and 24 per cent of the families in Visakhapatnam complained of GIT problems.

Table 25. Reasons for use of spices in both the districts of Guntur and Visakhapatnam

Reason	Spices used			
	% fami- lies	Guntur	% fami- lies	Visakhapatnam
Taste	100	Coriander, tamarind, salt, garlic, ginger	100	Chillies, tamarind salt, garlic, ginger, cardamom, cloves
Flavour	100	Coriander, garlic, ginger	100	Coriander, asafoetida, cardamom
Colour	100	Chillies, turmeric	100	Turmeric
Digestion	60	Chillies, garlic, ginger, onion, cardamom	80	Chillies, cumin, garlic, onion
Prevent infection	50	Turmeric	75	Turmeric
Preserve foods	40	Tamarind, salt	30	Tamarind, salt

DISCUSSION

CHAPTER V

DISCUSSION

The results of the study are discussed below:

Among all the districts in Andhra Pradesh, Guntur was found to produce high amount of spices like onion, coriander, chillies, ginger, turmeric and garlic (Season and crop report 1987-88), contrarily in Visakhapatnam low amount of spices were produced. However, the types of spices produced in Guntur and Visakhapatnam were same.

The population structure (Table 7 and 8) of the families in the two districts showed that more than fifty per cent of the population were adult increasing a higher dependency ratio. The population predominantly of young people reflected the impact of a high birth rate and the greater life expectancy, and this structure was typical of a developing country (James et al., 1990). Average family size was found to be more in large farm families than medium, small farm and landless families. This could be attributed to joint family system still prevalent in large farm families. Though extended

families have been found to consume better diets than those of nuclear families, as the family size increases the chances of pre-school child, receiving adequate calories becomes less (Thimmayamma et al., 1978, Visweswara Rao et al., 1971).

The educational data of the two districts (Table 9) showed that members from large farm families in both the districts were better educated. Level and degree of education were both high in these families. Contrarily, higher rate of illiteracy was found in landless families.

The occupational status of the two districts (Table 10) showed that apart from agriculture, the large and medium farm families had other subsidiary sources of income like business, public or private employment or trade. Also better cultivation methods used by these families gave better productivity. This ensured an adequate or more than adequate economic status of these families. Contrarily, the small farm families and landless labourers had insufficient agricultural produce and hence worked mainly as agriculture and non-agriculture labourers. Low educational status of this group of population prevented them from being gainfully employed in public or private sector or from running a business. Consequently unlike the large and medium farm families these people could not enjoy an adequate economic status.

5.1 FOOD INTAKE

Consumption of only a few food items (Tables 11 and 12) was found to be influenced by land holding in both the districts. As the land holding decreased (Figs. 3 and 4) cereal consumption increased and the consumption of other food items like green leafy vegetables, fleshy foods, oil and sugar decreased. It became evident that as income level increased people tended to go in for a variety of protective food items which included milk, egg, meat, fish and fruits. The small farmers and landless families, compensated inadequate consumption of vegetables and animal foods by taking in large quantities of chillies and/or other spices in the form of pickles or powders. This was one of the reason for higher consumption of spices by the small farm or landless families. However, in all the categories of families intake of legumes, green leafy vegetables, roots and tubers, fruits, nuts and oil seeds, fleshy foods, oil and sugar were found to be below the ICMR recommended allowances per adult consumption unit (A.C.U). Thimmayamma et al., 1983 and Madhyastha, 1985 also reported that intake of spices and condiments was found to be correlated with socio-economic status.

5.2 SPICE INTAKE

Consumption of red chillies, green chillies, tamarind, salt and onion was significantly ($P < 0.05$) more than other spices (Tables 13 and 14). The percapita consumption of spices ranged between 43.4 to 66.6 g/day in Guntur district and 27.6 to 27.5 g/day in Visakhapatnam district respectively (Figs. 5 and 6). These values were much higher than the amount reported for the state of Andhra Pradesh and other south Indian States (NNMB 1976-1980). The intake of spices in the present study was also higher than the values reported by Uma Nageswara Rao (1988). The difference could be attributed to difference in the location and heterogeneity of the sample. This could be due to the difference in the type of spices considered, sample size, regional differences in spice production, the state of economy and in particular culinary and social habits. These factors were also reported to affect consumption of spices in different population in an ITC market survey (1977 and 1982) in different countries.

