

Dietary Assessment of the Gadaba Tribal Children from Koraput, Odisha

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Abstract: Nutritional status is a major determinant of the health and well-being amongst children. Developing countries like India accounts for about 40% of the undernourished children in the world and are largely due to the result of dietary inadequacy in relation to their needs. More than half of the children in India are unable to grow to their full physical and mental potential owing to their malnutrition. Under nutrition is characterized by mental and physical starvation, low weight in relation to height or other skeletal indices, diminished skin fold, exaggerated and skeletal prominences and loss of elasticity of skin. The etiology of under nutrition is associated with several related consistent factors termed as poverty syndrome. This research study aims to determine the nutritional status of Gadaba tribal children in the remote district of Koraput, Odisha and make suggestion for their wellbeing.

Keywords: nutrient, tribal children, deficiency, malnutrition,

1. Introduction

In India malnutrition remains a silent emergency, though the Govt. of India has made significant progress in the past several decades in improving the health and well-being of its people. According to the World Bank report in the last 40 yrs in India the mortality has declined by half and fertility by two fifths, but malnutrition has only come down by about one fifth. While under nutrition remains a major concern area for tribal people however tribal children are the most vulnerable segment for under nutrition and their nutritional status has been considered as an important indicator for progress in efforts to combat under nutrition and associated ill health for tribal (ICMR, 2013).

Nutritional status is a major determinant of the health and well-being amongst children. Developing countries like India accounts for about 40% of the undernourished children in the world and are largely due to the result of dietary inadequacy in relation to their needs. More than half of the children in India are unable to grow to their full physical and mental potential owing to their malnutrition. Under nutrition is characterized by mental and physical starvation, low weight in relation to height or other skeletal indices, diminished skin fold, exaggerated and skeletal prominences and loss of elasticity of skin. The etiology of under nutrition is associated with several related consistent factors termed as poverty syndrome.

Odisha, the most picturesque state in eastern India, occupies a unique place in the tribal map of the country having largest number of tribal communities (62 tribes including 13 primitive tribes) with a population of 8.15 million constituting 22.3% of state's population (Census, 2011). The primitive tribal communities have been identified by the Govt. of India in 15 states/union territories on the basis of (a) pre agricultural level of technology (b) extremely low level of literacy; and (c) small, stagnant or diminishing population (Basu, 1994).

Keeping this fact in view and realizing the importance of nutritional status of the population, more particularly of the children, the researcher has taken an attempt to study the

nutritional study of the tribal children. As the state of Orissa has the higher number of tribal populations of eastern India, the study was designed and planned to be within the geographical limits of the state in the district of Koraput.

2. Objectives of the Study

The objectives framed to undertake the research study is described below:

- To assess the nutritional status of tribal children and to see whether there exists any difference in the nutritional status of the tribal children, due to the nature of locality they belong to, i. e., Developed Area and Underdeveloped Area'
- To examine whether there exist any difference in the nutritional status of tribal children due to the level of education of the child. i. e. literate or illiterate
- To examine whether there exist any difference in the nutritional status of tribal children based on their gender. i. e., boys or girls.

3. Methodology

The plan and procedure for achieving the objectives of this study are designed in conformity with the methodology/procedure adopted for a 'Normative Study'. The details of the methodology are confined to the three basic principle of the normative study, viz.

- a) Selection of Tools/Techniques
- b) Selection of the Sample, and,
- c) Collection and Analysis of Data

The interview schedule was designed in such a way that the hypothesis for the study could be tested and a near accurate result could be obtained. The schedule was also pretested within a small group of identical community in a nearby area and redesigned as per the results obtained thereof. Each aspect of the interview schedule was examined carefully and was finalized and used for the study purpose.

