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RESEARCH REPORT No. 15.



Impact of Supplementary Feeding on the Tribals
of
SRIKAKULAM DISTRICT

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TRIBAL WELFARE DEPARTMENT,
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I N T R O D U C T I O N

To combat malnutrition among Pre-school children, pregnant women and lactating mothers, who are more vulnerable, to the undesirable effects of malnutrition, several nutrition and feeding programmes are in operation in the country. These programmes are mostly sponsored by the Government of India, the State Governments or the CARE organisation. Huge amounts are being spent on the implementation of these programmes, and the fifth plan allocated 530.2 Crores for nutrition programmes.

The Special Nutrition Programme is one of such programmes launched for providing supplementary feeding for pre-school children of tribal areas and urban slums from the year 1970-71.

Though initially meant only for children in the age group 6 months to 3 years, it was extended to all children in the age group 1-6 years, pregnant women and lactating mothers, from 1971-72. About 38 lakhs of beneficiaries are covered through 28,000 feeding centres throughout the country. In Andhra Pradesh 2,06,330 tribal beneficiaries, of whom 1,80,224 Pre-School Children and 26,106 pregnant and lactating women are covered through 3,102 feeding centres, spread over all districts except Nizamabad and Medak, where the tribal population is negligible. Recipes evolved on locally available foods at an approximate cost of 18 paise per child and 25 paise per mother per day, are served regularly to the tribal beneficiaries. Over and above this amount about 5.5 paise per beneficiary per day are provided for overhead charges.

To evaluate the impact of this programme, studies were conducted in various parts of the State. The present study in Srikakulam district is conducted during the months of August-September, 1974.

During 1970-71, when the programme was initiated, there were 54 feeding centres, covering 3 Tribal Development blocks and one community development block, in Srikakulam District. By March 1974, the programme was extended to 18 blocks, with 328 feeding centres serving 23,649 Pre-School children and 3,655 expectant and nursing mothers, which forms about 13% of the total number of beneficiaries in Andhra Pradesh. Tribal communities such as Savara, Jatapu, Khond or Samanta, Konda Dora, Gadaba, Malia, Kotia etc. are benefitted by the programme.

CHAPTER-II

OBJECTIVES SAMPLE SELECTION AND METHODOLOGY

OBJECTIVES:

a) To evaluate the impact of supplementary feeding on the nutritional status of the beneficiary children and mothers.

b) To find out, whether the supplementary diet provided through Special Nutrition Programme is serving as a supplement or substitute to the home diets.

c) To find out the suitability and adequacy of the different supplements served through the programme in the background of the nutritional status of the beneficiaries.

d) To compare the nutritional status of the supplemented beneficiaries with unsupplemented children and mothers of the same area.

e) To findout the relative nutritional status of the tribal children, pregnant and lactating women of Srikakulam district with the other tribal communities of Andhra Pradesh.

SAMPLE SELECTION:

The Special Nutrition Programme is operating in 18 Panchayat Samithis of Srikakulam District, of which 7 Panchayat Samithis, which have less than 10 feeding centres, were excluded from the purview of this study. Out of the remaining 10 Panchayat Samithis 5 were selected on the following grounds.

1) ~~Baravakota~~ Baravakota Samithi for having maximum number of feeding centres (2&3) Pachipenta and Seethampet being Tribal Development Blocks (4&5) Kurupam and Mandasa on the basis of Geographical location, as they are situated away from the other three selected blocks. From all these selected Samithis, one out of every ten feeding centres functioning at the time of this study, are selected at random. From every selected centre, a minimum number of 25% of the total beneficiaries were picked up at random from the attendance registers, covering all age groups, for detailed study.

The Panchayat Samithis, feeding centres and the number of beneficiaries studied are as follows:

Panchayat Samithi	No.of feed- ing centres functioning	No.of feed- ing centres selected	Beneficiaries covered by the study	
			Chil- dren	Mothers
Sargavakota	55	Burujuvada	19	4
		Degalapaluru	26	2
		R.K.Puram (Jarali)	14	..
		Nautala	8	6
		Nallabonthu	19	4
		Kodukoligam	23	4
			109	20
Seethampet	46	Mogadara	20	8
		Chilakam	30	11
		Podi	24	4
		Kosangi	21	5
		Darapadu	21	5
			116	33
Pachipenta	25	Errasamantha Valasa	30	19
		Kothavalasa	30	11
		Gangannadora Valasa	18	5
			78	35

Mandasa	23	Cheepi	19	3
		Bathupuram	26	4
		Singupuram	18	3
			-----	-----
			63	10
			-----	-----
Kurupam	18	Ramabhadra- puram	45	28
		Kitchada	26	4
			-----	-----
			71	32
			-----	-----
Grand Total Pre-School Children			437	
Mothers			130	

For purposes of comparison, 12 villages which have no feeding centres are selected from the same Samithi areas and a total of 145 unsupplemented children, 25 unsupplemented pregnant women, 20 unsupplemented lactating mothers and 65 non-pregnant, non-lactating women, are covered in these villages. The age and sex specific coverage was presented in Table No.I.

•TABLE NO. I•

TRIBE WISE COVERAGE OF PRE SCHOOL CHILDREN, PREGNANT AND LACTATING MOTHERS
(SUPPLEMENTED AND UNSUPPLEMENTED).

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Age- Group	6-12 Months				1-3 years				3-6 Years				Pregnant Women		Lactating Mothers		Non Lactating Mother and Pregnant women un-supplemented	
	Suppl		Un-Suppl.		Suppl.		Un-Suppl.		Suppl.		Un-Suppl.		S.	U.S	S	U.S		
	B	G	B	G	B	G	B	G	B	G	B	G						
Savara	9	7	3	1	21	26	7	4	55	47	17	21	24	11	18	8	26	
Jatapu	7	13	2	4	34	35	7	4	39	34	11	10	16	10	33	9	16	
Gadaba	6	2	2	-	8	8	8	5	16	10	9	11	6	3	10	2	23	
Konda Dora	1	1	-	-	4	7	2	-	11	6	3	3	3	1	1	1	-	
Samantha	2	1	-	-	7	6	-	-	8	6	-	-	5	-	14	-	-	
Total:	25	24	7	5	74	82	24	13	129	103	40	45	54	24	76	20	65	

Suppl:- Supplemented,
S:- "

Unsuppl:- Un-Supplemented, B: Boys, G: Girls.
U.S.:- "

METHODOLOGY:

Individual dietary intake was assessed by questionnaire method, with the help of standardised cups and spoons. The mothers in the case of the children and the beneficiaries themselves in the case of pregnant and lactating women were asked to recall the diet consumed during the previous day. Breast feeding habits and particulars of births and deaths were collected direct from the mothers. The Nutrient intake was calculated with the help of tables from the "Nutritive value of Indian Foods", I.C.M.R. Special Report series No.42(1972). The recommended allowances are those suggested by the I.C.M.R.(1971). The allowances for pregnant and lactating mothers were those suggested for non-vegetarians doing moderate work, as all the women covered in the study were found to do moderate to heavy work on all days of the week.

Anthropometry:- Conventional landmarks and techniques were used in recording anthropometry. Height in cms. was recorded with an anthropometer, while weight in Kgs. was recorded with a portable balance. Circumferences of head, chest and midarm,

in cms. were recorded with the help of a flexible tape. Fat fold thickness at the middle of the triceps was measured in mm., with a special calipers. The heights of very young children, who could not stand were recorded with the help of an infantometer.

Nutrition deficiency signs:-

The techniques used to record the Nutrition deficiency signs were those suggested by D.B.Jelliffe (1966).

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CHAPTER-III

TRIBAL COMMUNITIES COVERED AND THEIR DIETARY HABITS

Five predominant tribal communities, namely Savara, Jatapu, Gadaba, Samantha or Khond and Konda Dora, living in the study area are covered in this study.

The Savaras, one of the Principal tribal groups of this district are also distributed in the Ganjam and Koraput districts of the neighbouring Orissa State. There are two types of Savaras in this district. The hill Savara, who practice Podu cultivation on the hill slopes and the Kapu Savara, who live on the low lands eking their livelihood as agricultural labourers or as settled agriculturists. Both the groups supplement their diet by hunting and food gathering. The hill Savaras are also growing turmeric, bananas and ginger on the hill slopes. They are usually very superstitious and the most backward of the tribal communities of this district.

The Jatapu practise terrace cultivation. They raise paddy by bunding the hill streams in an ingenious way and also practice podu cultivation and collect minor forest produce to supplement their diets.

The Samanthas, who are also known as Khonds are linguistically and racially different from other tribal communities. They speak 'Kui' dialect, which belongs to Dravidian language family. They practice podu as well as settled cultivation and raise Redgram, Blackgram, Millets, Ragi, Chillies and Sweet Potatoes in their fields. Collection of minor Forest Produce forms an important supplementary occupation.

The Gadabas are a Mundari speaking people inhabiting the Pachipenta, Parvatipuram and Salur blocks of Srikakulam district and the adjoining areas of Golconda agency, namely Chodavaram and Sungavarapukota taluks of Visakhapatnam district. They were originally Palanquin bearers of the local Rajas and have been awarded gift lands. They are skillful weavers and the occupation acquired such an importance in their social life that no 'Gadaba'

girl is considered to be qualified for marriage, unless she acquires the requisite skill in weaving. They also take up Podu cultivation, collection of Minor Forest Produce and hunting. Now a days many of them are engaged as stone cutters, agricultural labourers and as farm servants.

The Konda Dora is a Telugu speaking, community inhabiting the agency areas of Srikakulam, Visakhapatnam, East Godavari and West Godavari Districts. They are prinapally Podu cultivators.

DIETARY HABITS:

Ragi, Rice and a millet locally known as 'Vooda' are the staple cereals consumed by the tribal folk of this district. Other cereals consumed are 'Samai', Sorghum and Italian millet. Generally they consume mixed cereal diets such as Ragi and Rice, alternately in the morning and evening. It is very common for them to consume 'Pakali' early in the morning which is the cooked rice of the previous night preserved with much Kanji (gruel). This is eaten with dry chillies. The midday meal generally consists of Ragi or other millets, cooked in different forms alongwith vegetable or dal curry. The

cereals are cooked in any of the following ways.

If the dry cereal flour is added to boiling water stirring it thoroughly till it attains a semi solid consistency it is called 'Topa', which may be eaten simply with chillies and salt or with vegetable curry.

'Ambali' is the most popular cereal dish consumed by all tribals, which can be prepared out of any

cereal preferably 'Ragi'. The flour is soaked in water and usually the dough is left to get itself fermented overnight, and then mixed in boiling

water. This preparation will be very thin in consistency. 'Dappika' is a cereal preparation mixed

with vegetables and leaves. The flour is mixed with boiling water and all sorts of vegetables and leaves are added along with chilly powder and salt.

The preparation can be consumed without any other side dish. 'Kanji' or gruel is a very thin cereal dish prepared in times of cereal scarcity, to serve the little quantity of available cereals to all members of the household. The cereal flours or

broken rice, is cooked with large quantity of water and eaten simply with salt. This forms the diet for convalescents and invalids also. "Puttu" is a steam cooked preparation and is one of the popular dishes. To prepare "puttu", the flour is soaked in water, and rolled into small balls. These balls

are kept over conical baskets made of* "Adda" leaves and steam cooked over boiling water. They also add jaggery to sweeten this preparation.

Pulses like wild Redgram, Horsegram, cow pea, French beans etc. are also consumed in small quantities. The pulses are cooked either as thin soups with tamarind pulp or as dals with chillies or mixed dhal curries with vegetables. Many varieties of green leafy vegetables, wild as well as cultivated are liberally consumed. Notable among them are 'Pumpkin' leaves, cannabis hibiscus (Gongura), Gurugu, Amaranth, (Spiny and other varieties) 'Sirikura', Bamboo shoots etc. The bamboo shoots are cooked in any gruel to remove the bitterness. Vegetables like pumpkin, Brinjal, Cucumber, Papaya, are also eaten occasionally.

During times of scarcity they supplement their diets with a wide variety of wild roots, and tubers namely 'Pindidumpa'. Teega Dumpa, Pandeiga Dumpa, Pulidumpa (Tucca Pinnatifida) and 'Chedudumpa'. The chedu dumpa is a bitter root and has to be sliced, cooked and washed repeatedly several times to make it palatable. Other roots and tubers are consumed raw, roasted over fire or cooked.

*Bauhinia Vauhili, a giant creeper.

This area is not abundant in Jack fruit, hence this fruit does not form an important source of food as in the case of Visakhapatnam and Godavari agency areas. Mango and Toddy are available abundantly during the summer season and form the main stay for most of the tribal households. During the months of May and June the ripe mango fruits are eaten and the seeds are carefully preserved in their backyards for future consumption. During the months of July and August these seeds are broken and the Kernels are stored in 'Adda' leaf baskets till they turn black and then Pounded into small particles. This pounded seed is kept in running streams overnight, thoroughly washed and dried. The process of washing drying and pounding continues for about 5 to 6 days, when the bitterness is completely removed. Then the powder is stored in baskets for consumption. This stuff is called 'Tenkupittu' (Seed powder) and is used to prepare 'Roti' or 'Ambali' just like any other cereal powder. Most of the tribal families survive only on these seeds for about 2 to 3 months in the year.

All these tribal communities are flesh eaters and consume hunted mutton as well as flesh purchased from the Shandies. However, their chances of eating mutton are only once or twice in a month.

Milk and milk products are not consumed by them, as they traditionally believe that it is a sin to deprive the calf of its mothers milk. However, there is no taboo over milk consumption. They have not developed a taste for milk products inspite of the contacts with outsiders. However consumption of tea is becoming popular.

The habit of drinking intoxicants is very common. Mohwa liquor and Toddy (Salphi) are consumed in excess quantites during the seasons. Besides, they prepare indigenous beers from cereals such as Rice, Ragi and Samai. To prepare the beer, the cereals are cooked well and fermented for about five or six days, after adding a starter, and filtered in a cloth and then diluted with more water. These beers are considered to have curative properaties and cooling effect on the body. Similarly, they ferment the Mango juice and prepare liquor.

Generally, they eat three meals a day.
 Pakhal* forms the breakfast, Ragi for lunch and
 Rice for Supper.

CHILD FEEDING HABITS:

Ragi or Sama gruel forms the first weaning food. After a few months they are fed with the same foods as that of their elders.

FOODS DURING PREGNANCY AND LACTATION:

Usually no special foods are given during pregnancy, except some sweets presented by the husband or her parents to please the woman; if they can afford. The woman attends to her routine work till the time of delivery. After delivery the woman is usually fed with rice and chilly powder or Ragi gruel for about ten days or so. Then she gradually resumes normal diet.

The lactating women consume the same foods as that of the other members of their families. If the mother's milk is not sufficient for her child she consumes 'Paladumpa' a variety of tuber supposed to increase lactation.

* Fermented Food.

NUTRITION STATUS OF THE PRE SCHOOL CHILDREN

BREAST FEEDING HABITS:(Table No.2)

Breast feeding starts from the second day of delivery and continues till the mother conceives. They believe that mothers milk is superior to all other foods. Supplementary feeding usually starts around the sixth month, as the mother usually goes to the fields or into the jungle, leaving the child in the care of old women or older children. Usually Ragi or Samai gruel mixed with salt or Jaggery is given to the child as the first weaning food.

In the supplemented sample nearly half of the children are receiving supplementary food(gruel) besides breast milk even in the age group 6-12 months. However about 29.41% of the children in the age group to 1½ years and about 13.72% of the children in 1½ to 2 years age group are still exclusively breast fed.

TABLE NO.2

AGE SPECIFIC DISTRIBUTION OF PRE SCHOOL CHILDREN ACCORDING TO FEEDING HABITS

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Feeding Habit	Age Group						
	6-12 months	1-1½ Years	1½-2 Years	2-3 Years	3-4 Years	4-5 Years	5-6 Years
Breast Feeding							
Supplemented	51.02	29.41	13.72	..	..	..	..
Un-supplemented	56.66	11.11	11.11	..	..	..	..
Least Feeding with Supplements							
Supplemented	48.97	64.70	80.39	57.74	18.94	7.59	1.72
Un-supplemented	33.33	38.83	88.88	52.63	25.92	..	..
Fully weaned							
Supplemented	..	5.88	5.88	42.25	81.05	92.40	98.27
Un-supplemented	..	..	..	47.36	74.07	100.00	100.00

All numbers represent percentage distribution.

Complete weaning does not start in any case before completing one year. About 5.88% of the children are fully weaned between 1 to 2 years of age, which rose to 42.25% in the 2-3 years age group and 81.05% in the 3-4 years age group. It is interesting to note that a few children are being breast fed even after the completion of the 4th year.

The children who were not covered by the supplementary feeding programme do not show any significant differences with the supplemented ^{breast} children in the / feeding and weaning practices except that the percentage of children breast fed with supplements is higher in the lower age group.

DIETARY INTAKE:

Individual home intake of different foods are collected from a random sample of 388 pre-school children covered by the Special Nutrition Programme and 122 pre-school age children who are not covered by any supplementary feeding programme. Children below one year, who are mostly fed on breast are excluded.