As land holding decreased, the intake of variety of pices also decreased. This was evident from the data, where large farmers consumed a variety of spices like cloves, cardamom, cinnamon and the landless labourers consumed only chillies, salt, onion, turmeric and tamarind, mainly due to the difference in their

purchasing power. This was also supported by Thimmayamma et al. (1983). Wherein families with more than Rs.500/- per month consumed less but varied amounts of spices and condiments than the other income groups. Similar observations have also been reported by Pasricha (1966). In Guntur green chillies were the highest consumed among the major spices and cloves the least consumed spice. Contrarily in Visakhapatnam, dry chillies was the highest consumed spice but here too cloves were least consumed. This was probably due to availability of green chillies in Guntur from cultivators fields at low or no cost.

5.3 NUTRIENT INTAKE

Nutrient adequacy (Table 15 and 16) was not always proportionate to the land holding. The intake of calories, proteins, calcium and thiamine was adequate in all the families. However, intake of iron, riboflavin, carotene and vitamin C was less than the requirements in all the families (Figs. 7 & 8).

Nutrient contribution from spices showed that spices contributed considerably to micronutrients in the daily diet (Tables 17 and 18). It was observed that calcium (5.3 to 10.8%), iron (16.2 to 24-3%), thiamine (5.1 to 7.7%), riboflavin (10.7 to 17.2%), carotene (5.2 to 9.5%) and Vitamin C (26.8 to 80.2%) were contributed by spices. The main source of vitamin C was green

chillies and little quantity was contributed by dry chillies, tamarind, cumin, garlic and onion. Iron was contributed by tamarind, cumin and mustard; thiamine by dry chillies, mustard and cumin; riboflavin by chillies and cumin. Data revealed that among the four groups surveyed, landless labourers were found to be deriving more micronutrients from spices and condiments than others, more so in Guntur district. Thimmayamma (1983) also reported that the contribution of spices and condiments towards vitamin A among the rural families and the families with less or equal to Rs.500/- per month in the urban area was significantly higher than that among the urban group families with more than 500/- per month.

5.4 UTILISATION PATTERN OF SPICES

Frequency of spice consumption showed that while dry, green chillies, salt, tamarind, onion with little quantity of cumin, mustard and turmeric were used daily, coriander, ginger, garlic and pepper were used once in a week. Fenugreek, cloves and cardamom were used less frequently, i.e. once in fifteen days or once in a month.

Fenugreek though consumed in small amounts was consumed more frequently in Visakhapatnam. Consumption of ginger and garlic by landless labourers was less and that of chillies was higher than other farm families.

Though landless labourers did not produce chillies, it was obtained free of cost from the cultivators' fields and hence the consumption was high.

Use of spices like ginger, garlic, pepper, coriander, cardamom, cloves, cumin were high in large and medium farm families than small and landless families (Table 19). Though small and landless families also used those spices they were used by few families in limited quantity. This could be due to lower purchasing capacity of these families. This is also in accordance with the study of Thimmayamma et al. (1983).

Use of dry chillies, turmeric and pepper was mostly in powder form. Garlic, ginger and green chillies were used as paste. Other spices were used as such or in some other forms like powders or paste. Similar observations were also made by Thimmayama et al. (1983), Madhyastha (1985) and Uma Nageswara Rao (1988).

5.5 UTILISATION OF SPICES IN SPECIAL CONDITION

During pregnancy, use of chillies and salt was decreased in Guntur. In Visakhapatnam, in addition to these spices intake of mustard was also reduced. This was due to fear of large quantity of spice intake would cause abortions. The diets of the lactating women in Guntur district had more than normal amounts of chillies, garlic, onion and asafoetida. In Visakhapatnam

apart from these spices, the consumption of coriander and cumin also increased. These spices were consumed as "Modi Karam", a preparation made from the above ingredients. The increased intake was seen more in the first 15 days after delivery and then decreased gradually in three months. The increased intake of garlic and asafoetida was because they were considered as galactogogues. The increased intake of chillies, coriander, cumin was for getting the body back to normal condition. Similar observations were made by Padmini (1980), Karuna Rao (1980) and Uma Nageswara Rao (1988), wherein they observed that decreased amount of chillies and ginger were consumed during pregnancy and increased amounts of pepper and garlic were consumed during lactation. Mythili (1980) observed the intake of "Lehyam" a home made medicinal preparation consisting of a variety of indigenous herbs, spices, roots and barks during lactation. Girija and Geervani (1983) also recorded increased use of galactogogues (locally called as 'Modi'), like garlic, pepper, mace, ajowan, pipali (*Piper longum*) and nutmeg during the first 15 days after delivery.