The sample villages of the selected block are divided into two categories, viz., *Developed and Underdeveloped*. The

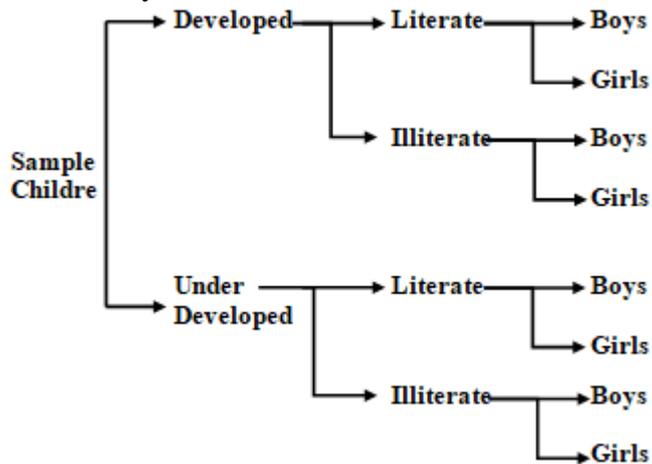
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required secondary information to categorize the villages is collected from the secondary source and the indicators on the basis which the division is made are shown below:

Organizational Chart Showing Different Strata Selected for the Study



A total number of 312 sample children of age 6 – 14 yrs are identified for the study and are regrouped into the following strata.

- **Developed and Underdeveloped:** This has been taken as a synonym for urban and rural. As discussed earlier the villages located within 4-5 kms. of the block headquarters are being identified as ‘developed’ and the villages beyond this limit are being considered as ‘underdeveloped’.
- **Literate and Illiterate:** The standard norm for literate and illiterate (defined by the Government) is used to regroup the children who live in the developed and underdeveloped villages.
- **Boys and Girls:** As usual to estimate and examine the difference in the nutritional status of the boys and girls both the categories are added into the strata.

The Pottangi Block of the Koraput district of Orissa has been selected as the sample block and as per our purpose some villages of the block are being identified. The villages of the block were divided into two categories, viz., Developed and Underdeveloped. Out of these strata some villages were selected from these two categories with the help of stratified sampling method. Thus the villages selected are; *Badlliguda, Nilampadu and Chintaguda*, which are considered as the developed villages and those villages are located within 4-5 kms of the Pottangi block. On the other hand, the villages, viz., *Podapadar, Mulaguda, Sisaguda and Ghodaghati*, which are located beyond the

above limit and located within a distance of 15-17 kms from the block head quarter are taken up for our research purpose as the underdeveloped villages.

Nutritional Status of the Sample Children

Furthermore, as per the methodology described earlier in this chapter –among various available methods the following two methods were preferred to be used; *a) Anthropometric Measurements and b) Dietary Assessment* for the purpose of estimation of the related data collected through the questionnaire. It is also mentioned above –in detail-that the ‘Anthropometric Measurement is based on the height-for age and the weight-for age, and the Dietary Assessment is based on the comparison of the Recommended Dietary Allowance (RDA) and the observed food intake of the Gadaba children. All those data, estimation and corresponding analysis are being presented in the sections below.

To get a comparative analysis of the nutrient intake of the sample Gadaba children in accordance with selected strata was estimated and analyzed. Twenty four Hour dietary recall method was used to assess dietary intake of the sample children. The total cooked volume of each of the preparations was recorded in terms of standard cups. The quantity of each preparation consumed by each individual was assessed in terms of cups and also recorded the quantity of food (NIN, 2005). The energy and nutrient content of the diet was calculated using food composition table (Gopalan et. al, 2012). Also to accommodate the seasonal and other variations the food composition and the dietary intake for sixty days were studied which was divided into various subgroups in accordance with different types of food calendar followed by the Gadaba tribe in the Pottangi block. These multiple recalls can be thought of as sampling from an individual's ongoing food behavior. All those data collected were computed and tabulated for our analyses and compared with the Recommended Dietary Allowances (RDA) developed by the Indian Council of Medical Research (ICMR) for a healthy child within the age group of 6 to 14 years.

The observed average intake of nutrients like calorie, protein, fat, carotene, vitamin-c, calcium, iron was computed for different age groups in the following tables and compared with RDA values as per ICMR. The composition of the nutrients were tabulated and presented in various tabular formats. The nutrients are estimated age group wise and compared with the RDA value. The corresponding tables are presented below for further analysis.