The mean intakes of various items of foods age wise are presented in Table No.3 for the supplemented and unsupplemented children.

TABLE NO.3

MEAN INTAKE OF FOODS BY SUPPLEMENTED AND UNSUPPLEMENTED CHILDREN AGE WISE

Foods in (Gms)	6-12 months		1-1½ Years		1½-2 Years		2-3 Years		3-4 Years		4-5 Years		5-6 years	
	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.
Cereals	19.97	16.58	42.62	45.22	54.64	59.40	99.51	95.04	145.17	118.34	164.56	221.42	172.54	152.2
Pulses	..	..	1.54	..	3.23	..	9.81	1.36	3.80	2.14	1.39	7.62	3.51	..
In Vegetables	9.56	12.75	35.06	28.00	60.82	83.00	76.56	77.27	137.30	104.79	162.17	125.62	123.78	195.7
Vegetables	..	..	..	..	0.82	..	1.62	..	0.96	10.03	1.43	2.67	0.27	4.3
Seeds and Nuts	7.74	15.41	13.20	26.66	27.86	24.00	54.16	66.36	48.50	42.35	54.84	13.50	20.92	99.3
Roots and Tubers	0.28	2.33	2.05	2.66	12.90	2.40	9.55	4.81	21.18	3.66	8.07	8.22	10.24	5.3
Flesh foods	..	..	..	..	1.93	..	0.08	..	..	1.78	1.33	..	8.09	..
Fruits	0.68	11.25	..	..	2.55	..	5.40	18.18	7.09	24.10	10.31	24.12	14.59	59.4
Milk(ml)	0.39	..	0.66	..	3.04	..	2.97	..	1.29	0.71	2.35	..	0.90	..
Oil	0.19	..	..	0.44	0.04	..	0.05	0.51	1.00	0.17	0.21	0.78	0.90	.
Sugar	..	2.50	1.00	..	0.65	..	1.01	..	1.29	1.07	1.76	0.50	0.68	1.
Spices	1.13	6.08	6.24	7.88	5.26	10.60	12.48	15.09	14.81	14.68	15.78	24.90	17.70	24.1

S = Supplemented
U.S. = Unsupplemented

The Principal item of food consumed is cereals and the consumption ranges from 19.97 gms to 172.54 gms among the supplemented children and 16.58 gms. to 220.78 gms. among the unsupplemented children. Leafy vegetables, seeds and nuts (especially mango seed) are the next important sources and are actually substituted, whenever a scarcity of cereals is felt. The intake of cereals is observed to increase sharply after the 2nd year, as it is the period when most of the children are fully weaned. The intake of Leafy vegetables is almost equal to the cereal intake in the higher age groups, while seeds and nuts form about $\frac{1}{2}$ the quantity of their cereal intake. The intake of roots tubers and fruits is considerably more among children who have crossed their 2nd year.

The food intake between the supplemented and unsupplemented children, taking cereals, leafy vegetables, seeds and nuts as a whole, show that whenever the intake of cereals is less it is found to be substituted with higher intake of leafy vegetables or seeds and nuts.

The mean intake of foods among the supplemented and unsupplemented Children pooled together into three age groups viz. 6-12 months 1-3 years and 3-6 years (Table 4) also does not exhibit any significant differences. However the intake of cereals among the supplemented children in the 6-12 months age group is slightly more than that of the unsupplemented children, which seems to have been compensated by higher intake of leafy vegetables, seeds and nuts and fruits by the unsupplemented children.

In the age group 1-3 years the intake of cereals is almost similar, while the unsupplemented children show a higher intake of seeds and nuts, fruits and spices.

In the age group 3-6 years, the cereal and fruit intake among the unsupplemented children is more than that of the supplemented children.

On the whole the unsupplemented children seem to take a little higher quantity of home diets than the supplemented children.

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Compared/ I.C.M.R. recommended allowances, the home dietary intake of the supplemented children (Table No.4) are deficient in all foods except,

TABLE NO.4
MEAN INTAKE OF FOODS BY SUPPLEMENTED AND UNSUPPLEMENTED CHILDREN
(GROUPED)

Food (gms)	6-12 Months		1-3 Years		3-6 Years	
	Supple- mented	Un-supple- mented	Supple- mented	Un-supple- mented	Supple- mented	Unsupplemented
Cereals	19.97	16.58	74.37	74.88	159.33	170.99
Pulses	..	..	6.14	0.83	2.88	3.76
L.Vegetables	9.56	12.75	63.44	65.75	142.31	139.53
Vegetables	..	..	1.05	..	0.94	3.99
Seeds and Nuts	7.74	15.41	37.90	51.22	43.25	47.62
Roots and Tubers	0.28	2.33	9.07	3.66	13.66	11.95
Flesh foods	..	..	0.63	..	2.65	0.51
Fruits	0.68	11.25	3.44	11.11	10.24	34.69
Milk and Milk Products(ml)	0.39	..	2.53	..	1.79	0.20
Oil	0.19	..	0.04	0.48	0.17	0.27
Sugar	..	2.50	0.90	..	1.29	0.92
Spices	1.13	6.08	9.02	12.66	15.93	21.83

pulses, seeds and nuts and leafy vegetables in the age group 1-3 years and leafy vegetables in the age group 3-6 years. As the tribals are consuming leafy vegetables to substitute their cereal deficiency the intake of leafy vegetables is more than the R.D.A. The intake of pulses is almost negligible but this is compensated very well by consuming large quantities of mango seed (their staple food), thereby making the intake of pulses, nuts and seeds as a class almost upto the R.D.A. Among 1-3 years age group children, the percentage deficiencies in flesh foods, oils and fats, milk and milk products, sugar and jaggery are as high as 98 to 99.8% and that of fruits is 93.12%. These items of foods are very rarely consumed at home. The deficiency in cereals, the main source of their energy is 50% and vegetables including roots and tubers is 66.26%.

Among children in the age group 3-6 years, only the intake of cereals is more than that of the R.D.A. The percentage deficiencies in oils, milk and milk products, sugar and jaggery is 97 to 99.32% as in the case of 1-3 years age group children.

However the percentage deficiency in flesh foods is 91.16% and fruits is 79.5%, which are 8 to 13% less than the lower age group children, which may be attributed to the self collection and consumption of fruit and differential feeding of flesh foods between younger and older children. The deficiency in cereals is 20.33% only and is 30% less than that of the children in the age group 1-3 years. This reveals that the parents did not bother to feed their children with cereal diets as long as they continue to be breast fed.

The analysis of the home diets reveal consumption of ^{no} monotonous diets consisting of cereals, many seeds and leafy vegetables and negligible consumption of protective foods like milk and flesh foods.

NUTRIENT INTAKE:

The available nutrients from the home diets consumed by the pre-school children supplemented and unsupplemented sexes separate are presented in Table No.6

TABLE NO.6

NUTRIENT INTAKE SUPPLEMENTED AND UNSUPPLEMENTED PRE SCHOOL CHILDREN
(SEXES SEPERATE)

Nutrients	Age group 1-3 Years					
	Supplemented	Unsupple-	Supple-	Un-supple-	Supple-	Un-supple-
	Boys	mented Boys	mented Girls	mented Girls	mented B+G	mented B+G
Protein(gm)	16.45	15.55	12.89	15.28	14.64	15.42
Fat(gm)	6.57	4.62	4.69	3.87	5.61	4.25
Carbohydrates (gm)	108.16	121.11	105.82	119.68	106.97	120.37
Calories(d)	514.47	580.35	510.47	578.68	512.43	579.32
Calcium(mg)	291.41	274.97	250.26	209.81	270.48	242.39
Iron (mg)	17.81	16.29	14.19	13.96	15.97	15.13
Vit.A	4736.79	2976.30	4313.00	2022.28	4521.24	2499.29
Thiamine(mg)	0.3622	0.4710	0.8017	0.3179	0.6736	0.3944
Riboflavin(mg)	0.3622	0.2826	0.4019	0.2341	0.3824	0.2583
Nicotinic Acid(mg)	4.33	6.31	3.71	6.88	4.02	6.59

(Contd....)

Nutrients	Age group		3-6 Years			
	Supplemented	Unsupple-	Supple-	Unsupple-	Supple-	Unsupplemented
	B	G	G	G	B + G	B + G
Protein(gm)	22.38	27.12	20.60	23.19	21.60	24.90
Fat (gm)	7.15	6.70	7.21	5.45	7.18	5.99
Carbohydrates(gm)	158.29	178.25	143.25	169.26	151.70	173.18
Calories(c)	744.56	807.33	697.05	807.66	723.73	807.51
Calcium(mg)	430.64	416.97	418.61	357.29	425.36	383.32
Iron(mg)	23.34	20.05	21.70	14.57	22.62	16.96
Vit. A (I.U.)	3325.11	3973.67	3474.75	2883.91	3390.73	3359.23
Thiamine(mg)	0.9050	0.7417	0.7975	0.6727	0.8578	0.7028
Riboflavin(mg)	0.5874	0.5532	0.5531	0.4834	0.5723	0.5138
Nicotinic acid (mg)	6.06	7.82	5.52	6.97	5.82	7.34

B: Boys, G: Girls

The table reveals that the intakes of girls among the supplemented as well as unsupplemented groups is generally lower than that of the boys, indicating some preferential feeding for boys. The relative differences in the intake of calories are very negligible, but differences in the intake of protein are more.

The protein and calorie intakes of the unsupplemented children are generally higher than that of the supplemented children. The differences are 0.78 gms of protein (5.32%) and 67 calories (13.00%) in the age group 1-3 years and 3.3 gms of Protein (15.3%) and 84 calories (11.6%) in the age group 3-6 years over the supplemented children. This indicates that the home diets of the supplemented children are reduced by the parents, in view of their receiving supplementary feeding at the Nutrition centres. However this reduction is only to the extent of 1/4th of the supplementary diet in calories and to about 1/10th and 1/3rd in protein, respectively for the age groups 1-3 years and 3-6 years. Thus about 1/4th of the supplementary diet provided by the Government is serving as a substitute instead of a supplement to their home diets.

Compared to recommended daily allowances (Table No.7) the diets of the supplemented children

TABLE NO.7

RECOMMENDED AND OBSERVED NUTRIENT INTAKE--SUPPLEMENTED PRE SCHOOL CHILDREN

Nutrients	Age group					
	R.D.A.	1-3 years Observed intake	Surplus(+) or Deficit(-)	R.D.A.	3-6 years Observed intake	Surplus(+) or Deficit(-)
Calories(c)	1200.00	512.43	-687.57 (57.29)	1400.00	723.73	-676.27 (48.30)
Calcium (mg)	450.00	270.48	-179.52 (39.89)	450.00	425.36	-24.64 (5.47)
Vit.A.	1000.00	4521.24	+3521.24 (352.12)	1150.00	3390.74	+2240.73 (194.84)
Protein(gm)	17.50	14.64	-2.86 (16.34)	21.30	21.60	+0.30 (1.40)
Iron(mg)	17.50	15.97	-1.53 (8.74)	17.50	22.62	+5.12 (29.25)
Nicotinic acid(mg)	8.00	4.02	-3.98 (49.75)	9.30	5.82	-3.48 (37.41)
Thiamine(mg)	0.60	0.6736	+0.0736 (12.26)	0.73	0.8578	+0.1278 (17.50)
Riboflavin(mg)	0.70	0.3824	-0.3176 (45.37)	0.76	0.5723	-0.1877 (24.69)

Numbers in brackets represent percentage to R.D.A.

are deficient in all nutrients except Vitamin A and Thiamine in the age group 1-3 years and protein, vitamin A, Iron and Thiamine among 3-6 years age group children.

The home diets among children in the age group 1-3 years, meets the requirements upto 91.26% of Iron, 87.74% of Thiamine, 83.66% of Protein, 60.11% of Calcium, 54.63% of Riboflavin, 50.25% of Nicotinic acid; and 42.71% of calories.

Among children in the age group 3-6 years the requirements of Protein, Iron, Vitamin A and Thiamine are completely satisfied. The requirements of calcium are met upto 94.53%, that of Riboflavin up 75.31% that of Nicotinic acid upto 62.60% and that of calories upto 51.70%.

Thus the major difficiencies in their diets are in calories, Nicotinic acid and Riboflavin only. Calcium deficiency observed among the children in the age group 1-3 years may be considerably reduced, when the mothers milk is taken into consideration. These deficiencies are a result of acute under nutrition and absence of milk in their diets.

The home intakes excluding mother milk of all communities (Table No. 8a) of children in the age group 1-3 years are inadequate in all nutrients except vitamin 'A' and Thiamine. The Samantha children are the only exception in having vitamin 'A' deficiency. The Savara, Samantha and Konda Dora children exhibit thiamine deficiency, while it is adequate for Jatapu and Gadaba children. Deficiency in Protein is very high among the Samantha and Savara, while other communities exhibit moderate deficiency. The deficiency in calories is more than 50% for all communities. Mineral deficiencies are comparatively less among the Savara and Konda Dora children. Nutritionally the Samantha and Savara children of this age group are the worse. Usually the Samanthas wean their children late, while the Savaras could not afford to feed their children adequately, in view of their economic backwardness.

TABLE NO.8

RECOMMENDED AND OBSERVED NUTRIENT INTAKE OF SUPPLEMENTED PRE SCHOOL CHILDREN
(TRIBE WISE) (1-3 YEARS)

Nutrients	R.D.A.	T r i b e								
		Savara			Jatapu			Gadaba		
		Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cite	% deficit to R.D.A.
Protein(gm)	17.50	10.48	7.02	-40.11	12.40	5.10	-29.14	13.76	3.74	-21.37
Calories (C)	1200.00	380.00	820.00	-68.33	481.00	719.00	-59.91	611.00	589.00	-49.00
Calcium(mg)	450.00	296.00	154.00	-34.22	234.00	216.00	-48.00	177.00	273.00	-60.66
Iron (mg)	17.50	14.54	2.96	-16.91	13.83	3.67	-20.97	13.84	3.66	-20.91
Vit.A (I.U.)	1000.00	4424.00	..	342.40	4919.00	..	+391.90	3291.00	..	+229.90
Thiamine(mg)	0.60	0.36	0.24	-40.00	0.83	..	+38.33	0.80	..	+33.33
Riboflavin(mg)	0.70	0.25	0.45	-64.00	0.53	0.17	-24.28	0.35	0.35	-50.00
Nicotinic acid(mg)	8.00	3.46	4.54	-56.75	2.08	5.92	74.00	4.37	3.63	-45.37

+ = Denotes Surplus.

(Contd....)

Samantha			Konda Dora			All communities(Pooled)		
Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cite	% deficit to R.D.A.
5.93	11.57	-66.11	13.11	4.39	-25.08	11.51	5.99	-34.22
272.00	928.00	-77.33	529.00	671.00	-55.90	452.00	748.00	-62.33
47.00	413.00	-91.70	201.00	249.00	-55.33	230.00	220.00	-48.83
3.85	13.65	-78.00	14.52	2.98	-17.02	13.34	4.16	-23.7
327.00	673.00	-67.33	1291.00	..	+29.10	3931.00	..	+29.10
0.45	0.15	-25.00	0.38	0.22	-36.66	0.61	..	+1.00
0.48	0.22	-31.42	0.24	0.46	-65.71	0.39	0.31	-4.28
9.76	..	+22.00	3.84	4.16	-52.00	3.49	4.51	-56.37

TABLE NO.3(a)
RECOMMENDED AND OBSERVED NUTRIENT INTAKE SUPPLEMENTED PRE SCHOOL
CHILDREN (TRIBE WISE) (3-6 YEARS)

Nutrients	R.D.A.	Savara			Jatapu			Gadaba		
		Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% deficit to R.D.A.
Protein(gm)	21.30	19.28	2.02	-9.48	19.47	1.83	-8.59	21.75	..	+2.11
Calories(c)	1400.00	633.00	767.00	-54.78	741.00	659.00	-47.07	701.00	699.00	-49.92
Calcium(mg)	450.00	678.00	..	+50.66	283.00	167.00	-37.11	426.00	24.00	-5.33
Iron (mg)	17.50	33.92	..	+93.82	12.08	5.42	-30.97	22.73	..	+29.8
Vit.A (I.U.)	1180.00	5502.00	..	+366.27	1422.00	..	+20.50	330.00	..	+186.44
Thiamine(mg)	0.73	0.77	..	+5.47	1.0719	..	+46.57	0.37	..	+19.17
Riboflavin(mg)	0.76	0.60	0.16	-21.05	0.54	0.22	-28.94	0.57	0.19	-25.00
Nicotinic acid(mg)	9.30	5.77	3.53	-37.95	5.19	4.11	-44.19	5.86	3.44	-36.98

+ : Denotes Surplus

(Contd...)

37	Samantha			Konda Dora			All communities		
	Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% defi- cit to R.D.A.	Obs.in- take	Defi- cit	% deficit to R.D.A.
	23.49	..	+10.28	34.47	..	+61.83	21.60	0.30	-1.40
	834.00	566.00	-40.42	810.00	599.00	-42.78	700.00	700.00	-50.00
	112.00	338.00	-75.11	313.00	137.00	-30.44	463.00	..	+2.88
	11.55	5.95	-34.00	16.68	0.82	- 4.68	23.14	..	+32.22
	2286.00	..	+93.72	3467.00	..	+193.81	3635.00	..	+208.05
	0.78	..	+6.84	0.60	0.13	-17.80	0.86	..	+17.80
	0.73	0.03	-3.94	0.52	0.20	-26.31	0.58	0.18	-23.68
	6.03	3.27	-35.16	7.84	1.46	-15.69	5.46	3.84	-41.29

However significant inter-tribal differences are observed in the percentage deficiencies of various nutrients.

Among children in the age group 3-6 years, (Table 8A) the deficiencies are generally lower than that of the 1-3 years age group children. The requirements of protein are satisfactorily met for all communities except the Savara and Jatapu, who have 9.48% and 8.59% deficiencies respectively. The maximum deficiency in calories is among the Savara (54.78%) followed by Gadaba (19.92%) Jatapu (47.07%), Konda Dora (42.78%) and Samantha (40.42%). Thus the Savara is nutritionally more backward than the other communities of the area.

The requirements of calcium are completely met among the Savara, but other communities exhibit deficiencies ranging from 75.1% among the Samantha to 5.33% among the Gadaba. The Jatapu and Konda Dora have 37.11% and 30.44% deficiencies respectively.

The requirements of Iron are satisfactorily met among the Savara, and Gadaba, while the Samantha has a deficiency of 34%, followed by 30.97% among

the Jatapu and 4.68% among the Konda Dora. As the Savara and Gadaba communities are living on a diet consisting of large quantities of leafy vegetables, rich in calcium and Iron, they did not show any mineral deficiencies.

The requirements of Vitamin 'A' and Thiamine are satisfactorily met for all the communities except the Konda Dora, who have a deficiency of 17.8% of Thiamine. Deficiency of Riboflavin and Nicotinic acid is common to all communities, the Jatapu having the highest deficiency. The deficiency of riboflavin is 28.94% among the Jatapu, 26.31% among the Konda Dora, 25.00% among the Gadaba, 21.05% among the Savara and 3.94% among the Samantha. As the consumption of milk and its products is almost nil among all communities, except Samantha, much variation is not observed in the percentage deficiency of this Vitamin.

The deficiency in Nicotinic acid is 44.19% among the Konda Dora, followed by 37.95% among the Savara, 36.98% among the Gadaba, 35.16% among the Samantha and 15.69% among the Konda Dora.

ANTHROPOMETRY:

To assess the impact of supplementary feeding, the anthropometric measurements of children receiving supplementary food are compared with children who are not receiving any supplementary food, from the same communities and same area. As most of the villages have already been brought under the Special Nutrition Programme, an equal number of unsupplemented children could not be covered.

The differences between the mean anthropometric measurements of boys and girls are not statistically significant. Hence the values are pooled, by age.

LEVELS OF NUTRITION:

As recommended by Jelliff the children are classified into four groups with reference to general standard. Children whose anthropometric measurements are above 90% standard are considered normal, 90-81% standard are placed in the Ist level, 80-71% standard as IInd level, 70-61% standard as IIIrd level and those below 60% standard as IVth level.

The Ist level constitute mild degree, the IIInd and IIIInd levels moderate degree and the IVth level severe degree of malnutrition.

WEIGHT FOR HEIGHT:-

The percentage nutritional levels among supplemented children in the age group 6-12 months in different communities are as follows:

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
90% above (Normal)	6.25	25.00	25.00	66.66	
51-90% (Ist level)	18.75	20.00	37.50	33.33	
71-90% (IIInd level)	50.00	25.00	25.00	..	
61-70% (III level)	25.00	20.00	12.50	..	50.00
60% and below (IV level)	..	..	..	..	50.00

The Samantha children are nutritionally far better than the others and the Konda Dora the worse. The total malnutrition cases are 100.00% for Konda Dora, 88.75% for Savara, 75.00% each for Jatapu and Gadaba and 33.33% for Samantha. Serious cases of IVth degree malnutrition are observed only among the Konda Dora.

In the 1-3 years age group the percentage levels are as follows:

Standard	Savara	Jatapu	Gadaba	Samantha	Konda Dora
90% above (Normal)	10.63	17.39	25.00	7.69	27.27
81-90% (Ist level) Mild	27.65	26.08	31.25	46.15	27.27
71-80% (II level) Moderate	38.29	24.63	18.75	30.76	9.09
61-70% (III level) Moderate	47.02	21.73	25.00	15.38	36.36
50% and less (IVth level Severe)	6.38	10.14	..	..	..

The Gadaba and Jatapu children of this age group exhibited higher standards than the other communities. The lowest standards are exhibited by the Savara children. The Samantha and Konda Dora, who have exhibited higher and far lower standards respectively in the age group 6-12 months did not show such wide variation in this age group. As the children covered in the age group 6-12 months among the Samantha and Konda Dora respectively are only 3 and 2, the relative variations may be

attributed to the small sample covered. Only the Savara and Jatapu communities have serve cases. A majority of the children of all communities exhibit moderate degree of malnutrition.

In the age group 3-6 years the percentage standards are as follows:-

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	24.50	34.72	7.59	44.44	29.41
Ist level	47.05	47.22	38.46	44.44	47.05
IIInd level	26.47	15.27	50.00	11.11	23.52
IIIrd level	1.96	1.38	3.84	..	..
IVth level	..	1.38	..	..	..

All communities except the Gadaba show considerable improvement in the nutritional levels. Nearly a third of the children are normal. Except a negligible number of cases among the Savara, Jatapu and Gadaba, all children are above the IIInd level.

ARM CIRCUMFERENCE FOR AGE:

The percentage standards among the different communities are as follows:

6-12 months

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	..	..	..	..	..
Ist level	6.25	15.00	..	..	..
IIInd level	37.50	45.00	50.00	100.00	..
IIIInd level	56.25	35.00	37.50	..	50.00
IVth level	..	5.00	12.50	..	50.00

The standards of all children are below normal. Nearly all children except the Konda Dora indicate moderate degree of malnutrition. A few children among the Jatapu and Gadaba and a half of the Konda Dora children exhibit severe malnutrition.

1-3 Years

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	..	1.44	6.25	..	..
Ist level	4.25	14.49	12.50	15.38	9.09
IIInd level	40.42	34.78	62.50	69.23	45.45
IIIInd level	48.93	47.84	18.75	15.38	45.45
IVth level	6.38	1.44	..	..	..

All communities show some improvement in the standards, though still most of the children are found to have moderate degree of malnutrition. Savara and Jatapu communities have some severe cases.

3-6 Years

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	..	2.77	..	..	..
Ist level	10.78	20.83	11.53	16.66	17.64
IIInd level	38.23	38.88	61.53	44.44	64.70
IIIrd level	45.09	37.50	23.07	38.88	17.64
IVth level	5.88	..	3.84	..	..

Though this age group shows a slightly higher percentage of children in the Ist level, the general tendency is the same as that of the 1-3 years age children, in having moderate degree of malnutrition for ~~the~~ most of the children.

FAT FOLD THICKNESS AT THE TRICEPS.

With reference to fat fold thickness, the nutrition standards in the different age groups are as follows.

6-12 months

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	6.25	..	..	..	..
Ist level	25.00	40.00	12.50	33.33	..
IIInd level	12.50	15.00	..	33.33	..
IIIrd level	37.50	20.00	37.50	..	50.00
IVth level	18.75	25.00	50.00	33.33	50.00

The depletion in body fat seems to be severe even in this early age. Except a negligible percentage of savara children all are below normal. A majority of the children ~~xxx~~ exhibit moderate to severe degree of malnutrition. The percentage of ^{cases} of severe depletion are as high as 50% among the Gadaba and Konda Dora while the Savara, Jatapu and Samantha exhibit 18.75%, 25.00% and 33.33% of severe cases respectively. It may be presumed that nearly 25% of the children of these communities suffer from severe fat depletion, if allowance is given to sampling errors.

1-3 years

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	6.38	2.89	6.25	..	..
Ist level	17.02	4.34	25.00	7.69	54.54
IIInd level	27.65	27.53	37.50	53.84	18.18
IIIInd level	29.78	27.53	25.00	23.07	9.09
IVth level	19.14	37.68	6.25	15.38	18.18

The percentage of severe cases considerably increased among the Jatapus, while among the Gadaba, Samantha and Konda Dora they reduced appreciably. The percentage of serious cases are the same as that of the 6-12 months age children, among the Savara. A majority of the children of this age group exhibit moderate degree of malnutrition.

3-6 years

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Normal	5.88	4.16	3.84	5.55	11.66
Ist level	26.47	23.61	30.76	27.77	17.64
IIInd level	31.37	23.61	46.15	50.00	29.41
IIIInd level	20.58	22.22	11.53	16.56	23.52
IVth level	15.68	26.38	7.69	..	17.64

About 4 to 6% of the children of all communities except Konda Dora who have 11.66% normal are in the normal range. The children in this age group show some improvement in fat content as the percentage of children in the Ist level are considerably more compared to children in the age group 1-3 years. The percentage of severe cases also are considerably less than the 1-3 years age children.

Not more than 6% of the children in all age groups are found to be in the normal range. Hence as much as 94 percent of the children are malnourished. (Table No. 9)

The nutritional levels of the supplemented children irrespective of age and community with reference to weight for height, Arm circumference and fat fold thickness are as follows:

	Weight for height	Arm circum- ference for age.	Fatfold thick- ness for age
Normal	22.72	0.90	4.77
Ist level	37.27	13.18	21.59
II nd level	26.59	42.95	29.31
III rd level	10.45	39.77	25.40
IV th level	2.95	3.18	20.90

About 3% of the children exhibit severe degree of malnutrition with reference to their weight for height and Arm circumference for age, the depletion of body fat seems to be the more serious symptom as nearly 21% of the sample shows severe degree of malnutrition. This indicates that the children have very little reserve energy in the form of fat. Muscle depletion also seems to be alarming as nearly 83%, of the children show moderate degree of malnutrition with reference to arm circumference.

CHEST/HEAD CIRCUMFERENCE:(Table No.10)

Among the well fed children the overtaking of the chest circumference over the head circumference takes around six months of age. Therefore between the ages of six months to five years a chest/head ratio of less than one may be due to failure to develop or to wasting of the muscle and fat of the chest wall, and can be used as a community indicator of protein calorie malnutrition in early childhood (Jelliffe). Among the tribal children of Srikakulam the overtaking of the chest circumference over the head circumference takes place after the completion of the 3rd year indicating very bad state of malnourishment.

TABLE NO.10

CHEST/HEAD CIRCUMFERENCE INDEX (ALL COMMUNITIES)
(SEXES COMBINED)

Age group	Supplemented			Un-supplemented			P.value
	No. tested	Mean \pm SEM	S.D.	No. tested	Mean \pm SEM	S.D.	
6-12 months	49	0.967 \pm 0.0277	0.1939	14	0.964 \pm 0.04954	0.1854	0.05295 .9 P N.S.
1-1½ years	34	0.9956 \pm 0.0965	0.5628	10	0.9641 \pm 0.00893	0.02825	0.3252 .8 P .7 N.S.
1½-2 years	51	0.976 \pm 0.00004	0.0003	7	0.9961 \pm 0.07377	0.1952	0.2724 .9 P .8 N.S.
2-3 years	71	0.988 \pm 0.00055	0.0047	18	0.97638 \pm 0.01409	0.05982	0.82469 .5 P .4 N.S.
3-4 years	95	1.019 \pm 0.00052	0.0051	35	0.9924 \pm 0.04114	0.2434	0.64657 .6 P .5 N.S.
4-5 years	79	1.041 \pm 0.01721	0.1530	30	1.0229 \pm 0.00658	0.03604	0.99614 .4 P .3 N.S.
5-6 years	58	1.037 \pm 0.00073	0.0056	30	1.048 \pm 0.03405	0.1865	0.33186 .8 P .7 N.S.

N.S. Not Significant.

TABLE NO.11
WEIGHT/HEIGHT² x100 INDEX (SUPPLEMENTED
AND UNSUPPLEMENTED CHILDREN)

Age- group	Community	Average Index+ SCM Suppld.	Un-suppld.	P.Value
6-12 months	Savara	0.132+ 0.006	0.141+ 0.01	
	Jatapu	0.141+ 0.007	0.157+ 0.005	
	Gadaba	0.133+ 0.007	0.151+ 0.018	
	Konda Dora	0.104+ 0.006	..	
	Samantha	0.153+ 0.008	..	
	All commu- nities	0.136+ 0.009	0.152+ 0.006	
1-3 years	Savara	0.137+ 0.006	0.136+ 0.004	
	Jatapu	0.136+ 0.006	0.135+ 0.003	
	Gadaba	0.148+ 0.006	0.136+ 0.003	
	Konda Dora	0.145+ 0.018	0.119+ 0.007	
	Samantha	0.149+ 0.018	..	
	All communi- ties	0.139+ 0.006	0.134+ 0.003	

3-6 years	Savara	0.144 ₊	0.134 ₊
		0.001	0.003
	Jatapu	0.140 ₊	0.126 ₊
		0.002	0.002
	Gadaba	0.132 ₊	0.132 ₊
		0.002	0.002
	Konda Dora	0.137 ₊	0.132 ₊
		0.014	0.007
	Samantha	0.142 ₊	..
		0.011	
	All communi- ties	0.139 ₊	0.132 ₊
		0.002	0.002

²
WEIGHT/HEIGHT ~~2~~ INDEX: (Table No.11)

$\frac{\text{Weight}}{\text{Height}} \times 100$ is an index, based on anthropometric measurements, irrespective of age, and is related clinical nutritional status, and is constant throughout the age period 1 to 5 years (M.C. Swaminathan 1971). Based on the above index, it was observed in I.C.M.R. studies on pre-school children, that this index among apparently normal children is 0.15. Children with signs of protein calorie malnutrition show lower values for this index.

In the present sample the index for 6-12 months, supplemented children is lower than 0.15 except for the Samantha. The standard of the unsupplemented children of this age group is better than that of the supplemented group.

In the age group 1-3 years, the index of the supplemented children considerably improved, while that of the unsupplemented children deteriorated. The index of the supplemented children is better than unsupplemented children in all communities, but none of them are upto the standard.

In the age group 3-6 years the supplemented Savara, and Jatapur children exhibit further improvement, but the other communities exhibit slight lowering of the index over that of the 1-3 years age children. The unsupplemented children show a further lowering of the index. But when all the communities are treated as one unit the index remains at the same level of (0.139) as that of the 1-3 years age children.

The analysis indicates that the nutritional standard of the tribal children of Srikakulam decreases as the age advances. In general the standards are 7 to 10% less than the normal.

The Samantha children are better than all the others, while the Konda Dora are the worse. The improvement among the Savara and Konda Dora children is better than the other communities, as these communities are initially more malnourished than the others. The generally higher standards observed among the supplemented children after the 6-12 months of age is a proof of the impact of supplementary feeding.

NUTRITIONAL DEFICIENCY SIGNS:

The most common deficiency signs observed among children are that of Protein calorie malnutrition, Anaemia, and liver and spleen enlargement. Vitamin deficiency signs are observed only in higher age groups.

Protein calorie malnutrition: Moon face is the most commonly observed sign of this category, the peak of prevalence being 19.73 among the supplemented children and 46.66 among the unsupplemented children, both in the age group 1-2 years. This sign gradually reduced as the age increased. Discoloration of hair also shows similar tendency. Sparseness of hair and easy pluckability sharply increased in the 2nd year and immediately came down in the 3rd year. The symptoms persist even upto the 6th year through in a milder rate. 1-2 years age is the peak period for most of the signs. Serious cases exhibiting Marasmus are found among children upto the 4th year, ranging from 8.00% (0-1 years) to 2.15% (3-4 years) among supplemented children 6.66% (1-2 years) to 4.14% (2-3 years), among unsupplemented children. Oedematic cases are observed among all age groups (except 0-1 among the supplemented children). The incidences

is relatively very high among the unsupplemented children.

Vitamin B-Complex deficiency signs: The manifestation of B Complex deficiency is almost negligible in both the supplemented as well as the unsupplemented children. The incidence is nil upto the 2nd year. Though a few cases are observed in the 3rd year the maximum incidence is observed only as the age advanced. Angular stomatitis is the principal deficiency in this category and observed in about 1.31% of the children in the age group 1-2 years itself and increased to 2.7% in the 3rd year. The symptom persisted in almost the same proportion upto the 5th year. Hypertropic papilla is ~~or~~ more common than Angular Stomatitis and is observed in about 13.04% of the supplemented children in the age group 5-6 years. Among the unsupplemented children this sign is observed only in the 3-4 years age group. Other signs are very mild in incidence.

Vitamin 'A' Deficiency Signs: Ocular manifestations of Vitamin 'A' deficiency are very low in both the supplemented and unsupplemented groups. None of the children exhibited any signs upto the 2nd year.

In the age group 2-3 years 1.35% of the supplemented children developed Bitot spots associated with night blindness. Bitot spot is the more common deficiency and is observed in about 7.52% of the supplemented children in 3-4 years but sharply fell down in the higher age groups. However among the unsupplemented, children in the age group 5-6 years have the maximum incidence of 7.14%. Night blindness is the next important sign with its high prevalence in the age group 5-6 years. Cases of conjunctival Xerosis are confined only to the age groups 4-5 and 5-6 years.

Iron deficiency signs: Pale conjunctiva and Koilonychias of toes are observed though in mildest form in almost all the age groups indicating Iron deficiency. Symptoms of pale conjunctiva started early and increased with age. The incidence among the unsupplemented children is more alarming than the supplemented children.

Vitamin 'C' and 'D' deficiency signs: Spongy bleeding gums are observed in about 2.15 to 2.32% of the supplemented children in the age group 3-6 years, while the unsupplemented group also exhibited this sign in about 4% of the children in 3-4 years of age. Beeding of Ribs, knock knees and bow legs indicate rickets in a milder form.

Other deficiencies:

Enlargement of liver and spleen among the supplemented as well as unsupplemented children indicating poor nutrition and hygiene was observed in a milder degree.

Cases of dental caries are observed, from 3rd year onwards, increasing with age. The incidence is as high as 13.04% in the age group 5-6 years of the supplemented group. The incidence among the unsupplemented children is about 7 to 9% from 3rd year through 6th year. Mottled enamel is observed after the 4th years onwards.

PERCENTAGE PREVELENCE OF NUTRITIONAL DEFICIENCY SIGNS

AMONG CHILDREN

Deficiency Signs	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15
	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.	U.S.	S.
Discoloured Hair	10.00	13.33	18.42	46.66	13.51	29.16	8.60	23.07	9.30	16.66	4.34	3.57	11.05	20.00	
Easily pluckable hair	4.00	33.33	21.05	40.00	6.75	25.00	5.37	19.23	5.81	14.28	6.52	14.28	8.47	21.33	
Sparse Hair	16.00	46.66	26.31	26.66	8.10	16.66	2.15	19.23	4.65	2.38	..	17.85	9.41	17.33	
Moon face	18.00	33.33	19.73	46.66	13.51	16.66	6.45	19.23	9.60	19.04	10.80	21.42	12.47	23.33	
Oedema	..	6.66	5.26	33.33	6.75	4.16	3.22	15.38	2.32	16.66	4.34	3.57	3.76	12.56	
Marasmus	8.00	..	2.63	6.66	2.70	4.16	2.15	..	..	..	..	3.57	2.35	2.00	
Angular Stomatitis	..	..	1.31	..	2.70	..	2.15	7.69	2.32	9.52	..	..	1.64	4.00	
Cheilosis	..	..	..	..	..	..	1.37	..	1.16	..	2.17	3.57	0.70	0.66	
Nasolabial dyssebacea	..	..	..	..	..	..	2.15	..	1.16	..	..	7.14	0.70	1.33	

	1	2	3	4	5	6	7
Scarlet and raw tongue	..	..	..	..	..	..	..
Tongue fissuring	..	..	..	..	..	..	..
Atrophic papillae	..	..	..	..	..	..	..
Hyper tro- phic papi- llae	..	..	..	..	2.70	..	..
Motor Weakness	2.00	..	..	..	1.35	..	..
Bitot spots	..	..	..	..	1.35	..	..
Photo- phobia	..	..	..	..	..	..	..
Night blindness	..	..	1.31	..	1.35	..	..
Pale con- junctive	4.00	..	2.63	13.33	6.75	..	..

8	9	10	11	12	13	14	15
3.22	2.38	..	3.57	0.70	1.33

1.07	..	1.16	3.57	0.47	1.33
------	----	------	----	----	------	------	------

..	2.38	1.33
----	----	----	------	----	----	----	------

2.15	7.69	1.16	..	13.04	..	2.58	1.33
------	------	------	----	-------	----	------	------

3.22	7.69	2.17	..	1.41	..
------	------	----	----	------	----	------	----

7.52	..	3.48	4.76	4.34	7.14	3.05	2.65
------	----	------	------	------	------	------	------

1.07	0.23	..
------	----	----	----	----	----	------	----

..	3.84	2.32	..	8.69	3.57	1.88	1.33
----	------	------	----	------	------	------	------

1.07	15.38	4.65	7.14	6.52	10.71	4.00	8.00
------	-------	------	------	------	-------	------	------

	1	2	3	4	5	6
Conjunctival xerosis
Keratoma- lacia
Dry con- junctiva
Corneal xerosis
Corneal vascula- risation	1.31	6.66	..	..
Knockknees						
Bowlegs
Enlargement of liver	2.00	..	1.31	..	2.70	..
Enlargement of Spleen	2.63	..	1.35	..
Thyroid enlargement
Parotid enlargement	1.35	..

[illegible]

NUTRITION STATUS OF THE PREGNANT AND LACTATING
MOTHERS.

Child mortality, still births and abortions:

The causes of child mortality, still births and abortions are many, but lack of hygienic conditions and maternal malnutrition are important factors. Particulars of past pregnancies, still births, abortions and infant and child mortality are collected from 116 mothers supplemented as well as unsupplemented. These mothers have reported 309 past pregnancies, which resulted in 295 live births, 7 abortions and 7 still births. Live births, stillbirths and abortions constitute 95.47%, 2.26% and 2.26% respectively to the total number of past pregnancies reported. The average past pregnancies per mother are 2.66 and the maximum number of pregnancies reported are 7, which are low compared to 10 among the tribal mothers

of East and West Godavari districts and among the tribal mothers of Adilabad district reported earlier by this Institute. Of the live born 78 children died constituting 26.44% of the live born, which works out to 264.4 deaths per thousand live births, which is almost the same as that of 270 per thousand among Gonds but lower than that of the mothers of Godavari agency which is 319, per thousand live births. The percentage distribution of deaths in different age periods are as follows:

<u>AGE PERIOD</u>	<u>PERCENTAGE OF DEATHS</u>	
Less than 1 week	37.17	} 69.23
1 week to 1 month	5.13	
1 month to 3 months	6.41	
3 months to 6 months	6.41	
6 months to 12 months	14.11	
1 year to 3 years	17.95	
3 years to 6 years	12.82	

This reveals that more than a third of the deaths are occurring in the first week after birth. Infant deaths or deaths among children below one year, constitute 69.23% of the total deaths among the children.

The deaths among children below one year occur as follows:

	Tribals of Srikakulam	<u>I.C.M.R.</u>
Neonatal (under 1 month)	61.10%	44.00%
1-6 months	18.50%	27.00%
6-12 months	20.36%	29.00%

The proportion of neonatal deaths reported to be 45% of the infant deaths (I.C.M.R.) among the Indian population are 16% less than the present sample, indicating poor nutrition and medical facilities among the tribal communities, but the percentage deaths in 1-12 months period are less than that of the I.C.M.R. sample.

FOOD INTAKE:

The percapita intake of foods (Table No.13(a) and (b) among the supplemented and unsupplemented mothers reveal that cereals, leafy vegetables, and seeds are the main items of their diet. Roots and tubers are consumed by pregnant mothers in considerable quantities. Other items of importance are the spices which include chillies, Tamarind etc. consumed in the form of curries or soups. The home dietary intake of the pregnant as well as the lactating supplemented mothers compared to unsupplemented does not show any lesser consumption in the

TABLE NO.13(a)

MEAN INTAKE OF FOODS SUPPLEMENTED AND UNSUPPLEMENTED PREGNANT MOTHERS
(TRIBE WISE)

Foods	T R I B E									
	SAVARA		JATAPU		SAMANTHA		GADABA		KONDA DORA	
	S.	U.S	S.	U.S	S.	U.S	S.	U.S	S.	U.S
Cereals(gm)	350.20	354.00	548.00	580.00	350.20	..	336.00	245.00	429.00	434.00
Pulses(gms)	..	..	5.87	22.00	12.40	..	3.30	..	8.33	..
Seeds and Nuts(gms)	294.30	..	24.25	..	..	..	..	..	..	..
Leafy vegetables (gms.)	326.40	49.80	383.50	267.00	307.20	..	149.50	256.00	100.00	100.00
Vegetables (gms)	11.50	27.60	..	..	..	..	..	..	57.00	..
Roots and tubers(gms)	132.62	2.80	44.87	12.70	13.20	..	4.60	21.00	5.00	10.00
Flesh foods (gms.)	..	..	..	5.50	..	..	..	..	..	..
Milk and Milk products (gms)	3.30	..	..	..	4.00	..	3.30	..	20.00	..

S: Supplemented ; U.S. Unsupplemented.

	Savara		Jatapu		Samantha		Gadaba		Konda Dora	
	S	U.S.	S	U.S.	S	U.S.	S	U.S.	S	U.S.
Oils(gms)	0.46	..	1.56	0.80	..	..	..	2.00	..	..
Sugar and Juggary(gms)	2.50	1.50	..	..	3.00	..	2.50	..	15.00	..
Spices(gms)	39.72	9.20	50.31	23.80	33.00	..	30.63	..	15.00	15.00
Fruits(gms)	1.04	75.00	25.00	..	..	..	..	..	..	..

S. Supplemented ; U.S. Unsupplemented.

principal items of foods. In general the intakes of the supplemented women are higher than that of the unsupplemented women. Wherever differences in cereal intake is observed it is found to be compensated by a higher intake of leafy vegetables or seeds and nuts. The findings did not support any reduction in the home diets as a result of supplementary feeding.

The diets are generally simple and monotonous. The consumption of protective foods like, flesh foods, milk and milk products, vegetable oils etc; are negligible among all communities. The intakes of Jatapu women are generally higher and the intakes of Savara and Gadaba women are generally lower than other communities.

Compared to I.C.M.R. recommended allowances, the home diets of the pregnant mothers (Table No. 14(a)) are adequate in respect of leafy vegetables, roots and tubers among the Savaras; cereals, and leafy vegetables among the Jatapu; leafy vegetables among the Samantha and Gadaba and cereals among the Konda Dora. The intake of other foods are deficient in different degrees.

The percentage deficiency in cereals ranges from 16 among the Gadaba to 12.45 among the Savara and Samantha. The deficiency in pulses is very high

Table No. 14(a) contd.....

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Milk & Milk Products(gms)	225.00	3.30	-221.70 (98.53)	--	-225.00 (100.00)	4.00	-221.00 (98.22)	3.30	-221.70 (98.53)	20.00	-205.00 (91.11)
Fruits(gms)	30.00	1.04	-28.96 (96.53)	25.00	- 5.00 (16.66)	--	-30.00 (100.00)	--	-30.00 (100.00)	--	-30.00 (100.00)
Sugar & Jaghery(gms)	40.00	2.50	-37.50 (93.75)	--	-40.00 (100.00)	3.00	-37.00 (92.50)	2.50	-37.50 (93.75)	15.00	-25.00 (62.50)
Fats & Oils(gms)	35.00	0.46	-34.54 (98.68)	1.56	-33.44 (95.54)	--	-35.00 (100.00)	--	-35.00 (100.00)	--	-35.00 (100.00)

Numbers in brackets denote percentage to R.D.A.

ranging from 100 among Savaras to 77.45 among the samantha. The Konda Dora community is the only exception in having a deficiency of leafy vegetables. The deficiency in vegetables is cent per cent among the Jatapu, Samantha and Gadaba and 84.66% among the Savara. The Konda Dora is the only exception in recording a fairly good intake of vegetables. Roots and tubers consumption is inadequate by 93% among the Konda Dora and Gadaba. Except the Jatapu women, all other communities exhibit very high deficiency of fruits. The deficiency in milk and milk products, fats and oils is more than 90% among all communities.

The intakes of lactating mothers (Table No.14(b)) of different tribal communities show the same tendencies as that of the pregnant mothers, but percentage deficiencies are more than that of the pregnant mothers. The Jatapu women consume adequate quantities of cereals, leafy vegetables and fruits, while the Samanthas consume cereals, and the Savara and Gadabas consume leafy vegetables in adequate quantities. The intakes of all other foods are deficient.

The deficiency in cereals was high among the savara women (44.97%) and mild to moderate among the Gadaba and Konda Dora. The deficiency in pulses is more than 94% except for the Samantha.

(Table No. 14(b) contd...)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
fruits(gmd)	30.00	2.50	-27.50 (91.66)	68.12	+38.12 (128.06)	--	-30.00 (100.00)	--	-30.00 (100.00)	--	-30.00 (100.00)	-30.00 (100.00)
sug-ar & Jaggery(gm)	50.00	3.33	-16.67 (93.34)	--	-50.00 (100.00)	--	-50.00 (100.00)	8.80	-41.20 (82.40)	15.00	-35.00 (70.00)	-55.00 (100.00)
Fats & Oils(gms)	50.00	0.39	-51.62 (99.29)	1.21	-53.76 (97.71)	0.06	51.91 (99.89)	--	-55.00 (100.00)	--	-55.00 (100.00)	-55.00 (100.00)

Numbers in brackets denote percentage to R.D.A.

TABLE NO. 15(a)

Mean intake of Nutrients Supplemented and Unsupplemented.
Pregnant Mother (Tribe wise)

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Nutrients	Savara		Jatapu		Samantha		Gadaba		Konda Dora	
	Suppl.	Unsuppl.	Suppl.	Unsuppl.	Suppl.	Unsuppl.	Suppl.	Unsuppl.	Suppl.	Unsuppl.
Proteins(gm)	36.68	27.88	56.41	68.01	34.87	--	33.65	27.32	38.69	35.94
Calories(C)	1492.	1365.	1938.	2269.	1383.	--	1343.	1240.	1574.	1407.
F a t (gm)	18.39	4.31	17.33	15.47	4.55	--	7.74	6.81	8.42	7.17
Calcium(mg)	837.00	760.33	615.00	771.51	195.00	--	182.00	321.54	564.00	523.40
Iron(mg)	30.90	15.37	38.60	74.55	17.80	--	24.90	9.96	43.70	37.25
Vit.A.ug.	8118	2391.	4787.	7366.	3329.00	--	3200.00	2126.	7112.00	5120.00
Thiamine(mg)	1.31	0.35	2.38	1.43	0.70	--	0.90	0.42	0.44	0.44
Riboflavin(mg)	1.49	0.2842	1.81	1.66	0.49	--	0.41	0.29	0.39	0.44
Nicotonic Acid (mg)	9.29	8.22	15.77	13.14	9.42	--	12.09	7.37	11.27	14.44

TABLE NO. 15(b)

Mean intake of Nutrients supplemented and Unsupplemented.
Lactating Mothers (Tribe Wise)

Nutrients.	Savara		Jatapu		Samantha		Gadaba		Konda Dora	
	Suppl.	Unsuppl.	Suppl.	Unsuppl.	Suppl.	Unsuppl.	Suppl.	Un- Suppl.	Suppl.	Unsuppl.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Protein(gm)	41.50	23.52	49.92	56.04	40.83	---	34.79	26.60	62.31	55.91
Calories(C)	1546.	1082.	2025.	2183.	1356.	--	1207.	1140.	1679.	1507.
F a t (gm)	12.80	6.56	19.40	6.62	4.71	--	11.11	7.04	5.94	1.17
Calcium(mg)	998.	448.	897.	1132.	395.	--	198.	280.	571	523.
Iron (mg)	55.10	13.33	54.50	46.88	30.30	--	24.70	21.27	42.50	7.25
Vit.A(I.U)	11940.	4667.	4803.	7420.	5153.	--	4285.	3286.	5671.	--
Thiamine(mg)	1.92	0.53	1.93	0.78	1.85	--	1.16	0.95	2.67	2.14
Riboflaving(mg)	1.16	0.41	1.46	0.82	1.77	--	0.48	0.60	2.70	2.14
Nicotinic acid(mg)	11.72	6.36	13.49	14.66	11.17	--	10.22	6.87	11.21	14.44

Except the Konda Dora and Savara, all other communities exhibit cent percent deficiency in flesh foods. The deficiency in Roots and tubers is about 90% except for the Savara for whom it is 73.2%. Except the Jatapu who have a very high consumption of fruits other communities exhibit high deficit of even wild fruits. The deficiency in vegetables, Milk and milk products, fats and oils is more than 90% among all communities.

The analysis reveal that intakes of the Jatapu and Samantha women are relatively better than the other communities.

NUTRIENT INTAKE:

The mean intake of nutrients derived from the home diets of the supplemented and unsupplemented pregnant (Table No. 15(a) and lactating women (Table No.15(b) do not indicate any reduction in the home diets of the supplemented women as a result of receiving supplementary diet. Among the Jatapus the unsupplemented women's intakes are more, by about 12 gm. of protein and 332 calories for pregnant women and 6gms. of protein and 158 calories for lactating women. This community alone seems to substitute the supplementary diet to their home diet.

TABLE NO. 16 (a)

Recommended and observed Nutrient intake supplemented
Pregnant Mothers (Tribe Wise)

Nutrients	R.D.A.	Savara (24)		Jatapu(16)		Samartha(5)		Gadaba(6)		Konda Dora(3)	
		Obs.intake	Deficit or Surplus	Obs.intake	Deficit or Surplus	Obs.intake	Deficit or Surplus	Obs.intake	Deficit or Surplus	Obs.intake	Deficit or Surplus
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Protein(gm)	55.00	36.68	18.32 (33.30)	56.41	+1.4 (2.56)	34.87	-20.13 (36.60)	33.65	-21.35 (38.81)	38.69	()
Calories(C)	2500.00	1492.00	-1008.00 (40.32)	1938.00	-562.00 (22.48)	1383.00	-1117.00 (44.68)	1343.00	-1157.00 (46.28)	1574.00	()
F a t (gm)	50.00	18.39	-31.61 (63.22)	17.33	-32.67 (65.34)	4.55	-45.45 (90.90)	7.74	-42.26 (84.52)	4.82	()
Calcium(mg)	1000.00	837.00	-163.00 (16.30)	615.00	-385.00 (38.50)	195.00	-805.00 (80.50)	182.00	-818.00 (81.80)	564.00	()
Iron(mg)	40.00	30.90	-9.10 (22.75)	38.60	-1.40 (3.50)	17.80	-22.20 (55.50)	24.90	-15.10 (37.75)	43.70	()

Table No. 16(a) contd

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Vit.A. (I.U.)	3000.00	8118.00	+5118.00 (170.60)	4787.00	+1787.00 (59.56)	3329.00	+329.00 (10.96)	3200.00	+200.00 (6.66)	7112.00	+4112.00 (137.06)
Thiamine(mg)	1.30	1.31	+0.01 (0.76)	2.38	+1.08 (83.07)	0.70	-0.60 (46.15)	0.90	-0.40 (30.76)	0.44	-0.86 (66.15)
Riboflavin(mg)	1.40	1.49	+0.09 (6.42)	1.81	+0.41 (29.28)	0.49	-0.91 (65.00)	0.41	-0.99 (70.71)	0.39	-1.01 (72.14)
Nicotinic acid (mg)	17.00	9.29	-7.71 (45.35)	15.77	-1.23 (7.23)	9.42	-7.58 (44.58)	12.09	-4.91 (28.88)	11.27	-5.73 (33.70)

Numbers in brackets denote percentage to R.D.A.

PERCENTAGE DEFICIENCIES AMONG SUPPLEMENTED
PREGNANT MOTHERS: Table No. 16(a)

Compared to recommended allowances the diets of all communities except the Jatapu are inadequate in protein ranging from 30 to 39%. The intake of calories is deficient among all communities but the percentage deficiency of Jatapus (22.48%) is far lower than the other communities. As a result of consuming mango seed, which is very rich in fat, the percentage deficiency in fat, was much lower than that of the other communities, among the Jatapu and Savara. As a result of consuming fairly high quantities of leafy vegetables none of the communities have Vitamin A deficiency. Thiamine and Riboflavin intakes are adequate for the Savara and Jatapu women but deficient among other communities. Deficiency of Nicotinic acid is very low among the Jatapu but moderate among the other communities.

To sum up the pregnant mothers exhibit a high deficiency of fat, moderate deficiency of calories, calcium and Iron and mild deficiency of protein and B Complex vitamins.

NUTRIENT DEFICIENCIES AMONG LACTATING MOTHERS. (Table No. 16(b))

The intakes of protein, calories, fat, calcium and Nicotinic acid are adequate for all communities. The intake of Vitamin 'A' and Thiamine are more than the

TABLE NO: 16(b)

Recommended and Observed Nutrient intake of supplemented.
Lactating Mothers (Tribe Wise)

Nutrient	R.D.A.	Savara (18)		Jatapu(33)		Samantha(14)		Gadaba (10)		Konda Dora(1)	
		Obs. intake	Deficit or Surplus	Obs. intake	Deficit or Surplus	Obs. intake	Deficit or Surplus	Obs. intake	Deficit or Surplus	Obs. intake.	Deficit or Surplus
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Protein(gm)	65.00	41.50	-23.50 (36.15)	49.92	-15.08 (23.20)	40.83	-24.17 (37.18)	34.79	-30.21 (46.47)	62.31	-2.69 (4.13)
Calories(C)	2900.00	1546.00	-1354.00 (46.68)	2025.00	-875.00 (30.17)	1356.00	-1544.00 (53.24)	1207.00	-1693.00 (58.37)	1679.00	-1221.00 (42.10)
F a t (g s)	50.00	12.80	-37.20 (74.40)	19.40	-30.60 (61.20)	4.71	-45.29 (90.58)	11.11	-38.89 (77.78)	5.94	-44.06 (88.12)
Ca...ium(mg)	1000.00	998.00	-2.00 (0.20)	897.00	-103.00 (10.30)	395.00	-605.00 (60.50)	198.00	-802.00 (80.20)	571.00	-429.00 (42.90)
Iron (mg)	30.00	55.10	+25.10 (83.66)	54.50	+24.50 (81.66)	30.30	+0.30 (1.00)	24.70	-5.30 (17.66)	42.10	+12.10 (40.33)

Table No. 16(b) contd....

81	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
				+7340.00		+203.00		+553.00		-315.00		+1071.00
Vitamin A (I.U.)	4600.00	11940.00	(159.56)	4803.00	(4.41)	5153.00	(12.02)	4285.00	(6.81)	5671.00	(23.28)	
Thiamine(mg)	1.50	1.92	+0.42 (28.700)	1.93	+0.43 (28.66)	1.85	+0.35 (23.33)	1.16	+0.34 (22.66)	2.67	+1.17 (78.00)	
Riboflavin(mg)	1.64	1.16	-0.48 (29.26)	1.46	-0.18 (10.97)	1.77	+0.13 (7.92)	0.48	-1.16 (70.73)	2.70	+1.06 (64.63)	
Nicotinic acid (mg)	20.00	11.72	-8.28 (41.40)	13.49	-6.51 (32.55)	11.17	-8.83 (44.15)	10.22	-9.78 (48.90)	11.21	-8.79 (43.95)	

Numbers in brackets denote percentage to R.D.A.

recommended standards in all communities, while Iron intake is adequate for all communities except Gadaba. Only the Samantha and Konda Dora consume adequate quantity of Riboflavin.

The percentage deficiency in protein is maximum among the Gadaba (46.47%) followed by Samantha (37.18%) Savara (36.15%) Jatapu (23.20%) and Konda Dora (4.13%). The deficiency among the Konda Dora is negligible.

The deficiency in calories ranges from 58.37% (Gadaba) to 30.00% (Jatapu) while Konda Dora, Savara and Samantha have 42.1%, 46.68% and 53.24% deficiencies respectively.

The deficiency in fat is very high ranging from 90.58% among the Samantha, 88.12% among the Konda Dora, 77.78 among the Gadaba, 74.4% among the Savara to 61.29%, among the Jatapu.

Mineral deficiencies are very low among the Savara and Jatapu. Only the Gadaba women have a deficiency of 17.66% in Iron; all other communities having a satisfactory intakes. The highest deficiency in calcium is among the Gadaba (80.2%) while the Samantha has 60.5% deficiency and the Konda Dora has 42.9% deficiency. Among the Savara calcium deficiency is almost nil and among the Jatapu it is as low as 10.3%. Except among

the Gadaba and Samanths, mineral deficiencies are not serious.

The intakes of vitamins are satisfactory except Nicotinic acid, which shows more than 40% deficiency for all communities other than Jatapu. The Jatapu women have a slightly lower deficiency of 32.5%. The intake of Riboflavin is adequate for Samantha and Konda Dora women, while the Jatapu women have 10.97% and Savara Women 29.26%. The Gadaba women are an exception in having a high deficiency of 70.73%.

To sum up the diets of the lactating mothers in general are good in minerals and vitamins, as a result of consuming leafy vegetables in fair quantities. The major defect in their diet lies in the inadequacy of calories, protein and Nicotinic acid and Riboflavin.

TABLE NO. 18.

Weight gains during pregnancy.

84

Trimester	Pregnant women		Non pregnant and non lactating women(65)	P Value
	Supplemented(54)	Unsupplemented(24)		
Ist Trimester	38.19 \pm 0.66	38.75 \pm 2.19	36.69 \pm 0.5023	0.2448 N.S.
IIInd Trimester	42.09 \pm 0.44	40.16 \pm 1.022	---	1.7371 N.S.
IIIrd Trimester	44.29 \pm 0.55	43.13 \pm 1.35	---	0.7956 N.S.
% weight gain	19.62	16.51	---	0.7956 N.S.
9th month only	46.36 \pm 1.30	---		

ANTHROPOMETRY:

The mean anthropometric measurements of the Supplemented and unsupplemented pregnant and lactating mothers and unsupplemented non-pregnant non-lactating mothers are presented in Table No. 17.

The mean height among the different samples does not show any notable difference and range from 146.61 cm. to 147.8 cm. The average weight of the unsupplemented lactating mothers is 37.85 and that of Non-pregnant non-lactating mothers is 36.69. Hence the average weight of the women of this area may be assumed to be around 37 Kgs. The weight of the lactating mothers supplemented as well as unsupplemented is more than this average. Hence the lactating women are not losing weight during lactation. The average weight of the supplemented pregnant mothers is about 5 Kgs. more and that of the unsupplemented pregnant mothers is about 2 Kgs. more than the Non-pregnant non lactating women. This reveals that the weight gain during pregnancy among the supplemented women is more than the unsupplemented women. The weight gain during pregnancy calculated trimesterswise (Table No. 18) for the supplemented and unsupplemented shows that among the supplemented the weight gains are 1.5 Kgs.

Table No. 17.

Mean Anthropometric measurements of Pregnant, Lactating and Non pregnant
and Non - lactating mothers. (Supplemented and unsupplemented).

Measurements.	Pregnant Mothers.				P Value	Lactating Mothers				P Value	Non.PMs Non	
	Supplemented(54)		Unsupplemented(24)			Supplemen- ted(76)	Unsupplemen- ted (20)	LM (65)	Mean+SEM		S.D.	
	Mean+SEM	S.D.	Mean+SEM	S.D.								
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Height(Cms)	146.98 ± 0.6966	5.120	146.78 ± 1.1178	5.589	N.S.	147.80 ± 0.6449	5.623	146.86 ± 1.0147	4.538	N.S.	146.61 ± 0.6753	5.445
Weight(Kgs)	42.22 ± 0.3374	2.480	40.92 ± 0.8426	4.213	N.S.	38.46 ± 0.4584	3.997	37.85 ± 0.6938	3.103	N.S.	36.69 ± 0.4934	3.978
Head Circum- ference(Cms)	52.27 ± 0.2430	1.786	51.85 ± 0.3182	1.591	N.S.	52.53 ± 0.0386	0.3366	51.39 ± 0.3146	1.407	N.S.	52.16 ± 0.1968	1.587
Arm Circum- ference(Cms)	20.64 ± 0.1815	1.324	20.35 ± 0.3440	1.720	N.S.	20.73 ± 0.3187	2.779	20.54 ± 0.2871	1.284	N.S.	20.76 ± 0.1905	1.536
Infant's thi- ness(Cms)	8.1 ± 0.0259	0.1904	7.7 ± 0.0551	0.2755	N.S.	7.6 ± 0.0302	0.2640	7.3 ± 0.0384	0.172	N.S.	7.4 ± 0.0273	0.220

3.9 Kgs. and 2.20 Kgs. while among the unsupplemented the gains are 2.1 kg. 1.41 kg. and 3.01 kg. respectively for I, and II and III Trimesters, thereby revealing that the weight gain among the supplemented women is more, after the II trimester, which may be attributed to supplementary feeding. Generally the weight gains during pregnancy among the poorly fed communities are inadequate. Studies among the Indian mothers revealed about 10 Kgs weight gain for well fed mothers, and about 6.7 Kgs. for mothers of the low income groups. The average weight gain among the supplemented pregnant mothers of this sample is 7.29 Kgs., while among the unsupplemented it is 6.13 Kgs., which are almost nearer to the poor Indian women. Though the weights of the supplemented are more than the unsupplemented in general, they are not statistically significant.

The Head circumference, Arm Circumference and fat fold at triceps among the supplemented pregnant women are higher than the unsupplemented pregnant women, but they are not statistically significant, while among the lactating women, the head circumference among the supplemented mothers, is statistically significant compared to the unsupplemented women. The unsupplemented women also show lower values than the non-pregnant non-lactating women.

On the whole though the supplemented women's Anthropometric values are better than the unsupplemented women, the differences are not statistically significant, there by indicating that the differences are purely due to chance. However the weight of the supplemented lactating mothers show statistically significant differences with the non-pregnant, non-lactating mothers, while the unsupplemented did not show any significant difference.

Nutrition Levels:

The body weight for height of the supplemented lactating women expressed as a percentage of the Harvard standard for different communities is as follows:

Standard	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Above 90%	--	6.06	--	--	--
81-90%	38.88	60.60	--	42.85	100.00
71-80%	55.55	33.33	40.00	57.14	--
61-70%	5.55	--	50.00	-	--
Less than 60%	--	--	--	--	--

Except 6.06% of the Jatapu women, the Women of all other communities are below the normal level. The Gadaba women exhibit the lowest standards. The maximum percentage of women are in the 71-80% level

i.e. moderate degree of mal-nutrition.

The arm circumference expressed as percentage of the Harvard standard is as follows:

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Above 90%	Nil	Nil	Nil	Nil	Nil
81-90%	5.55	9.09	Nil	7.14	100.00
71-80%	61.11	62.63	50.00	57.14	Nil
61-70%	27.77	24.24	50.00	35.71	Nil
below 60%	8.33	3.03	Nil	Nil	Nil

All communities are below the normal level.

Nearly 90% or more of all communities except the Konda - Dora exhibit moderate degree of malnutrition. Severe cases though in a small percentage are observed among the Savara and the Jatapu.

The fatfold thickness at triceps expressed as percentage of the Harvard Standard shows:-

	Savara	Jatapu	Gadaba	Samantha	Konda Dora
Above 90%	--	3.03	--	--	--
81-90%	--	--	--	--	--
71-80%	11.11	3.03	--	--	--
61-70%	--	18.18	10.00	--	--
60% below	88.88	75.75	90.00	100.00	100.00

All communities exhibit severe degree of malnutrition. Only a few have moderate degree of malnutrition. Depletion of fat is the most severe symptom of malnutrition among all these communities. Nutrition levels of the Pregnant mothers could not be compared with general standards, as the tables did not include standards for pregnant women.

PREVALENCE OF NUTRITION DEFICIENCY SIGNS (TABLE No. 19)

The clinical deficiency signs most commonly observed among the women are anaemia, Iron deficiency, B Complex deficiency and muscular weakness.

Protein Calorie Malnutrition Signs:

None of the supplemented mothers exhibited frank cases of hair discoloration, while 16.66% of the unsupplemented pregnant mothers and 5% of unsupplemented lactating mothers had hair discoloration. However, oedema is more common among the supplemented women than the unsupplemented women.

Vitamin B Complex deficiency Signs:

Oedema, Motor weakness, burning feet and calf muscle tenderness are the important deficiency signs of this group. The incidence is comparatively more among the pregnant mothers than the lactating mothers. About 1/4th of the supplemented pregnant mothers reported burning feet and calf muscle tenderness, while it is as high as 53.33% for calf muscle tenderness, 37.50% for burning feet among the unsupplemented pregnant mothers. The prevalence of these signs among the supplemented lactating mothers is almost negligible, but among the unsupplemented lactating mothers is also negligible, but among the unsupplemented

... they are 40% for calf muscle tenderness and 30% for burning feet. The incidence of labial manifestations of B complex deficiency are negligible among the supplemented women, but the unsupplemented pregnant women and lactating women have 20.83% and 15.00% of Red and raw tongue cases respectively.

These signs indicate moderate thiamine and Riboflavin deficiency among pregnant mothers and mild thiamine, Riboflavin and nicotinic acid deficiencies among the lactating mothers. The unsupplemented women exhibited the signs in a higher degree.

Vitamin 'A' deficiency signs:

Vitamin 'A' deficiency signs are generally very low. The supplemented pregnant women exhibited 1.88%, each of Bitot spots, photophobia and Keratomalacia, and 3.77% of Night blindness, while the lactating mothers exhibited 8.10% of photophobia, 5.40% of night blindness and 1.35% each of Keratomalacia and Bitot spots. The prevalence among the unsupplemented women is generally higher than the supplemented women.

Table No. 19.

Deficiency signs.	Pregnant Mother		Lactating Mother	
	Suppl.	Unsuppl.	Suppl.	Unsuppl.
<u>P.C.M. Signs</u>				
Hair changes	--	16.66	--	5.00
Oedema	15.09	8.33	5.40	5.00
<u>Vit. B. Complex Deficiencies.</u>				
Angular Stomatitis	--	4.16	--	--
Red and Raw tongue	--	20.83	1.35	15.00
Tongue fissuring	--	8.33	5.40	5.00
Atrophic papillae	7.54	8.33	1.35	--
Hyper trophic papillae	--	--	--	5.00
Burning feet	24.52	37.50	5.40	30.00
Tenderness of calf muscles.	28.30	53.33	8.10	40.00
<u>Vit. 'A' deficiency Signs:</u>				
Bitot spots	1.88	5.33	1.35	4.00
Photophobia	1.88	4.16	8.10	25.00
Night blindness	3.77	4.16	5.40	35.00
Conjunctival Xerosis	1.88	--	2.70	5.00
Keratomalacia	--	--	1.35	5.00
<u>Vit. 'C' Deficiency signs:</u>				
Spongy bleeding gums.	--	--	--	5.00

Table No. 19 contd.....

Deficiency Signs	Pregnant Mothers		Lactating Mothers	
	Suppl.	Unsuppl.	Suppl.	Unsuppl.
<u>Iron Deficiency:</u>				
Pale Conjunctiva	41.50	37.50	21.62	30.00
Koilonychias	7.54	8.33	14.86	10.00
<u>Other Deficiency signs:</u>				
Dental Caries	--	15.66	2.70	15.00
Mottled enamel	--	4.16	--	5.00

Vitamin 'C' and 'D' deficiency signs:

No cases of skeletal deformities or spongy bleeding gums are observed among the supplemented women. The unsupplemented lactating mothers exhibited 5% incidence of spongy bleeding gums.

Iron deficiency signs:

The occurrence of oedema, pale conjunctiva and Koilonychias of toes among the supplemented and unsupplemented women indicate moderate to mild incidence of Iron deficiency, coupled with B complex deficiency. The incidence of pale conjunctiva is very high being 41.50% and 21.62% among the supplemented pregnant and lactating

women and 37.50% and 30.00 among the unsupplemented pregnant and lactating women.

Other deficiency signs:

There are no cases of glandular enlargement or bone deformities. Dental caries is completely nil among the supplemented pregnant women and 2.7% among the supplemented lactating women. However the unsupplemented women exhibit 15% of incidence. While cases of mottled enamel are absent among the supplemented women, a mild incidence of 4.16 and 5.00% are observed respectively for the unsupplemented pregnant and lactating mothers.

The clinical signs observed among the women suggest mild protein calorie malnutrition, B complex deficiency and Iron deficiency. The incidence among the unsupplemented women is generally higher than the supplemented women.

TABLE NO. 20

Impact of Supplementary Food on Pre-School Children.

Age group		1 - 3 - Years			3 - 6 Years			
g Nutrients.	R.D.A.	Obs. intake	+ SNP Food	Deficit(-)or Surplus(+) to RDA	R.D.A.	Obs. intake	+ SNP Food	Deficit (-) or Surplus (+) to RDA
1.	2.	3.	4.	5.	6.	7.	8.	9.
Protein(gms)	17.50	14.64	10.00	+ 7.14 (40.80)	21.30	21.60	10.00	+10.30 (48.35)
Calories(C)	1200.00	512.43	300.00	-387.57 (32.29)	1400.00	723.73	300.00	-376.27 (26.87)
Calcium(mg)	450.00	70.00	50.00	-129.52 (28.78)	450.00	425.36	50.00	-25.36 (5.63)
Iron (mg)	17.50	18.97	6.00	+4.47 (25.54)	17.50	22.62	6.00	+11.12 (3.54)
Vit.A. (I.U.)	1000.00	4321.24	45.64	+3566.88 (356.62)	1150.00	3390.74	45.64	+3286.38 (198.81)
Thiamine(mg)	0.60	0.6736	0.21	+0.2836 (47.26)	0.73	0.8578	0.21	+0.3378 (46.27)
Riboflavin(mg)	0.70	0.3824	0.08	-0.2376 (3.94)	0.76	0.5723	0.08	-0.1077 (14.17)
Nicotinic acid (mg)	3.00	4.02	3.13	-0.85 (10.62)	3.30	5.82	3.13	-0.35 (3.78)

IMPACT OF SUPPLEMENTARY FEEDING ON THE BENEFICIARIES.

Pre.School children:

Food: (Table No. 20)

To estimate the extent of neutralisation of deficiencies in home diets, the nutrients received through supplementary food, are added to the nutrients received through home diet, assuming that the feeding is going on regularly. The following picture has to emerge after the supplementary feeding.

Among children in the age group 1-3 years, the supplementary food completely neutralises deficiencies in Protein and Iron observed in the home diets. The intake of Vitamin ~~B1~~ and Thiamine are adequate even before receiving supplementary diet. The major deficiencies that remain even after supplementary feeding are calories (32.29%) Riboflavin (33.94%) and calcium (28.78%). The deficiency in Nicotinic acid is mild (10.62%). However if the nutrients received through breast milk also are taken into consideration these deficiencies will come down further. According to I.C.M.R. estimates breast milk supplies around 300 calories/^{of}energy per day. If this allowance is added for the 104 children who are breast

fed with supplements, the average deficiency of this group will be reduced from 387 calories to 187 calories or 15.58% deficiency.

Among children of the age group 3-6 years the supplementary feeding neutralises the deficiency of all nutrients except calories, Riboflavin and Nicotonic acid. The deficiency in Nicotonic acid is marginal.

To sum up deficiency in calories as a result of under nutrition is the most important problem of these children, B Complex deficiency coming next.

ANTHROPOMETRY.

To evaluate the impact of supplementary feeding, the mean anthropometric measurements of the supplemented children are compared with unsupplemented children.

In the total sample, supplemented children of the 6-12 months of age (Table No. 21(a)) does not show any significant differences with unsupplemented children. However community wise the height of the supplemented Savara children and the head circumference of the Jatapu children are significantly higher than the unsupplemented children of their communities.

Among children in the age group 1-3 years (Table No. 21(b)) the supplemented children as a whole exhibit significantly higher values for height, weight and head circumference. In the individual communities, the Savara, Jatapu and Gadaba children's heights are significantly higher than the unsupplemented children. The weights of the supplemented Savaras, and the chest circumference of the supplemented Jatapu are also significantly higher than the unsupplemented children. The Konda Dora did not show any significant difference between the supplemented and unsupplemented children.

In general the supplemented children in both the 1-3 years and 3-6 (Table No. 21(c)) years age groups are significantly taller, heavier and have larger

TABLE No. 21 (a)

Mean anthropometric values of supplemented and unsupplemented children.
6 - 12 months. All communities pooled.

100 Measurements	Supplemented (49)		Unsupplemented (13)		't' Value	P Value
	Mean \pm SEM	S.D.	Mean \pm SEM	S.D.		
Height (cms)	65.85 \pm 0.208	1.456	63.90 \pm 0.974	3.514	1.958	N.S.
Weight (Kgs)	5.92 \pm 0.097	0.6782	5.99 \pm 0.1384	0.4992	0.4144	N.S.
Head Circum- ference (cms)	43.54 \pm 0.269	1.889	41.10 \pm 1.241	4.478	1.921	N.S.
Chest Circum- ference (cms)	40.29 \pm 0.326	2.285	39.83 \pm 0.545	1.967	0.7245	N.S.
Arm Circumference (cms)	10.83 \pm 0.161	1.127	10.83 \pm 0.237	0.8543	0.0005	N.S.
Fatfold at triceps (mms)	7.02 \pm 0.022	0.1517	7 \pm 0.087	0.3162	0.0227	N.S.

TABLE No. 21 (b)

Mean anthropometric values of supplemented and unsupplemented children. 1 - 3 years. All communities pooled.

101

Measurements.	Supplemented		Unsupplemented		't' Value	P Value
	Mean + SEM	S.D.	Mean + SEM	S.D.		
Height(cms)	75.25 + 0.102	5.025	71.81 + 0.765	4.716	3.9805	.01 P .001
Weight (Kgs)	7.84 + 0.111	1.381	7.12 + 0.164	1.009	3.6418	.01 P .001
Head Circumference (cms)	44.84 + 0.132	1.653	44.55 + 0.023	0.1404	2.1674	.05 P .02
Chest Circumference (cms)	44.49 + 0.234	2.923	43.60 + 0.763	4.706	1.1152	N.S.
Arm Circumference (cms)	11.39 + 0.078	0.974	11.32 + 0.312	1.923	0.2179	N.S.
Fatfold at triceps (mms)	7.2 + 0.078	0.171	7.1 + 0.168	1.038	0.0540	N.S.

TABLE NO. 21(c)

Mean anthropometric values of supplemented and unsupplemented children.
3-6 years. All communities pooled.

102

Measurements.	Supplemented(232)		Unsupplemented(94)		't' Value	P Value	
	Mean \pm SEM	S.D.	Mean \pm SEM	S.D.			
Height(cms)	92.86 \pm 0.368	5.615	91.21 \pm 0.700	6.789	2.1115	.05 P	0.02
Weight(Kgs)	11.61 \pm 0.119	1.808	10.66 \pm 0.191	1.853	4.2278	.001 P	
Head Circumference(cms)	47.28 \pm 0.119	1.398	46.35 \pm 0.022	0.2179	3.5714	.001 P	
Chest Circumference(cms)	48.72 \pm 0.092	8.457	47.98 \pm 0.5141	(.985)	1.4176	N.S.	
Arm Circumference(cms)	12.05 \pm 0.555	0.7013	11.71 \pm 0.149	---	0.5917	N.S.	
Fatfold at triceps(mms)	7.5 \pm 0.010	0.1549	5.3 \pm 0.139	---	1.5725	N.S.	

TABLE No. 22(IV)

Mean anthropometric values of supplemented and unsupplemented Savara children.

Measurements	6 - 12 months.				P Value
	Supplemented(16)	S.D.	Unsupplemented(3)	S.D.	
Height (cms)	66.10 \pm 0.569	2.275	63.20 \pm 0.816	3.504	.001 p
Weight(Kgs)	5.80 \pm 0.204	0.8158	5.66 \pm 0.353	0.469	N.S.
Head circumference (cms)	42.29 \pm 0.364	1.456	40.00 \pm 1.389	1.988	N.S.
Chest circumference (cms)	40.13 \pm 0.364	1.456	39.26 \pm 0.8758	1.517	N.S.
Arm circumference (cms)	10.68 \pm 0.057	0.2298	10.63 \pm 0.1019	0.1766	N.S.
Fatfold at triceps (mms)	7.1 \pm 0.051	0.2037	0.70 \pm 0.0816	0.1415	N.S.

Analysis was done by the method of t tests for means.

S.D. Standard Deviation., N.S. Not Significant,

S. Significant.

TABLE NO. 22(ii)

Mean anthropometric values of supplemented and unsupplemented
Jatapu children.

104

Measurements	6 - 12 months				
	Supplemented(20)	S.D.	Unsupplemented(8)	S.D.	P Value
Height (cms)	65.83 \pm 0.852	3.808	64.28 \pm 1.1771	3.329	N.S.
Weight(kgs)	6.14 \pm 0.173	0.775	6.25 \pm 0.0866	0.245	N.S.
Head circumference (Cms)	45.52 \pm 0.004	2.252	41.92 \pm 0.6492	1.836	0.001 p
Chest Circumference (cms)	40.87 \pm 0.254	2.828	40.50 \pm 0.4823	1.364	N.S.
Arm circumference(cms)	10.99 \pm 0.632	1.137	11.02 \pm 0.2091	0.5916	N.S.
Fatfold at triceps (mms)	7.3 \pm 0.504	0.200	0.725 \pm 0.0086	0.0245	N.S.

Analysis was done by the method of t test for means

S.D. Standard Deviation, N.S. Not significant

S. Significant.

TABLE NO. 22(iii)

Mean anthropometric values of supplemented and unsupplemented
Gadaba Children.

105

Measurements	6 - 12 months.				P Value
	Supplemented(7)	S.D.	Unsupplemented(2)	S.D.	
Height (cms)	65.11 \pm 0.451	1.276	63.45 \pm 1.8023	2.550	N.S.
Weight(kgs)	5.66 \pm 0.2622	0.7416	5.50 \pm 0.2707	0.4998	N.S.
Head circumference (cms)	41.52 \pm 0.355	1.005	39.50 \pm 1.1478	1.965	N.S.
Chest circumference (cms)	39.97 \pm 1.115	2.153	38.00 \pm 0.4725	2.800	N.S.
Arm circumference (cms)	10.50 \pm 0.386	1.091	10.40 \pm 0.2380	0.7589	N.S.
Fatfold at triceps (mms)	6.2 \pm 0.059	0.1673	6.0 \pm 0.1154	0.00	N.S.

Analysis was done by the method of t tests for means

S.D. Standard Deviation, N.S. Not Significant.

S. Significant.

TABLE NO. 22 (iv)

Mean anthropometric values of supplemented and unsupplemented
Samantha children.

106

Measurements.	6 - 12 months.				P Value
	Supplemented(3)	S.D.	Unsupplemented (0)	S.D.	
Height(cms)	66.80 \pm 0.589	1.020	---	--	---
Weight(Kgs)	6.83 \pm 0.490	0.8484	---	--	---
Head circumference (cms)	44.00 \pm 0.048	0.4319	---	--	---
Chest circumference (cms)	41.26 \pm 0.340	1.216	---	--	---
Arm circumference (cms)	12.00 \pm 0.702	0.5887	---	--	---
Fatfold at triceps (mms)	7.7 \pm 0.249	0.084	---	--	---

Analysis was done by the method of t tests for means

S.D. Standard deviation; N.S. Not significant

S. Significant.

TABLE NO. 22(v)

Mean anthropometric values of supplemented and unsupplemented
Konda Dora children.

107

Measurements.	6 - 12 months.				P Value
	Supplemented (2)	S.D.	Unsupplemented(0)	S.D.	
Height(cms)	65.65 \pm 0.162	0.2292	---	--	---
Weight(kgs)	4.50 \pm 0.354	0.50	---	--	---
Head circumference (cms)	41.20 \pm 0.848	1.20	---	--	---
Chest circumference (cms)	38.50 \pm 1.202	1.70	---	--	---
Arm circumference (cm)	10.10 \pm 0.636	0.8999	---	--	---
Fatfold at triceps (mms)	6.0 \pm 0.141	0.20	---	--	---

Analysis was done by the method of t tests for means.
S.D. Standard Deviation, N.S. Not Significant,
S. Significant.

Table No. 22(vi)

Mean anthropometric values of supplemented and unsupplemented Savara children.

Measure- ments.	1 - 3 years.				P Value	3 - 6 years				P Value
	Suppl(47)	S.D.	Unsupplemented(14)	S.D.		Suppl.(102)	S.D.	Unsuppl.(47)	S.D.	
Height(cm)	75.31 \pm 0.688	4.719	72.19 \pm 0.854	3.196	.01 P .001	93.41 \pm 0.377	3.812	91.55 \pm 1.0215	7.004	N.
Weight(Kgs)	7.78 \pm 0.217	1.489	7.13 \pm 0.2267	0.8484	0.05 P .02	11.30 \pm 0.165	1.666	10.50 \pm 0.3159	2.166	.0 P
Head circum- ference(cms)	44.54 \pm 0.246	1.690	44.31 \pm 0.4043	1.513	N.S.	46.81 \pm 0.197	1.988	46.73 \pm 0.2682	1.839	N.
Chest circ- umference(cms)	44.18 \pm 0.399	2.739	43.41 \pm 0.7629	2.855	N.S.	48.74 \pm 0.170	1.719	47.93 \pm 0.3182	2.182	.0 P
Arm circum- ference(cms)	11.2 \pm 0.154	1.058	11.15 \pm 0.2902	1.086	N.S.	11.85 \pm 0.107	1.076	11.41 \pm 0.1134	0.7780	N
Fatfold at triceps(mms)	7.3 \pm 0.024	0.1618	7.2 \pm 0.0378	0.1415	N.S.	7.0 \pm 0.016	0.1576	6.8 \pm 0.0345	0.2370	N

Analysis was done by the method of t test for means.
 S.D. Standard Deviation, N.S. Not significant.
 S. Significant.

TABLE NO. 22(vii)

Mean anthropometric values of supplemented and unsupplemented Jatapu children.

601

Measure- ments.	1-3 years.				P Value	3 - 6 years.				P Value
	Suppl(69)	S.D.	Unsuppl(9)	S.D.		Suppl(73)	S.D.	Unsuppl(21)	S.D.	
Height(cms)	76.17 \pm 0.716	5.947	73.56 \pm 0.9753	2.926	.05 P .02	92.96 \pm 0.767	6.554	91.35 \pm 1.3288	6.09	N.S.
Weight(kgs)	7.92 \pm 0.179	1.483	7.33 \pm 0.260	0.780	N.S.	12.17 \pm 0.230	1.965	11.02 \pm 0.2277	1.044	.001 P
Head circum- ference(cms)	44.72 \pm 0.214	1.781	44.60 \pm 0.5696	1.709	N.S.	47.95 \pm 0.145	1.236	47.15 \pm 0.3323	1.523	.05 P .02
Chest circum- ference(cms)	44.79 \pm 0.405	3.365	43.00 \pm 0.7796	2.339	.05 P .02	48.32 \pm 0.337	2.881	47.14 \pm 0.5664	2.596	N.S.
Arm circum- ference(cms)	11.22 \pm 0.115	0.9530	10.93 \pm 0.4966	1.49	1. .	11.90 \pm 0.174	1.490	11.62 \pm 0.2635	1.208	N.S.
Fatfold at triceps(mms)	6.7 \pm 0.230	0.2270	6.5 \pm 0.0684	0.2053	N.S.	8.8 \pm 0.020	0.172	7.1 \pm 0.0298	0.1368	.001 P

Analysis was done by the method of t test for means

S.D. Standard Deviation, N.S. Not Significant,

S. Significant.

TABLE No. 22(viii)

Mean anthropometric values of supplemented and unsupplemented Gadaba children.

Measure- ments.	1 - 3 Years				P Val- ue.	3 - 6 years				P Value
	Suppl(16)	S.D.	Unsuppl(13)	S.D.		Suppl(26)	S.D.	Unsuppl(20)	S.D.	
Height(cms)	73.81 \pm 0.650	2.599	70.32 \pm 1.357	4.895	.05 P .02	92.46 \pm 1.141	5.821	90.04 \pm 1.456	6.512	N.S.
Weight(kgs)	7.59 \pm 0.237	0.943	7.16 \pm 0.260	0.938	N.S.	11.35 \pm 0.314	1.602	10.78 \pm 0.290	1.296	N.S.
Head Circum- ference(cms)	45.03 \pm 0.429	1.716	44.96 \pm 0.446	1.609	N.S.	47.61 \pm 0.359	1.833	46.85 \pm 0.292	1.308	N.S.
Chest Circum- ference(cms)	41.26 \pm 0.540	2.158	41.16 \pm 0.624	2.249	N.S.	49.85 \pm 0.463	2.360	49.01 \pm 0.425	1.900	N.S.
Arm Circum- ference(cms)	11.88 \pm 0.200	0.800	11.75 \pm 0.283	1.020	N.S.	12.60 \pm 0.185	0.944	12.49 \pm 0.329	1.473	N.S.
Fatfold at triceps(mms)	7.8 \pm 0.042	0.167	7.7 \pm 0.028	0.100	N.S.	7.3 \pm 0.012	0.063	7.0 \pm 0.032	0.141	N.S.

Analysis was done by the method of t test for means.

S.D. Standard Deviation, N.S. Not Significant,

S. Significant.

TABLE No. 22(ix)

Mean anthropometric values of supplemented and unsupplemented
Samantha Children.

Measure- ments.	1-3 years.				P Val- ue.	3-6 years.				P Value
	Suppl(13)	S.D.	Unsuppl(0)	S.D.		Suppl(14)	S.D.	Unsuppl(0)	S.D.	
Height(cms)	73.42 \pm 0.582	2.100	--	--	--	89.23 \pm 1.221	4.534	--	--	--
Weight(kgs)	8.04 \pm 0.292	1.054	--	--	--	11.22 \pm 0.375	1.414	--	--	--
Head Circum- ference(cms)	45.10 \pm 0.445	1.603	--	--	--	46.92 \pm 0.327	1.224	--	--	--
Chest Circum- ference(cms)	44.56 \pm 0.536	1.933	--	--	--	48.36 \pm 0.600	2.267	--	--	--
Arm Circum- ference(cms)	12.08 \pm 0.279	1.007	--	--	--	12.48 \pm 0.224	0.913	--	--	--
Fatfold at triceps(mm)	7.4 \pm 0.045	0.162	--	--	--	6.6 \pm 0.038	0.141	--	--	--

TABLE NO. 22(x)

Mean anthropometric values of supplemented and unsupplemented
Konda Dora children.

112

Measure- ments.	1-3 years				P Value	3-6 years				P Value
	Suppl(11)	S.D.	Unsuppl(2)	S.D.		Suppl(17)	S.D.	Unsuppl(6)	S.D.	
Height(cms)	73.49±0.933	3.093	71.00±1.768	2.500	N.S.	93.03±1.770	7.298	92.03±3.621	8.873	N.S.
Weight(kgs)	7.86±0.573	1.897	6.00±0.707	1.000	N.S.	11.90±0.50	2.132	10.33±0.956	2.330	N.S.
Head Circum- ference(cms)	45.12±0.423	1.412	43.40±1.035	1.463	N.S.	47.11±0.710	2.929	46.80±0.924	2.205	N.S.
Chest Circum- ference(cms)	44.19±0.876	2.905	44.10±0.778	1.100	N.S.	48.89±0.768	3.161	47.91±0.921	2.200	N.S.
Arm Circum- ference(cms)	11.73±0.309	1.123	11.50±0.212	0.300	N.S.	12.69±0.259	1.067	11.78±0.870	2.132	N.S.
Flatfold at triceps(mms)	8.1±0.004	0.063	7.0±0.071	0.100	N.S.	6.4±0.041	0.167	5.8±0.135	0.332	N.S.

Analysis was done by the method of t tests for means.
S.D. Standard Deviation, N.S. Not Significant,
S. Significant.

head circumferences than the unsupplemented children. The differences in chest circumference, Arm circumference and fatfold thickness at triceps are not significant at 5% level of probability.

In the age group 1-3,/^{Years}the intra tribal differences in height and weight among the Savara, height among the Gadaba, height and chest circumference among the Jatapu are statistically significant between the supplemented and unsupplemented children. The Konda Dora did not show any significant differences. As no unsupplemented children are covered among the Samantha, the differences could not be tested individually.

The weight among the Savara, weight, head circumference and fatfold among the Jatapu of the supplemented children, in the age group 3-6 years are significantly higher than the unsupplemented children.

The weight for height, Arm circumference and fat fold thickness of the supplemented and unsupplemented, when separately expressed as percentage of the general standard, reveal that the nutritional standards of the supplemented children are better than the unsupplemented children of the same community. The chest for head circumference and weight for height indices also show the same tendency.

The analysis reveals that the impact of

supplementary feeding does not show any marked improvement in the anthropometric measures of the children in the 6-12 months age over unsupplemented children of the same age. It is usually observed that the supplementary food meant for children of this age group is shared or sometimes exclusively consumed by older members of the family. Hence the feeding could not show any significant differences. The children in the 1-6 years age show marked improvement in their height, weight and head circumference. As the supplements are principally designed to supply calories and protein only, significant differences could not be observed in the body fat among the supplemented and unsupplemented groups.

Nutritional Deficiency Signs:

The percentage prevalence of all deficiency signs except that of Vitamin 'A' among the supplemented children, are less than the unsupplemented children. The protein calorie Malnutrition signs in particular, are 50% less among the supplemented children. This direct evidence testifies the impact of supplementary feeding on the children.

TABLE No. 23(a)

Impact of supplementary food - Pregnant mothers.

115

Nutrients	R.D.A.	+ SNP diet	All communities (144) Obs. intake	Deficit or Surplus	% deficit or Surplus to R.D.A.
Protein(gm)	55.00	12.68	42.13	-0.19	0.34
Calories(C)	2500.00	408.00	1602.00	-490.00	19.60
Fat(gm)	50.00	6.80	14.85	-28.35	56.70
Calcium(mg)	1000.00	86.50	623.00	-290.50	29.05
Iron(mg)	40.00	9.00	32.01	+1.01	2.52
Vit A (I.U.)	3000.00	63.00	6085.00	+3148.00	104.93
Thiamine(mg)	1.30	0.28	1.47	+0.45	34.61
Riboflavin(mg)	1.40	0.10	1.31	+0.01	0.71
Nicotinic acid(mg)	17.00	4.40	11.64	-0.96	5.64

TABLE No.

Nutritient Intake of Pregnant Mothers.

116

Nutrients.	R.D.A.	Obs.intake of all communities (144)	Deficit or Surplus	% deficit or Surplus to R.D.A.
Protein(gm)	55.00	42.13	-12.87	23.40
Calories(C)	2500.00	1602.00	-898.00	35.92
Fat(gm)	50.00	14.85	-35.15	70.30
Calcium(mg)	1000.00	623.00	-377.00	37.70
Iron(mg)	40.00	32.01	-7.99	19.97
Vit. A (I.U.)	3000.00	6085.00	+3085.00	102.83
Thiamine(mg)	1.30	1.47	+0.17	13.07
Riboflavin(mg)	1.40	1.31	-0.09	6.42
Nicotinic acid (mg)	17.00	11.64	-5.36	31.52

Nutritive intake of Lactating Mothers.

Nutrients	R.D.A.	Observed intake of all communities(76)	Deficit or Surplus	% deficit or Surplus to R.D.A.
Protein(gm)	65.00	44.42	-20.58	31.66
Calories(C)	2900.00	1676.00	-1224.00	42.20
Fat(gm)	50.00	13.86	-36.14	72.28
Calcium(mg)	1000.00	732.00	-268.00	26.80
Iron(mg)	30.00	46.10	+16.10	53.66
Vit. A. (I.U)	4600.00	6426.00	+1826.00	39.69
Thiamine(mg)	1.50	1.82	+0.32	21.33
Riboflavin(mg)	1.64	1.33	-0.31	18.90
Nicotinic Acid(mg)	20.00	12.18	-7.82	39.10

TABLE NO. 23(b)

Neutralisation with SNP Diets. Lactating Mothers.

118

Nutrients.	R.D.A.	+ SNP Diet	All communities Obs.intake (76)	Deficit or Surplus	% Deficit or Surplus to RDA.
Protein(gm)	65.00	12.68	44.42	-7.90	12.15
Calories(C)	2900.00	408.00	1676.00	-816.00	28.13
Fat(gm)	50.00	6.80	13.86	-29.34	58.68
Calcium(mg)	1000.00	86.50	732.00	-181.50	18.15
Iron(mg)	30.00	9.00	46.10	+25.1	83.66
Vit.A(I.U.)	4600.00	63.00	6426.00	+ 889.00	41.06
Thiamine(mg)	1.50	0.28	1.82	+0.60	40.00
Riboflavin(mg)	1.64	0.10	1.33	-0.21	12.80
Nicotinic Acid	20.00	4.40	12.18	-3.42	17.10

PREGNANT AND LACTATING MOTHEPS: (Table No. 23(a) & (b).

Food and Nutrients: The supplementary diet could neutralise the deficiencies of protein, Iron and Riboflavin among the pregnant mothers and Thiamine deficiency among the lactating mothers. The deficiency in protein among lactating mothers is brought to a very low level. The inadequencies in calcium and Nicotinic acid have been reduced considerably.

However the requirements of calories could not be met to the extent of $\frac{1}{3}$ of the recommended allowances and the high deficiency of fat remains high even after supplementary feeding.

Anthropometry:

The anthropometric measurements of all communities are pooled together for purposes of comparison with unsupplemented women as it was not possible to test the impact of supplementary feeding in individual communities in view of the small samples covered among some communities.

When subjected to students 't' test for means the supplemented pregnant mothers (Table No. 24) did not show any significant differences with the unsupplemented mothers at 5% level of probability. However the weight for height among the supplemented women is higher than that of the unsupplemented women, indicating an edge over the unsupplemented pregnant women.

TABLE No. 24

Comparative Anthropometry of Pregnant Mothers.
All communities (Pooled)

122

Measurements	Supplemented(54)		Unsupplemented(24)		P Value
	Mean \pm SEM	S.D.	Mean \pm SEM	S.D.	
Height(cm)	146.98 \pm 0.6966	5.120	146.78 \pm 1.1178	5.589	N.S.
Weight(Kgs)	42.22 \pm 0.3374	2.480	40.92 \pm 0.8426	4.213	N.S.
Weight/Height	0.2872	--	0.2787	--	--
Head Circum- ference(cm)	52.27 \pm 0.2430	1.786	51.85 \pm 0.3182	1.591	N.S.
Arm Circumference (cm)	20.64 \pm 0.1815	1.334	20.35 \pm 0.3440	1.720	N.S.
Fatfold at Triceps(mm)	8.4 \pm 0.0259	0.1904	7.7 \pm 0.0551	0.2755	N.S.

TABLE No. 25
All Communities Pooled.

Measure- ments.	<u>Lactating women Supplemented.</u>		<u>Lactating women unsupplemented</u>		<u>Non Lactating and Non Pregnant women Unsupplemented</u>		<u>P Value</u>		
	Mean \pm SEM	S.D.	Mean \pm SEM	S.D.	Mean \pm SEM	S.D.	Suppl.LM vs. Unsuppl. L.M.	Suppl.LM vs. Non PM & LM	Unsuppl. LM vs. Wom PM & LM.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Height(cms)	147.80 \pm 0.6449	5.623	146.80 \pm 1.0147	4.538	146.61 \pm 0.6753	5.445	N.S.	N.S.	N.S.
Weight(Kgs)	38.46 \pm 0.4586	3.997	37.85 \pm 0.6938	3.103	36.69 \pm 0.4934	3.978	N.S.	.01 P	0.001 N.S.
Wt./Ht.	0.2602	--	0.2577	--	0.2502	--	--	--	--
Head Circumfe- rence(cm)	52.53 \pm 0.0380	0.3366	51.39 \pm 0.2110	1.4070	52.16 \pm 0.1000	1.587	P .001	N.S.	.05 P .
Arm Circumfe- rence(cm)	20.73 \pm 0.3187	2.779	20.54 \pm 0.2371	1.284	20.76 \pm 0.1905	1.536	N.S.	N.S.	N.S. ?
Fatfold at triceps(mm)	7.6 \pm 0.0302	0.2640	7.3 \pm 0.0384	0.1720	7.4 \pm 0.0273	0.2209	N.S.	N.S.	N.S.

The supplemented lactating women (Table No.25) did not exhibit any significant differences with the unsupplemented lactating women except for head circumference. The weight of the supplemented lactating women is significantly higher than the non-pregnant women, while that of the unsupplemented women did not show any significant difference. This reveals that the supplementary feeding has not significantly improved the nutritional standards of these women. Sharing the food with children and their husbands may be the reason.

The weight for height and fatfold thickness at triceps, expressed as percentage of Harvard standard among the supplemented pregnant women shows some upward trend, but the Arm circumference shows a downward trend. The supplemented and unsupplemented lactating women do not show any appreciable differences.

Nutrition Deficiency Signs:

Dietary analysis reveals that the supplementary food meets the requirements of protein to a large extent, but could not neutralise the deficiency in energy requirements completely. The clinical deficiency signs among the supplemented women are far lower than the

unsupplemented. The pregnant and lactating women of the supplemented group show a low-incidence though not as convincing as in the case of children. Anthropometric comparison of the children reveal positive and significant improvement among the supplemented group, but among the pregnant and lactating women the differences between the supplemented and unsupplemented are not significant.

CHAPTER VI

Comparison between Tribals of Srikakulam and the Tribals and Non-Tribals of Andhra Pradesh.

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The study reveals that the tribals of Srikakulam are malnourished and their physical standards are mostly lower than the normal level. As malnutrition and growth retardation are commonly observed among other tribal communities of Andhra Pradesh also, it will be very useful, to know the relative position of the tribals of Srikakulam, among the tribal and non-tribal communities of Andhra Pradesh. Comparison have been made on the intake per caput per day of foods, nutrients and anthropometry of the tribals of Srikakulam, Godavari agency, Gonds of Adilabad, Chenchus of Nallamelais, and Rural populations of Hyderabad (I.C.M.F) and/or Andhra Pradesh (Protein Foods and Nutrition Society of India.)

Food Intake:

The intake of cereals among the Srikakulam pre-school children (Table No. 26) is less than all others and it is substituted with higher intake of seeds and nuts. The consumption of leafy vegetables is far higher than all other samples. The intake of

Food Intake of Pre-School Tribal children of Andhra Pradesh. (1 - 6 Years)

127

	Srikakulam Tribals	Chenchus	Paravari Tribals	Gonds	I.C.M.R.
Cereals(g)	126.98	207	140	171	147
Pulses(g)	45.3	9.7	7.5	58	16.1
Seeds & Nuts					
Leafy vegetables(g)	112.28	13.3	7.5	9	4
Vegetables(Roots&Tubes) (g)	12.89	22.3	33	6.5	14
Flesh Foods(g)	1.88	10	16.16	0.35	4
Milk and Milk products(g)	2.07	2.5	27	18.5	30
Oil & Fats(g)	0.12	0.25	1.6	1.3	4
Sugar & Jagary(g)	1.14	8.5	5.0	1.4	5

TABLE NO. 29

Nutritive intake Pre-School children of Tribal
com unities of A.P. 1-6 Years.

	Srikakulam Tribals	Chenchus	Gonds	Godavari Tribals	I.C.M.R.	Andhra Pradesh
Protein(g)	18.95	28.8	33.77	26.49	19.5	27.5
Calories(c)	643.28	902	896	721	758	939
Calcium(g)	263.42	269	192	220	230	--
Iron (mg)	20.08	18.8	17.4	14.4	8.6	---
Vitamin 'A' (I.U.)	3821.13	254	417	707	1050	---

of flesh foods are negligible among the Srikakulam tribals, Gonds and Rural Hyderabad children, while it is comparatively more among the Chenchus and Godavari children. The consumption of milk and milk products is the least among the Srikakulam children. The Srikakulam tribals and Gonds who have taken up settled cultivation are taking lesser quantity of flesh foods, while the Chenchus and Godavari tribals who still take much pleasure in hunting are consuming more flesh foods. Scarcity of cereals is compensated by consuming more mango seed and leafy vegetables among Srikakulam tribals.

Pregnant women: (Table No. 27)

The cereal consumption of Srikakulam pregnant tribal women is almost the same as that of the Chenchu and Gond women. The largest percapita consumption of pulses, seeds and nuts is observed among the Srikakulam women and Gonds. Among the Srikakulam women mango seeds make the largest contributions while among the Gonds red-grape and field beans are the chief contributors. A conspicuously high consumption of leafy vegetables is observed among the Srikakulam women, while it is low among the Gonds and Chenchus. However the relative differences may be attributed,

TABLE No. 27

Food intake of Pregnant Tribal women of Andhra Pradesh.