At menarche girls were given diets with lower amounts of spices in Guntur, while in Visakhapatnam they totally avoided the use of spices because it was believed that high intake of spices during menarche would lead to body pains.

Infants were generally given diets with lower amounts of salt, chillies and other spices, mainly due to low spice tolerance and gastro intestinal problems.

Among the common illnesses (Table 22), spices were used as home remedies in the case of cold, cough, vomiting, diarrhoea, stomach pains and body pains. They were used either singly or in combination with some allopathic treatment. The spices used for cold and cough included pepper in most of the cases, followed by dry ginger, salt and turmeric. Karuna Rao (1980) observed the intake of "Sonti Kashayam" (dry ginger extract) and turmeric during common cold. The spices used for stopping vomiting were coriander seeds, omum, cumin, cloves and garlic. In Guntur fenugreek was used for controlling diarrhoea. Omum was used for the treatment of stomach pains. For relieving body pains too, ginger and pepper were being used even though their mode of action was not known. These were tips usually handed down from one generation to the other. With increased use of modern medicines for even the common illnesses, use of these spices has declined rapidly and only families with the older generation women show awareness of the different use of spices in illness. Some spices like fenugreek and garlic are also being used by some families for patients suffering from heart problems.

5.6 KNOWLEDGE, ATTITUDE AND PRACTICES

Spices were used mostly for imparting taste, flavour, colour and for preservation of foods (Table 25).

Most of the families in both the districts opined that spices were good for health, mainly due to their medicinal values. Most housewives believed that spices like ajowan and garlic could be used for treating ailments like indigestion; turmeric to cure or prevent skin infections, cold and cough; garlic for relief from body pains; ginger for relief from nausea, vomiting, stomach pains and heart problems and pepper to cure cold and cough (Table 22).

In both the districts there was a decrease in the consumption of spices in the last decade. This was due to greater urban impact on the rural families, wherein, reduced use of spices is being advocated for maintaining good health. This was also supported by the observations reported by FAO (1962) that there was decreased per capita consumption of main spices in selected countries i.e. Canada, France, Germany, India, Indonesia, Italy, Sweden, United Kingdom and United States from 1937 to 1960.

Most of the families (80%) prepared spice powders in their houses, while twenty per cent purchased spices from the shops.

The use of pickles was more in Guntur than in Visakhapatnam, probably due to the differences in food habits. The frequency of pickle preparation was also high in Guntur.

All the families in both the districts were using turmeric for decorating the doors, conducting poojas and as cosmetic.

Though there was difference in the intake of spices in Guntur and Visakhapatnam, the consumption of different spices was observed to be the same in both the districts.

It can probably be assumed that incidence of gastro intestinal problems could be related to spice consumption. This assumption was supported by the fact that 60 per cent of the families in Guntur and 24 per cent of the families in Visakhapatnam complained of gastro intestinal problems. The statistics of the medical intelligence data 1985 of Guntur and Visakhapatnam districts also support this assumption wherein high incidence of gastric ulcers and gastric duodenitis was reported in Guntur. Therefore, it could be concluded that even though there is no definite

evidence of relating incidence of gastro intestinal tract problems with spice consumption, higher intake of spices particularly chillies could be the cause of gastric ulcers, duodenal ulcers in Guntur.

So though spices have several beneficial effects in normal and therapeutic diets, their consumption beyond a certain limit could prove harmful to health.

SUMMARY

CHAPTER VI

SUMMARY

Spices and condiments are virtually indispensable in the culinary art throughout the world. They not only create differences in food but also possess medicinal properties which lead to their extensive use in the Indian system of medicine. Spices are used singly or in combination with other foods in the treatment of loss of appetite, indigestion, nausea, vomiting, dyspepsia, flatulence, diarrhoea, diabetes, heart problems and constipation. Spices and condiments are used for flavouring foods and are also used in perfumery, cosmetic and several other industries. Spices were observed to be good sources of many nutrients particularly in the diets of poor rural families. The percentage contribution of spices to the intake of various nutrients ranged from 1.5 to 14.5 per cent depending upon the nutrients. The contribution of spices towards the intake of calcium, iron and vitamin A in the daily diet of the low income families was reported to be considerable.