Table 1: Nutrient Intakes of the Sample Children 6 Years

Development Indicator	Education Status	Sex	Calorie (kcal)	Protein (gm)	Fat (gm)	Carotene (µg)	Vit-C (mg)	Calcium (mg)	Iron (mg)
Developed	Literate	Boys	1007.29	20.98	18.90	903.40	26.58	404.32	18.99
		Girls	1084.98	21.94	18.64	911.30	26.96	405.18	18.94
	Illiterate	Boys	991.80	20.95	18.57	901.52	26.65	398.27	18.45
		Girls	984.89	19.65	18.44	913.69	27.16	325.84	17.50
Under Developed	Literate	Boys	997.10	27.92	18.96	903.80	26.65	385.52	9.06
		Girls	885.28	20.89	18.82	912.70	26.99	348.24	12.05
	Illiterate	Boys	879.11	23.48	18.48	947.73	27.49	400.42	15.30
		Girls	871.54	18.29	18.44	902.59	26.65	328.73	18.26
RDA (ICMR)			1690.00	30.00	25.00	1600.00	40.00	400.00	18.00
SD			76.30	2.91	0.21	15.21	0.32	34.52	3.69

Table2: Percentage of Excess& Deficiency of Average Nutrients among 6 years children with comparison to ICMR Recommended Diet

Development Indicator	Education Status	Sex	Calorie	Protein	Fat	Carotene	Vit-C	Calcium	Iron
Developed	Literate	Boys	-40.40	-30.07	-24.40	-43.54	-33.55	1.08	5.50
		Girls	-35.80	-26.87	-25.44	-43.04	-32.60	1.30	5.22
	Illiterate	Boys	-41.31	-30.18	-25.71	-43.66	-33.38	-0.43	2.50
		Girls	-41.72	-34.50	-26.22	-42.89	-32.11	-18.54	-2.78
Under Developed	Literate	Boys	-41.00	-6.93	-24.18	-43.51	-33.38	-3.62	-44.11
		Girls	-47.62	-30.37	-24.72	-42.96	-32.53	-12.94	-33.06
	Illiterate	Boys	-47.98	-21.73	-26.26	-40.77	-31.28	0.11	-15.00
		Girls	-48.43	-39.05	-26.06	-43.59	-33.39	-17.82	1.44