130	Srikakulam	Godavari	Gonds	Chenchus	I.C.M.R.
Cereals(g)	411.60	265.4	396	419	276
Pulses, nuts & Seeds(g)	141.7	18.44	126	12	21
Leafy Vegetables(g)	164.24	68	6.3	--	8
Vegetables, Roots, and Tubers(g)	8.27	65.8	24.5	31.5	20
Flesh Foods(g)	---	20.3	--	27.6	22
Milk and Milk Products(ml)	3.31	26.5	37.2	--	41
Sugar and Jaggary(g)	2.5	4.5	--	10.7	--
Oils & Fats (g)	0.88	1.60	0.38	0.24	20

* Pulses only

TABLE NO. 28

Food Intake of Lactating Tribal mothers of Andhra Pradesh

131	-----				
	Srikakulam	Godavari	Chenchus	Gonds	I.C.M.R.

Cereals(g)	387	329	440	548	333
Pulses, Nuts and Seeds(g)	79.25	22.8	11.3	198	* 15
Leafy Vegetables(g)	204	15.0	---	6.6	9
Vegetables, Roots and Tubers (g)	11.4	190	49	22	26 3
Flesh Foods(g)	2.6	22.7	27	--	18
Milk and Milk products (g)	1.31	66.6	27	1.33	23
Sugar & Jaggery (g)	2.14	2.18	18	1.66	15
Oils & Fats (g)	0.64	2.7	--	0.4	12

to the different seasons, in which the data is collected. The consumption of flesh foods, milk and milk products is low among the Srikakulam and Gond women compared to Chenchu and Godavari tribal women. The consumption of oils and sugar are negligible among all groups.

Lactating women: (Table No. 28)

The consumption of cereals among the Srikakulam women are far lower than the Gond and Chenchu women, but higher than the Godavari women. While the lactating women of other tribal communities are found to consume more cereals than the pregnant women of the same communities, the Srikakulam tribal women consume less cereals than the pregnant women. The Srikakulam women are consuming $\frac{2}{5}$ th the average quantity of pulses, seeds and nuts consumed by Gond women, while the Chenchu and Godavari women are consuming negligible quantities. The consumption of leafy vegetables among the Srikakulam tribal women is conspicuously far higher than the other communities, as in the case of pregnant women. The lower consumption of cereals is compensated by the higher intake of the ~~xxxxxxxxxxxx~~ roots, vegetables, leafy vegetables, flesh foods, milk and milk products among the Srikakulam and Gond women are far lower than the Godavari and Chenchu women. The consumption of oil among all communities is negligible.

To sum up the intake of cereals among the Srikakulam tribals is lower than the other tribal communities of Andhra Pradesh and it is compensated by a higher intake of seeds and leafy vegetables. The intake of milk and milk products, flesh foods and vegetables among the Srikakulam tribals and Gonds, are lower than the Chenchus and Godavari tribals. The consumption of oil among the tribal communities as a whole is almost negligible. The tribal diets are not inferior to the rural Hyderabad diets.

NUTRIENTS INTAKEPre-School Children (Table No. 29)

The protein intake of Srikakulam tribal children is almost the same as that of the I.C.M.R. sample, but other tribal communities and Andhra Pradesh pre-school children have a relatively higher consumption. The conspicuously highest consumption of Gonds is due to their higher consumption of pulses, which is traditionally a staple food of that area.

The intake of calories among the Gonds Chenchus and Andhra Pradesh Children are higher than the I.C.M.R. sample, while intakes of the Godavari and Srikakulam tribals are lower. The intake of Srikakulam children is the lowest. The intakes of tribal children are generally lower than the non-tribal children of Andhra Pradesh.

Except for the Gonds, the intake of Calcium among the tribal children and the I.C.M.R. sample does not show any appreciable variation.

The intake of Iron among the tribal children is far higher than that of the I.C.M.R. sample.

The intake of Vitamin A among the tribal children of Srikakulam is lower than that of the I.C.M.R. sample.

tribal children is 4 times higher than the I.C.M.R. sample, while the intake of other tribal children is lower. The conspicuously higher consumption of leafy vegetables by the Srikakulam tribal children is responsible for the relatively superior intakes of calcium, Iron and Vitamin 'A'.

The Srikakulam tribal children show the lowest intake of protein and calories among all the groups compared.

Pregnant Women (Table No. 30)

The protein intakes of the Hyderabad Chenchu and Srikakulam tribal women show very little difference, while the Gond women show a far higher intake and the Godavari women is slightly lower intake.

The intake of calories among Chenchu and Srikakulam women are a little higher than the Hyderabad women. The Gond women's intake is the highest and the Godavari women intake is the least.

The intakes of calcium, Iron and Vitamin 'A' among the Srikakulam and Godavari tribal women are far higher than the other communities.

Lactating Women (Table No. 31)

Except the Gonds, all other communities show

TABLE No. 30

Comparison of Nutrient Intake - Pregnant Mothers.

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Nutrients	R.D.A.	Hyderabad	Godavari Agency	Chenchus	Gonds	Srikakulam Tribals.
Calories(C)	2500	1528	1188	1638	1931	1602
Protein(g)	55	39.9	35.9	41.7	76.9	42.1
Calcium(mg)	1000	259	528	304	320	623
Iron(mg)I.U.	40	16.8	24	19.7	31.9	32
Vitamin A	3000	311	6622	192	848	6085

TABLE No. 31

Comparison of Nutrient Intake - Lactating Mothers.

Nutrients	R.D.A.	Hyderabad	Godavari Agency	Chenchus	Gonds	Srikakulam Tribals
Calories(C)	2900	1891	1723	1700	2647	1676
Protein(g)	65	46.7	53	32.8	96.6	44.4
Calcium(mg)	1000	180	334	170	456	732
Iron(mg)	30	18.1	27	18.4	43	46
Vitamin 'A' I.U.	4600	796	3353	131	1070	6426

close similarity in the intake of protein and calories with the Hyderabad women. The protein intake of Gonds is twice higher than that of the Hyderabad women, while that of the Godavari women is slightly higher. The intake of the Srikakulam women is almost the same. The Chenchu women's intake is the lowest.

The intake of Calories, except among the Gonds, are about 200 calories less than that of the Hyderabad women. The intake of Gond women is far superior to the Hyderabad women.

The Srikakulam women exhibit the highest intakes of calcium, Iron and Vitamin 'A'; the Chenchu and Hyderabad women having the lowest intakes.

Summing up the intakes of pre-school children, pregnant and lactating mothers, it may be concluded that the Srikakulam tribals generally exhibit the lowest intake of calories and highest intake of minerals and Vitamin 'A'. Their protein intake is similar to that of the Hyderabad sample. Their intakes of protein and calories in general are closer to the Chenchus and Godavari tribals. The Gonds exhibit an absolute superiority over all others in the intake of protein as well as calories, in view of their capacity to afford to consume higher quantity of cereals and pulses grown in their fields.

Weight/Height Index for Pre-school children:

The index based on weight/height 2×100 which is about 0.15 for apparently normal children irrespective of age is applied for comparing the relative nutrition statuses of the pre-school tribal children of Srikakulam, Godavari agency, Chenchus, Gonds and Pre-school children of rural Hyderabad.

The index among children in the age group, 6-12 months is more than 0.14 for all children except the children of Srikakulam.

The index was normal for the rural Hyderabad children over 1 year of age, while the tribal children other than Srikakulam maintained the same level of 0.14, even during 1-3 years of age. However the Srikakulam children of this age group show a slight improvement, compared to retardation observed among other tribals.

In the age group 3-6 years the index for all tribal children fell to the level of 0.13 and above but less than 0.14, indicating reduction in the relative weight for height.

The index for Srikakulam children is the lowest in all age groups indicating that the Srikakulam children are more malnourished than all the other tribal communities.

Table No. 32:

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Weights and Heights of Pre-School
Tribal and Rural Hyderabad children.

Community/ group	Age	Height (Cm)	Weight (Kgs)	$\frac{\text{Weight}}{\text{Height}^2} \times 100$
1.	2.	3.	4.	5.
I. Tribals of Srikakulam Agency.	6-12 months.	65.85	5.92	0.136
	1-3 years	75.25	7.84	0.138
	3-6 years	92.88	11.61	0.134
II. Chenchus	6-12 months	66.70	6.43	0.149
	1-3 years	82.58	9.94	0.145
	3-6 years	104.19	15.10	0.139
III. Gonds.	6-12 months	66.67	6.43	0.144
	1-3 years	77.91	8.56	0.141
	3-6 years	99.10	13.54	0.137
IV. Godavari Agency.	6-12 months	63.49	5.74	0.142
	1-3 years	77.04	8.40	0.141
	3-6 years	97.54	13.05	0.137
V. Rural Hyderabad.	6-12 months	66.05	6.35	0.145
	1-3 years	73.10	8.05	0.150
	3-5 years	87.15	11.40	0.150
	3-6 years	N.A.	N.A.	---

CHAPTER-VIID I S C U S S I O N .

The study reveals that malnutrition is widespread among the tribals of Srikakulam district.

The children of this area are generally introduced to solid foods between 6 and 9 months, in contrast to the very late introduction among other tribals of the State. The tribal women of this district go usually into the forest or fields very early in the morning leaving their toddlers in the care of old women, and return late in the afternoon. As they could not afford to give any animal or artificial milk to the children, they acclimatize them to Ragi gruel and other cereal foods as early as 5th or 6th month and attend to their field work without any worry. However breast feeding also continues as late as the 3rd year, if the mother does not conceive again.

The home diets are highly deficient in oils, milk and milk products, sugar and jaggery flesh foods and vegetables. Economic backwardness and conservatism are playing major role in the exclusion of these foods from their diets. Traditionally they are not habituated to milk their animals and also

consider it a sin to deprive the calf of its mothers milk. Though they are fond of flesh foods, their economic backwardness does not afford them to purchase this item in sufficient quantities. In view of the association of all these tribal communities with some sort of agriculture, they devote very little time in hunting, that too during some festival occasions.

Even the intake of the main source of their energy i.e. cereals is inadequate. However the low cereal intake is compensated by a high intake of mango seed and leafy vegetables collected from the forest. Thus the poor tribals try to strike a balance between availability and demand.

The nutrient intake of Vitamin 'A' and Thiamine are adequate for the community and the intake of Iron also is adequate except for children in the age group 1-3 years.

The most severe deficiency is in calories which is about 50% among children, 42% among lactating mothers and 28% among pregnant mothers, Nicotinic acid and Riboflavin deficiencies come next, while deficiency in calcium and protein are comparatively less. The percentage deficiencies are more severe among the lactating mothers than the pregnant mothers.

The nutrition status of the Jatapu community was relatively better than the other communities, as they are settled agriculturists and derive better incomes than the other communities. The Savara Samantha, and Gadaba are nutritionally more backward.

The food as well as the nutrient intakes of supplemented children are slightly lower than the unsupplemented children, but such difference is not observed among the supplemented mothers. The parents of these children might have been eliminating a portion of the diet, in view of their receiving food through the feeding centres. Enquiries among the beneficiary mothers revealed that they usually share the supplementary food with their husbands and children. Some of the women expressed that while their children and themselves are receiving supplementary food, it is only their husbands who are left without supplementary food. Hence they feel that it is improper for them to consume the extra food without sharing it with their husbands. In view of this tendency no differences could be observed in the intakes of the supplemented and unsupplemented pregnant and lactating women. The supplemented Jatapu women are the only exception in consuming less quantity of foods than the unsupplemented women of the same communities. It is probable that the

beneficiary women of this community, who are superior in the tribal hierarchy are utilising the supplementary feeding to the maximum advantage, while other communities are not deriving similar benefits.

Anthropometric assessment reveals under-weight for height, and also for age in all communities. The variations between the communities do not show any appreciable differences when expressed as a percentage of the general standard. The Jatanu community show slightly higher standards to all other communities.

The heights of the children in the age group 6-12 months were 10% less than the standard, while in other age groups they are 20 to 10% less than the standard. Their weight for age, Arm circumference and fatfold thickness at triceps are 30 to 40% less than the Standard, revealing that the muscle depletion was more severe than re tradition in length.

The weight of the mothers for their height is 20 to 25% less than the standard, while the Arm circumference is 30% less than the standard. The diminution in body fat is more than 40% less than the standard.

In general 78% of the supplemented children and 95% of the unsupplemented children exhibit malnutrition

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in different levels. Only 5% or less of the supplemented as well as unsupplemented children are in the normal level. Cases of serious malnourishment range from 1 to 3% among the children as well as women.

The major clinical deficiency signs observed among the children are that of protein calorie malnutrition, which were around 10% among the supplemented children and around 20% among the unsupplemented children. Cases of Marasmus are 0.7% among the supplemented children and 1.33% among the unsupplemented children. Vitamin deficiency signs are comparatively less in both the supplemented and unsupplemented groups.

Anaemia, Burning feet, and Tenderness of calf muscle, indicating deficiency of calories, Iron and B Complex are the more prevalent signs among the women. Anaemia was comparatively more among the pregnant women. The percentage prevalence among the unsupplemented women was comparatively more than the supplemented women.

Regular supplementary feeding could result in the complete neutralisation of protein deficiency among children and pregnant women, while the lactating women still have about 12.1% deficiency. It could also meet the deficiencies in Iron. However the children as well as mothers will still have 25 to 30% deficiency

in calories. Another notable feature of supplementation is the neutralisation of Nicotinic acid deficiency to a mild level. The requirements of fat remain to be tackled even after supplementary feeding.

The major nutrients that have to be augmented are calories, calcium and fat.

The food as well as nutrient intake of Srikakulam tribals is lower than other tribal communities. Similarly their nutrition standards are also relatively lower than the Gonds, Chenchus, and Tribals of East and West Godavari agencies. The weight for height standard was lowest among the Srikakulam tribal children as it was 30 to 40% less than the standard compared to 10 to 20% less than the standard among other tribals. Their arm circumference and fatfold thickness were 30 to 40% less than the standard, compared to 10 to 20% less than the standard among the Gonds and Chenchus. The tribal children of East and West Godavari district have the same standard of arm circumference and fatfold thickness as that of the Srikakulam district.

The supplemented children were significantly taller and heavier than the unsupplemented children, but such positive impact could not be observed among the pregnant and lactating women, probably due to sharing of supplementary food with other members of their families.

The dietary analysis reveals that a part of the supplementary diet is actually serving as a supplement to home diet. As the combined home and supplementary diet together also could not completely meet the requirements of calories, this tendency has to be curbed. This has to be done by educating the women about the ~~xxxxxxx~~ extra nutritional needs of Pre-school children, pregnant women and lactating mothers, through demonstrations, talks and Audiovisual aids.

As the principal deficiency was in calories and not in protein, the emphasis should be on increasing the quantitative consumption of cereals. All the diets suggested for the Special Nutritive Programme will serve this purpose. Hence the recipes which can be procured with least expenditure may be selected by the respective Block Development authorities. However, if funds permit, recipes containing oil will be more preferable in view of the complete absence of oil in their home diets.

The deficiencies observed in calcium and B Complex vitamins were due to the avoidance of milk and milk products by the tribals of this district.

However the calcium intake of this area is relatively far higher than other tribal communities of this state, as Ragi a very rich source of calcium and iron, is one of their staple foods. If Ragi porridge or Laddu can be served in the SNP programme also it may bridge the gap between calcium intake and requirements. But it is likely to create a feeling of monotony. Hence it is desirable to encourage the tribals to take up dairying and consume milk and milk products. If the tribals can adopt dairying, it will also provide them extra income to purchase more cereals. Introduction of Tapioca as a garden crop also will serve to meet the requirements of Calcium.

This area is unique in having highest consumption of leafy vegetables, resulting in the highest intake of Vitamin 'A'. The intake of Vitamin 'A' is far higher than the requirements. Hence there is no need to administer vitamin 'A' concentrates through the feeding centres.

An extra provision of 7 paise was provided to serve extra quantity of food for pregnant and lactating mothers. In spite of this some Sanithis are still serving the same quantity of food for children as well as mothers. As the mothers are

facing severe caloric undernutrition, it is highly essential to serve extra quantity of supplementary food, as suggested in the guidelines and take steps to see that the food is consumed by the women themselves.

To curb Anaemia which is highly prevalent among the mothers, Iron and Folic acid tablets may be served through the feeding centres. Though folic acid tablets are served at some feeding centres, care was not taken to see that the tablets are swallowed by the beneficiaries. As the tribals do not know the value of the tablets, usually they are found to throw away the tablets, thereby wasting a lot of money. Hence the organisers should be instructed to serve the recipes, only after the tablets are consumed in their presence.

It was observed that the recipes are not prepared as suggested in the guidelines. Usually the groundnut is not properly roasted and the leafy vegetables are not added. At some centres the various ingredients are simply mixed and served without any cooking. Such deviations are likely to create problems of indigestion. Hence, the authorities may take steps to see that the foods are prepared as suggested in the guidelines. Children below 1 year could not chew and swallow solid preparations. In spite of this some