As India is the largest producer of spices in the world, it is also the largest consumer. There is no Indian cuisine made without the addition of one or more spices. However, no study carried out so far has documented the actual consumption pattern and knowledge regarding use of various spices in the farm families with respect to economic status and the relation between spice production and consumption. Hence, this study was planned in high and low spice producing areas of Andhra Pradesh with the following objectives.

- to obtain data regarding consumption pattern of different spices in farm families belonging to different socio economic status,
- to compare consumption pattern of spices in high and low spice producing areas,
- to collect information on the knowledge and attitude regarding use of spices and their utilisation pattern, and
- to estimate the nutrient contribution of spices to the rural diet.

Guntur district was found to be the highest spice producing area with a production of 83,412 tonnes per year and Visakhapatnam having low spice production of 21,372 tonnes (Season and crop report 1987-88) and hence these areas were selected as the high and low

spice producing areas. Sample (household) selection was based on the land holding i.e., large (more than 10 acres), medium (5 to 10 acres), small (upto 6 acres) and landless labourers (0 acres).

From each group 25 families were selected purposively. Information was obtained by using a pretested personal interview schedule. Information on the consumption and utilisation of various spices and condiments was obtained through diet survey of 100 families each, in Guntur and Visakhapatnam district.

The results are summarised as follows:

1. In Guntur district it was observed that cereal intake increased as land holding decreased, similarly chilli consumption increased as land holding decreased and there was decrease in vegetable consumption. This showed that chillies in the form of pickle or powders are being substituted for vegetables. In Visakhapatnam also there was increased consumption of spices as land holding decreased. However, this increase was much lesser than in Guntur district.
2. There was considerable (3 to 80%) contribution of micronutrients like calcium, iron, thiamine, riboflavin, carotene and vitamin C by spices and

condiments in the daily diet more so in the landless families. Nutrients like vitamin C was mainly obtained from green chillies, dry chillies and to a little extent from tamarind, cumin, garlic and onion. Calcium was mainly contributed by tamarind, cumin and mustard, thiamine by dry chillies and mustard, carotene by green chillies and cumin.

3. Consumption of red chillies, green chillies, tamarind, salt and onion was significantly more than other spices.
4. The per capita consumption of spices ranged between 43.4 to 66.6 g/day in Guntur district and 27.6 to 37.4 g/day in Visakhapatnam district.
5. As land holding decreased the variety of intake of spices decreased and consequently only dry chillies, green chillies, tamarind, salt and onion were mainly being consumed by the landless families. In Guntur green chillies were found to be highest consumed spice and cloves the least consumed spice. In Visakhapatnam contrarily dry chillies were the highest consumed spice but here too cloves were least consumed.
6. Spices like dry chillies, green chillies, salt, tamarind, onion with little quantities of cumin, mustard and turmeric were used daily. Coriander seeds, ginger, garlic, pepper were used once in a

week. Fenugreek, cardamom and cloves were used once in 15 days or a month. Consumption of green chillies was high in Guntur district. Contrarily fenugreek though consumed in small amounts was consumed frequently in Visakhapatnam.

7. During pregnancy, use of chillies and salt was decreased in Guntur and in Visakhapatnam, in addition to these spices, intake of mustard was also reduced.
8. While the diet of lactating women in Guntur district had more than normal amounts of chillies, garlic, onion and asafoetida, in Visakhapatnam coriander and cumin were also increased.
9. At menarche girls in Guntur were given diets with lower amounts of spices, while in Visakhapatnam they totally avoided the use of spices during this period.
10. Infants were generally given diet with lower amounts of salt, chillies and other spices.
11. Among the common illnesses, spices were used as home remedies in the case of cold, cough, vomiting, diarrhoea, stomach pains and body pains.
12. In both the districts 70, 80 per cent of the families in Guntur and Visakhapatnam districts respectively believed that spices were good for health.

13. In both the districts there was a decrease in the consumption of spices during the last decade.
14. Most of the housewives prepared spice powders at home and only a few purchased from shops.
15. The use and frequency of preparation of pickles was high in Guntur than in Visakhapatnam district.
16. There was no difference in the consumption of different types of spices in both the districts.
17. It was observed that 60 per cent of the families in Guntur and 24 per cent of the families in Visakhapatnam complained of GIT problems.

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APPENDIX I

Spice production in different districts of A.P.