N. B.-Figures in *Italic bold* represents Excess and rest represents Deficiency

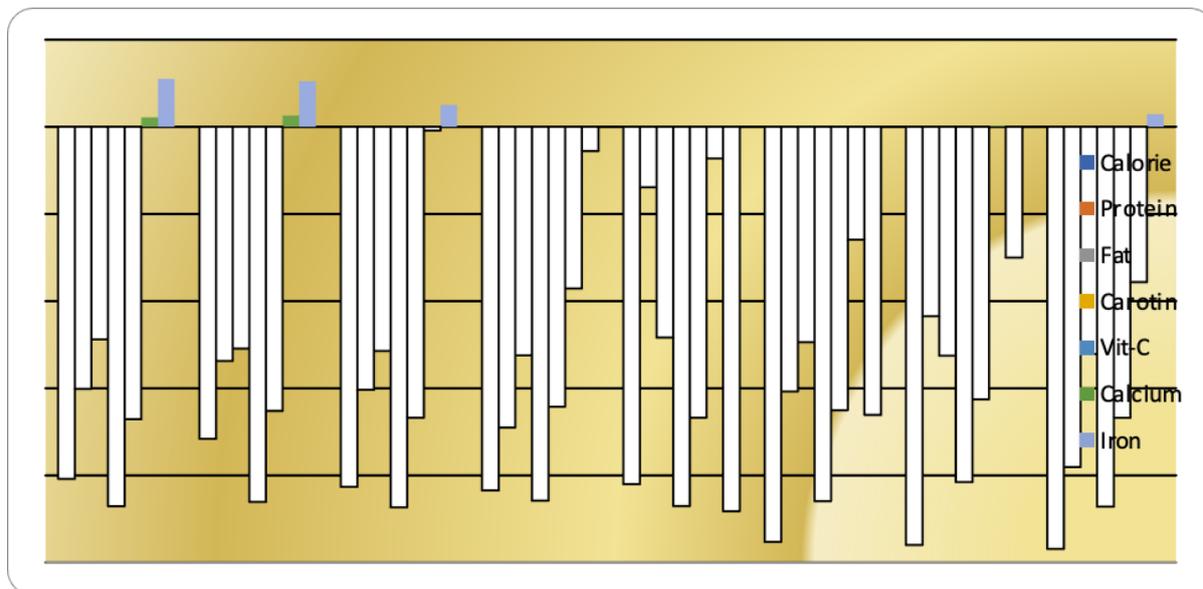


Chart 1: Percentage Wise Deficiency for 6 Yrs. children

A Comparative analysis of the average availability of these nutrient ingredients (estimated on the basis of the average dietary intake of the children) from Table 1 and Table 2 indicates a huge gap in between the requirement and the availability of the nutrients to the sample children for the above mentioned age group. The estimated figure also shows that the underdeveloped illiterate girls get the lowest amount of Calorie (871.54 Kcal), Protein (18.29 gm), Fat (18.44gm) thereby showing a percentage deficiency of -48.43,-39.05,-26.06 respectively. Further it is observed that highest Carotene deficiency is found with the developed illiterate boys (-43.66%) and highest calcium deficiency (-18.54%) in food intake is found in developed illiterate girls. The deficiency of calorie in comparison to ICMR standard is

very low with standard deviation (SD) 76.30. A peculiar deviation is seen for the underdeveloped literate boys for the iron intake which is -44.11%. This shows that although they are literate but their parents aren't providing them with sufficient iron rich diet. Chart 1 shows a slight increase in calcium and iron for developed literate boys and girls. A careful comparison and examination of the nutrient availability figures indicate that normally the Gadaba children in the developed area are getting slightly higher micronutrients in their food than that of their counterparts who live in the underdeveloped areas.

Further estimation and comparison of the nutrient required are presented in a complied form in Table 3 and in Chart 2

Table 3: Nutrient Intakes of the Sample Children (7-9) Years

Development Indicator	Education Status	Sex	Calorie (kcal)	Protein (gm)	Fat (gm)	Carotene (µg)	Vit-C (mg)	Calcium (mg)	Iron (mg)
Developed	Literate	Boys	961.44	36.19	21.53	1642.35	29.110	397.81	23.25
		Girls	956.11	36.01	21.24	1637.92	29.80	399.51	23.16
	Illiterate	Boys	940.16	36.26	21.23	1687.83	30.14	390.00	23.28
		Girls	934.10	35.58	21.55	1642.19	30.00	374.41	23.44
Under Developed	Literate	Boys	942.62	36.90	21.54	1699.41	30.45	387.96	23.30
		Girls	935.45	35.70	21.57	1649.84	30.30	386.32	23.55
	Illiterate	Boys	935.60	36.31	21.23	1684.05	30.28	369.69	23.09
		Girls	933.37	35.63	21.17	1676.15	30.70	370.31	22.95
RDA (ICMR)			1950.00	41.00	25.00	2400.00	40.00	400.00	26.00
SD			10.69	0.44	0.18	24.46	0.50	11.77	0.19

Table 4: Percentage of Excess & Deficiency of Average Nutrients among 7-9 years children with Compared to ICMR Recommended Diet

Development Indicator	Education Status	Sex	Calorie	Protein	Fat	Carotene	Vit-C	Calcium	Iron
Developed	Literate	Boys	-50.70	-11.74	-13.89	-31.57	-27.25	-0.55	-10.60
		Girls	-50.97	-12.18	-15.06	-31.75	-25.50	-0.12	-10.91
	Illiterate	Boys	-51.79	-11.56	-15.08	-29.67	-23.98	-2.50	-10.46
		Girls	-52.10	-13.22	-13.79	-31.58	-25.00	-6.40	-9.85
Under Developed	Literate	Boys	-51.66	-9.99	-13.86	-29.19	-23.88	-3.01	-10.39
		Girls	-52.03	-12.92	-13.73	-31.26	-24.25	-3.42	-10.39
	Illiterate	Boys	-52.02	-11.43	-15.10	-29.83	-24.30	-7.58	-11.19
		Girls	-52.13	-13.10	-15.34	-30.16	-23.25	-7.42	-11.73

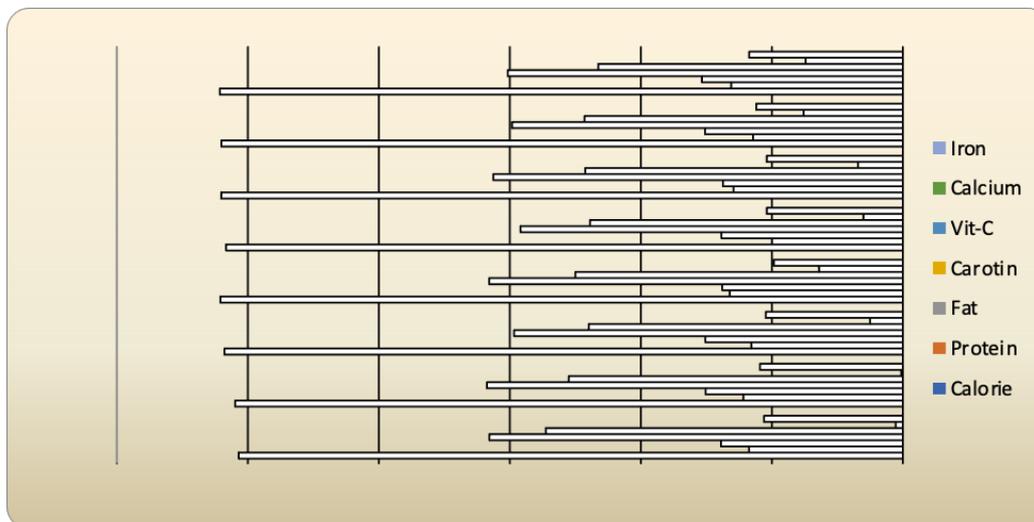


Chart 2: Percentage Wise Deficiency for 7-9 Yrs children

An examination of the above table and graph indicates the fact that the Calorie availability of the underdeveloped illiterate girls is the lowest (933.37 K. Cal), and the developed literate boys get the highest amount of calorie (961.44 K. Cal). But it could be seen that the difference of calories availability is not that significant. But the variances of required calorie (1950.00 K. Cal) for this age group of 7-9 years and the highest available average calorie (961.44 K. Cal) are quite significant. In addition to this it can be observed that the highest estimated Carotene availability (1699.41µg) is significantly lower than the required carotene

(2400.00 µg). The above Chart 5.36 for the children of 7-9 yrs age shows that they are not getting sufficient nutrient in comparison to their requirement as per ICMR standard and the deficiencies in descending order of nutrients can be shown as calorie, carotene, vitamin C, fat and protein.

The nutrient intake of the children within the age group of 10-12 years are also estimated and presented in Table 5 and Table: 6 and Chart 3 below for further examination and analysis.

Table 5: Nutrient Intakes of the Sample Children (10-12) Years

Development Indicator	Education Status	Sex	Calorie (kcal)	Protein (gm)	Fat (gm)	Carotene (µg)	Vit-C (mg)	Calcium (mg)	Iron (mg)
Developed	Literate	Boys	1232.81	44.99	18.81	1800.46	32.26	542.33	37.43
		Girls	1194.03	42.39	18.37	1787.04	32.09	528.57	24.84
	Illiterate	Boys	1204.36	44.02	20.01	1797.16	31.44	534.25	31.18
		Girls	1173.21	41.72	18.27	1784.52	32.07	507.83	21.60
Under Developed	Literate	Boys	1213.19	44.36	18.02	1800.34	31.78	535.23	32.28
		Girls	1192.86	42.35	18.35	1789.74	32.07	529.07	19.90
	Illiterate	Boys	1192.24	43.35	18.92	1795.90	31.40	523.73	36.05
		Girls	1170.90	41.72	18.01	1787.02	32.10	508.75	20.59
RDA (ICMR)	Boys		2190.00	54.00	22.00	2400.00	40.00	600.00	34.00
	Girls		1970.00	57.00	22.00	2400.00	40.00	600.00	19.00
SD	Boys		17.09	0.69	0.82	2.29	0.40	7.67	5.07
	Girls		12.39	0.37	2.02	2.13	0.01	11.86	2.19

Table 6: Percentage of Excess& Deficiency of Average Nutrients among 10-12 years children with Compared to ICMR Recommended Diet

			Calorie	Protein	Fat	Carotene	Vit-C	Calcium	Iron
Developed	Literate	Boys	-43.71	-16.68	-14.49	-24.98	-19.35	-9.61	10.10
		Girls	-39.39	-25.64	-16.48	-25.54	-19.78	-11.91	30.75
	Illiterate	Boys	-45.01	-18.49	-9.06	-25.12	-21.40	-10.96	-8.29

		Girls	-40.45	-26.80	-16.95	-25.65	-19.83	-15.36	<i>13.69</i>
Under Developed	Literate	Boys	-44.60	-17.85	-22.09	-33.31	-20.55	-10.80	-5.06
		Girls	-39.45	-25.71	-16.59	-25.43	-19.83	-11.82	<i>4.74</i>
	Illiterate	Boys	-45.56	-19.73	-14.02	-25.17	-21.50	-12.71	<i>6.02</i>
		Girls	-40.56	-26.81	-18.14	-25.54	-19.75	-15.21	<i>8.39</i>

N. B.-Figures in *Italic bold* represents Excess and rest represents Deficiency

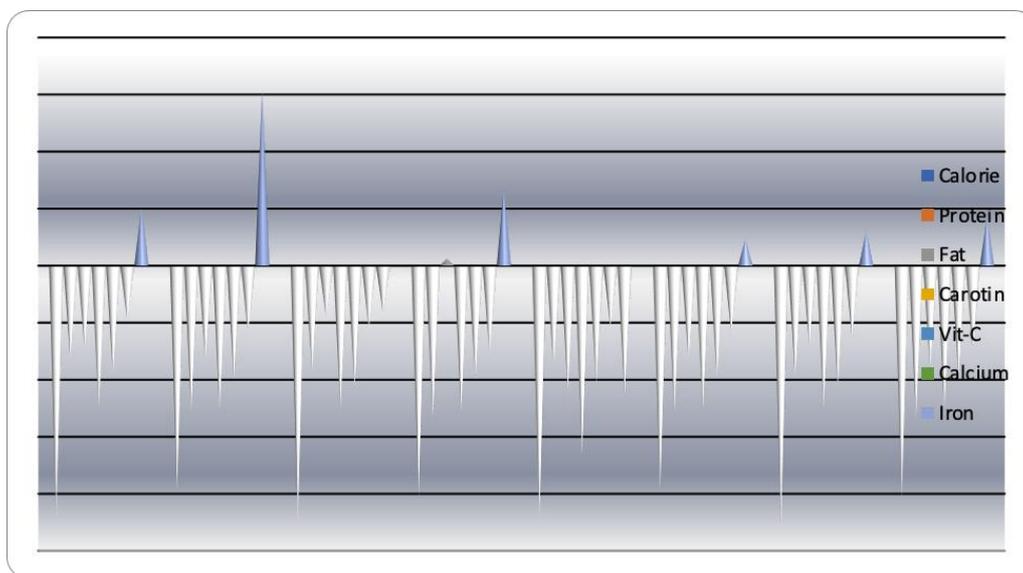


Chart 3: Percentage Wise Deficiency for 10-12 Yrs children

A critical examination of the figures given in the Table 5 and Table 6 and Chart 3 indicates the fact that all the sample Gadaba children irrespective of their literacy level and developmental level get lower amount nutrients except iron. Children of this age group consume iron rich diet which shows iron requirement of the body normal or little bit higher. They get a very lower dose of calorie, protein, fat, carotene and vitamin C. The under developed illiterate girls is evidently visible as the most nutritionally deficient as

compared to other categories. The deficiencies detected in the underdeveloped areas are higher as compared to the developed areas indicating the facts that development plays a major role in the upliftment of nutritional status.

The nutrient intake of the children within the age group of 13-14 years are also estimated and presented in Table 5.3, Table: 5.32 and Chart 5.38 below for further examination and analysis.

Table 7: Nutrient Intakes of the Sample Children (13-14) Years

Development Indicator	Education Status	Sex	Calorie (kcal)	Protein (gm)	Fat (gm)	Carotene (µg)	Vit-C (mg)	Calcium (mg)	Iron (mg)
Developed	Literate	Boys	1563.56	57.70	19.33	1256.55	36.29	659.94	36.79
		Girls	1556.46	56.06	19.28	1179.67	36.27	574.66	27.20
	Illiterate	Boys	1543.64	55.68	20.00	1148.11	36.27	548.17	36.25
		Girls	1540.15	55.08	19.12	1174.57	34.97	563.00	22.95
Under Developed	Literate	Boys	1553.49	56.98	19.30	1151.65	36.31	556.06	36.59
		Girls	1548.54	55.35	19.26	1074.39	33.75	571.60	22.00
	Illiterate	Boys	1538.38	55.70	19.02	1118.58	36.11	531.20	36.14
		Girls	1526.58	54.64	18.67	1072.35	34.49	542.15	20.21
RDA (ICMR)	Boys		2450.00	70.00	22.00	2400.00	40.00	600.00	41.00
	Girls		2060.00	65.00	22.00	2400.00	40.00	600.00	28.00
SD	Boys		11.13	1.00	0.42	60.40	0.09	58.33	0.30
	Girls		12.77	0.59	0.28	59.94	1.06	14.66	2.97

Table 8: % of Excess & Deficiency of Average Nutrients among 13-14 years children with Compared to ICMR Recommended Diet

Development Indicator	Education Status	Sex	Calorie	Protein	Fat	Carotene	Vit-C	Calcium	Iron
Developed	Literate	Boys	-36.18	-17.57	-12.15	-26.81	-9.28	9.99	-10.27
		Girls	-36.47	-19.92	-12.36	-30.01	-9.32	-4.22	-2.85
	Illiterate	Boys	-36.99	-20.45	-9.10	-27.16	-9.33	-8.64	-11.58
		Girls	-37.14	-21.32	-13.09	-30.23	-12.58	-6.17	-18.05
Under Developed	Literate	Boys	-36.59	-18.59	-12.27	-31.18	-9.23	-7.32	-10.75
		Girls	-36.79	-20.93	-12.46	-32.48	-15.63	-4.73	-21.41
	Illiterate	Boys	-37.21	-20.43	-13.56	-28.39	-9.73	-11.47	-11.86
		Girls	-37.69	-21.94	-15.13	-36.99	-13.78	-9.64	-27.82

N. B.-Figures in *Italic bold* represents Excess and rest represents Deficiency

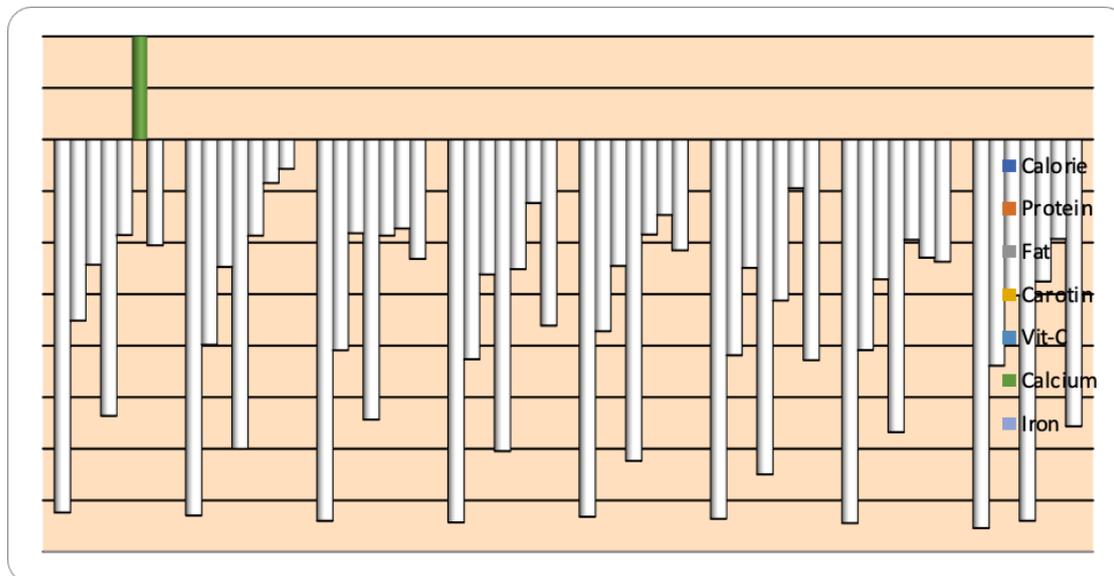


Chart 4: Percentage Wise Deficiency for 13-14 Yrs children

Table 7 and Table 8 along with Chart 4 reveal the fact that the level of nutrition associated with the underdeveloped area is significantly as compared to the developed areas. Also it is seen that the underdeveloped illiterate girls have very poor nutritional status as compared to other categories. The nutrient deficiency associated with the sample girl children irrespective of their locality and literacy levels is higher than that of the boys. The underdeveloped boys show the greater deficiency of nutrients as compared developed boys. These children are undernourished because they are not taking sufficient amount of nutrients required for the body during the adolescent period.

The most common food items used by the family and, more particularly, the Gadaba children are Rice, Ragi, Maze and Bazra which comes under the category of cereals. They consume pulses like Kandul and Dongarani (a local pulse product). In addition to this they eat vegetables like pumpkin and potato. The prominent leafy vegetable constitutes Koshila which was also supplemented with other leafy products primarily collected from their own back yard. Roots and tubers like sweet potato (which are mainly collected from the forest surrounding their villages also features in their food routine along with the Nizer Seed (oil Seed). Besides these the food basket of the Gadaba children also constitutes Flesh Foods like Boiler, Beef and Pig meat. Also, they use fruits (mostly collected from the nearby forests) like Amla. Mango and Tamarind which are normally available seasonally. Besides these food stuff they also use Vagi, Kolath, Kumuda, Jadam Jala, Mandia Reba, Medarang, Dua, Barada, Purudi, Chellari in their diet which constitutes more or less a specialty for the Gadaba children.

All the above analysis on the Gadaba tribal Children –based on various principles, norms and guidance by different prominent institutions who are very much concerned working on the health aspects of the children, both at their infant stage and also at their growing stage (6-14 years)-mostly agreed upon one point that those tribal children –who slowly are losing their rich culture of living, their own dietary pattern to a certain extent which was purely based on the forest produces in the earlier day-are living under a

under nutritional or mal nutritional condition. These people are not aware of the nutrient deficiencies and about the kind of disease they suffer which may bring serious health hazards to their tribal community. Hence, this aspect can be taken up as a serious concern for the existence of the tribe.

4. Conclusion

Efforts to reduce under nutrition depend on reducing poverty, eradication of illiteracy, providing better sanitation, increasing access to clean drinking water, maternal and child health services. Such programs would be beneficial in not only reducing the rates of CED, but also it helps reducing morbidity and mortality.

This study demonstrated that the nutritional status of the Gadaba children, especially during the 6 – 14 yrs age is very critical. There is an immediate requirement for appropriate steps to be taken to improve nutritional status of this ethnic group. Moreover, it must be mentioned here that similar studies should be undertaken among children of other tribal populations of not only Orissa but also in other parts of India. Since various tribal groups constitute a sizeable portion of India's population, improvement of their nutritional status is of paramount importance from the national public health perspective.

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