(000 tonnes)

District	Garlic	Onion	Coriander	Chillies	Ginger	Turmeric
1. Srikakulam	--	7457	--	6047	67	5
2. Vizianagaram	--	2540	--	3714	--	1
3. Visakhapatnam	15	4454	1	8275	4500	4127
4. East Godavari	--	2883	107	5597	3	2058
5. West Godavari	--	451	27	11901	--	3295
6. Krishna	1	1335	565	26269	1	5186
7. Guntur	1	9050	1940	53497	117	18807
8. Prakasam	35	4089	2936	15867	1	604
9. Nellore	--	26	186	8847	--	697
10. Kurnool	33	38969	15558	9476	2	2055
11. Anantapur	38	9153	9002	1360	--	17
12. Cuddapah	--	22368	3392	921	--	13959
13. Chittoor	36	1938	52	1676	--	146
14. Rangareddy	225	21498	1281	4948	291	4197
15. Hyderabad	--	3	--	--	--	--
16. Nizamabad	1093	5748	230	5207	325	20144
17. Medak	185	11218	2856	4808	1308	1624
18. Mahabubnagar	93	8401	96	5517	1	87
19. Nalgonda	4	107	349	955	--	14
20. Warangal	96	941	444	13106	--	1413
21. Khammam	2	369	57	43024	4	17
22. Karimnagar	481	2004	43	9600	8	13729
23. Adilabad	184	1671	560	2114	9	6733

Season and crop report (1987-88)

APPENDIX - II

Schedule used to elicit information on the consumption and utilisation pattern of spices in Andhra Pradesh.

Part I

a. General Information

Name of the respondent :

Address of the respondent:

District :

Village :

b. Land holding

Large farmers : More than 10 acres

Middle farmers : More than 5 acres

Small farmers : Below 5 acres

Landless labourers : Nil

c. Family composition

S.No.	Name of the member	Age	Sex	Literacy level	Occupation
1.					
2.					
3.					
4.					
5.					

Part II

a. One day dietary recall

Menu	Raw Ingredients	Amount (g)
Breakfast		
Lunch		
Dinner		
Any other		

b. Quantity of consumption of spices

Spices	Quantity used (g)	
	Week	Month
Asafoetida		
Cardamom		
Chillies dry		
Chillies green		
Cloves		
Cumin		
Cinnamon		
Fenugreek		
Garlic		
Ginger		
Ajowan		
Pepper		
Salt		
Tamarind		
Turmeric		
Mustard		
Others (specify)		

Part III

a. Spices commonly consumed

a

b

c

d

e

f

g

h

i

b. Opinion on the use of spices during special conditions

Condition	Spices used			Reason	Spices used			Reason
	N	L	E		N	L	E	
Pregnancy								
Lactation								
Infancy								
Menarchae								
N = Normal L = Low E = Excess								

c. Opinion on the use of food during illnesses

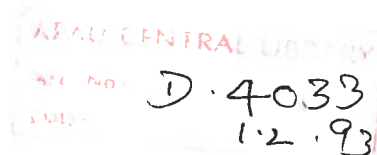
Illness	Spices used		Reason	Spices avoided		Reason
Cold/Cough						
Fever						
Vomiting						
Diarrhoea						

Illness	Spices used	Reason	Spices avoided	Reason
Eye infection				
Worm infection				
Jaundice				
Malaria				
Typhoid				
Boils				
Measles				
Any other (specify)				

Part IV

Knowledge, Attitude and Practices regarding spices

1. Is spice consumption good for health
2. Do you know the therapeutic use of spices and condiments
 - a. Turmeric
 - b. Garlic
 - c. Ginger
 - d. Fenugreek
 - e. Ajowan
 - f. Pepper
 - g. Asafoetida
 - h. Sounph
 - i. Any other
3. What are the non-nutritional user of spices



4. Why should spices be consumed

Reason

Spices used

1. Improve taste
2. Impart flavour
3. Improve digestion
4. Reduce flatulence
5. Destroy bacteria
6. Prevent infection
7. Help to preserve foods

5. Has spice consumption decreased/increased
in the last decade

Yes/No

6. Do you buy/prepare spice powders for
regular use

Yes/No

7. Has usage of pickles increased/decreased
in the last decade

Yes/No

8. How often do you prepare pickles

Once in a year

Twice in a year

As and when required.

9. Is there any Gastro intestinal problem?

Specify: