



Food Availability in Households of Young Children (upto 3 years) in Three Tribal Villages of Odisha

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Abstract

A one year study was undertaken in three tribal villages in Koraput district of Odisha, to understand the food availability situation in households of children upto three years. The study mapped the food items available in the households, their sources, seasonal variations and strategies for augmenting food supply. Eighty per cent of the households were small and marginal farmers. Fifty five food items were reported throughout the year and eight food sources. Major dependency for food was on agricultural land, public distribution system and markets while landless households also utilized community initiated grain banks. About 50% of households had ration cards. Rice was available throughout in all households. Ragi was available in more than 80% and 68% of households respectively for six months each. Lentil was available in 68 - 80% of households, throughout the year, but purchased from market, since pulse cultivation was not a viable proposition. Animal foods and fruits were consumed rarely. Drumstick leaf was available for 7 months in a year, while potatoes, onions and tomatoes purchased from market were available throughout. Small farmer households showed significantly higher number of food items. Maximum number of food items were available in winter, soon after harvest. There was no starvation. More than 50% of households reported availability of four food groups including animal food. Universal PDS, supply of ragi, a pulse and an essential oil through the PDS, alongwith livelihood initiatives and improved agricultural technologies are suggested policy measures for improving dietary diversity.

Keywords: Household food security, tribal households, children upto three years

Introduction

While under nutrition affects productivity and quality of life for all individuals, it is especially critical during the first three years, since 80% of brain development takes place during

this period. Setback to growth and development in this period is largely irreversible. According to National Family Health Survey (III) India is home to about 44% of under nourished children below three years. Though

the current Global Nutrition Report¹ has reported a 9% decline in child stunting in India for children below five, the situation of children below three years is still grim. The NFHS results hardly show any noteworthy reduction in the levels of child under nutrition. In 1998-1999, 51% of children less than 3 years were stunted and 43% were underweight and this fell to 45% and 40% respectively in 2005 - 2006. In addition 79% of children in the 6 - 35 months age group were anemic.

The conceptual framework on factors affecting child nutrition identifies household food security as a necessary condition for optimal child nutrition². During the first six months after child birth, a mother needs an adequately balanced diet to regain health and sustain lactation. After six months, in addition to providing mothers with nutritious food, complementary feeding has to be initiated for the newborn. Household food availability is a key factor in ensuring that mothers get a balanced meal and in initiation of complementary feeding.

When compared with the rest of the population, child under nutrition is higher among the tribals³. While a majority of tribals in India are cultivators, there is an increasing body of evidence to show that the alienation of land and forests from the tribals pose grave concern to their livelihood

activities and food security⁴. While advancement in food production has made famines a rarity, the benefits of the same for the nutritionally vulnerable such as tribals and children are still elusive⁵. There is very little documented evidence about household food availability in tribal communities, especially those with children below three years. Koraput district in Odisha with 50% of scheduled tribe population is one of the most backward districts of Odisha. According to an NSSO survey of six most insecure districts from six States in India⁶ of which Koraput was one, it was found that Koraput was the most food insecure with the lowest per capita calorie intake of 1559 kcal/day and the lowest per capita protein intake of 36 g/day as against more than 52 g/day for the other districts.

The situation is ironic since Koraput is considered to be land of origin of rice in India⁷ with thousands of varieties being grown and conserved by the tribals. Agriculture, though the main source of livelihood, is characterized by low levels of productivity⁸. A preliminary survey in January 2012 in three sites in Koraput showed that 59% of children below three years were underweight. The present study was undertaken to understand food availability situation in households with children below three years in three predominantly tribal villages in Koraput district of Odisha.

Objectives of the study were to

- map the food groups available in households of young children upto 3 years for a one year period
- identify the food sources
- understand seasonal variations in food availability
- understand the strategies adopted by households to augment food supply

Materials and Methods

The study data was collected as part of a larger intervention to reduce under nutrition in children below three years in two hamlets namely Nuaguda and Gunthaguda and one revenue village namely Boliguda in Odisha and is stand alone in itself. The first two hamlets were in Kundra Block and the revenue village was in Boipariguda Block in the Jeypore sub division of Koraput district of Odisha. Data was collected over a twelve month period from March 2012 to February 2013 from all households with children below 3 years in all the three villages, followed by ex post facto analysis. Mixed methodologies were used for data collection. A monthly survey was done by trained investigators with a questionnaire, to collect information from the parents of children below three years on socio economic details, the various food groups available on the day of the survey and their sources. Focus group discussions were held once in a month

in all three villages with members of the study households, local leaders, elders, anganwadi worker and ANM on food preferences, cropping patterns, periods of food scarcity and strategies for augmenting food supply. Secondary data regarding borrowing of food stuff from community managed local grain bank in all the villages was collected from the grain bank registers.

Descriptive and inferential statistics was used to analyse the data⁹. Percentages were used in calculating proportion of households reporting availability of various food groups. The total number of food items available in the households were counted and analysis of variance was used to test the mean difference in the availability of food items between landless and landed households. The scope of the present study was limited to presence or absence of food and not its adequacy according to household requirement.

Results and Discussion

Socio economic profile

There were 188 households in all the three villages. Nuaguda, the smallest, was practically uni ethnic with all but four households belonging to the Bhumia tribe. Similarly, 92 % of households in Gunthaguda hamlet comprised of the Paroja tribe and 4% each belonged to the Other Backward Class (OBC) (Kamar) and Scheduled Caste (SC) communities. In Boliguda,

43% were OBC; 38% were the remaining 19 percentage of C than that of tr villages lacked facilities such electricity an provided drinkin had a primary s centre the han mini anganwad

Most of the with thatched r size was five households w farmers pra agriculture. F households had of less than or per cent were landholding bet 9% of the house: hectares of l; landless and be Nuaguda and B forest. Fifty households wer as extended far cent of women non literates. households wit years varied bet the whole year, children or exi completed thre Eight househo

43% were OBCs of the Rana caste and 38% were the Gadaba tribe. The remaining 19% were SCs. The percentage of OBCs was a little higher than that of tribals in Boliguda. The villages lacked basic infrastructure facilities such as motorable roads, electricity and toilets. Tubewells provided drinking water. While Boliguda had a primary school and an anganwadi centre the hamlets were served by a mini anganwadi.

Most of the houses were kutchcha with thatched roofs. The average family size was five. Eighty per cent of households were small or marginal farmers practising subsistence agriculture. Forty six per cent of households had a marginal landholding of less than one hectare. Twenty five per cent were small farmers with landholding between 1 to 2 hectares and 9% of the households had more than two hectares of land. Only 20% were landless and belonged to Gunthaguda. Nuaguda and Boliguda had access to the forest. Fifty one per cent of the households were nuclear and 45% lived as extended families. Seventy six per cent of women and 49% of men were non literates. The number of study households with children below three years varied between 47 and 49 during the whole year, owing to the birth of new children or exit of children who had completed three year of ages (Table I). Eight households exited and another

eight came in at various points of time between March 2012 to February 2013.

Food items and sources

Fifty five food items were counted in the study households throughout the year and they could be classified under seven categories (Table II). Four of these were food groups such as cereals, pulses, vegetables and animal foods. The other three were value added foods, processed foods and supplementary food meant for women and children. Among food groups, 'other vegetables' had a maximum diversity of 16 items, while 9 varieties of green leafy vegetables were reported. Besides cabbage, amaranthus and drumstick leaves, the stalk of onion and leaves of radish, colocasia, cauliflower and pumpkin were reported as consumed. Bamboo shoots and a wild variety of green known as barada saga, was also available. Four varieties of cereals namely rice, little millet, finger millet and maize were available. Eight pulse and legume varieties were found, of which five were dhals that included green gram, lentils, black gram, horse gram and Bengal gram. The pod of broad beans (semi), cow pea and pigeon pea (kandula) are used as dhal substitutes in tribal food preparations. The four root vegetables were onion, potato, yam and radish.

Poultry and sheep were reared for economic gain and their meat including eggs were rarely consumed. Cows and

TABLE I
Distribution of Households with Children from Birth upto 3 Years Between Mar. 2012 – Feb. 2013

Village	Total households in March 2012	Number of households (0 – 3 year children)											
		Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Boliguda	84	16	15	15	15	15	14	16	16	14	13	12	12
Gunthaguda	69	25	25	26	26	28	25	29	29	27	27	27	28
Nuaguda	35	5	6	7	7	8	8	5	5	8	8	8	8
Total	188	47	47	48	49	49	47	48	47	49	48	47	48

oxen were used for ploughing in agriculture. Milk, tea or coffee was not consumed and hence there was not much effort to improve production. Milk was sold either to government cooperatives or tea shops. The value added foods were of two types - freshly prepared savouries and sweets, usually bought from petty shops within the village and dry preserves such as fish, seeds, meat, leaves and stem of vegetables. These were sun dried and stored by households for use during lean periods. The processed foods were biscuits, chips, chocolates and roasted items, bought from retail stores or in weekly markets. The supplementary mix was supplied by ICDS for pregnant, lactating mothers and children.

There were eight food sources which included agricultural land, Public Distribution System, forest, community operated grain bank, kitchen garden, village shops, weekly markets and the anganwadi. In addition, local vendors occasionally came in cycles and sold

fresh fish. Agricultural land was the main source of food for most of the households. Rice was supplied through the Public Distribution System, to households Below Poverty Line (BPL) and Antyodaya Anna Yojana (AAY) households. Some households which did not have ration cards but identified as very poor were provided with PLO (Poor Left Out) cards. Wheat was provided to Above Poverty Line (APL) households. Wild greens, yam, mushroom and bamboo shoots were collected from the forest. In addition these were collected and sold by some men and women in the local markets. All three villages had a community owned grain-seed bank, which lent grains / seeds at a low interest to the needy households. Paddy, rice, ragi and horse gram were available in the grain banks. Membership was mandatory to borrow grains. The interest rate, charged in kind as grains, decided by the community was lower than that of local money lenders. The item thus borrowed was used for either

TABLE II
Food Groups and Varieties Found in Study Households During March 2012 - February 2013

Food categories	Varieties	No.
Cereals	Rice, finger millet (ragi, mandiya), little millets (saun), maize	4
Pulses and legumes	Green gram dhal (moong dhal), lentils (massur), Bengal gram dhal, horse gram (kolatha), black gram (channa dhal), Pigeon pea (arhar / kandula), cow pea	5
Green leafy vegetables	Drumstick, pumpkin, amaranthus, cauliflower, colocasia, radish, onion, cabbage, barada saga (wild variety)	9
Root vegetables	Potato, onion, radish, yam	4
Other vegetables	Bamboo shoot, beans, brinjal, tomato, bitter gourd, broad beans, cauliflower, jackfruit, papaya, kovai (kunduri), chilli, drumstick, parwar (parwal), cucumber, pumpkin, spine gourd	16
Animal food	Milk, meat (mutton) fish, poultry	5
Value added food	Rice cake bara (savory made of Bengal gram or wheat flour), pakudi, (savory prepared from wheat flour and vegetables), roasted peas, laddu (made of ragi and jaggery), home dried preserves - fish, meat, chilli, jack fruit seeds radish leaves and stem, cauliflower leaves, tamarind, bamboo shoot	5
Processed food	Biscuits, chips, toffees, roasted peas, masala peanuts, mixture	6
Supplementary food	ICDS mix (for children, adolescent, pregnant and lactating mothers)	1
Total		55

direct consumption / cultivation or were sold for buying inputs for cultivation.

While the markets and anganwadi were common sources of food to all households, access to the other sources varied depending on ownership to land, availability of space for kitchen garden, membership in grain bank, possession of a ration card and access to forest. Among the study households it was found that 80, 41, 55 and 51% respectively owned land, kitchen garden, ration card and were members of the grain bank. Though Boliguda and

Nuaguda had access to forest, only a few households utilized the source during rainy season. A majority of households (i.e) 28% had access to three food sources, while 23% had access to five food sources. While 21% had access to four sources of food, another 26 and 2% respectively could access two sources and one source only.

Agricultural land type and crops cultivated

The type of land determined the crops that could be grown. Koraput is a hilly terrain, with three major land types namely upland, middle land and

low land. Upland supported the maximum variety of food crops (Table III). Among cereals the traditional short duration varieties of paddy such as *Paradhan*, *Matidhan* and *Pankagura* could be grown in upland and middleland while the long duration varieties such as *Kalajeera*, *Machakanta*, *Sapuri* and *Umriachudi* grow in low lands. Traditional varieties are preferred for household consumption and during rituals. The high yielding short duration rice varieties such as 1001, 1010 and *Akasa Nirmal* are grown mainly for economic reasons. The rice obtained from PDS is used either for consumption or for sale depending on household grain availability. All millet varieties could be grown in upland, while only finger millets could be grown in middle land. Maize, either the traditional or the hybrid variety, is sown in the rainy season in the agricultural field and the kitchen garden and is harvested in winter. Though not a staple, it is grown for economic purpose and consumed either as pop corn or dried, powdered and consumed during lean periods.

Among pulses, black gram and horse gram could be grown in upland while only green gram could be grown in middle and low lands. Among the vegetables, except for potatoes and onions the rest could be grown round the year depending on the availability of water. For all crops except other

vegetables the sowing period is the rainy season (i.e) the months of July and August. Harvesting lasts from September to January (i.e) during winter and in the case of green gram even in the summer months of April and May.

Availability of cereals

All households reported availability of rice throughout the year. The landed households had cultivated traditional or hybrid varieties or both. All the BPL, AAY and PLO households had lifted their share of rice from the ration shops. All nine landless households were members of the grain bank, of which seven had borrowed either paddy or rice from the community grain bank on one or more occasions throughout the year to the tune of 15 to 100 kg respectively. Among the landed households, 15 were members of the grain bank and seven and 13 households respectively had borrowed paddy during August and September 2013, to the tune of 520 and 700 kg. The grains were used for sowing or were sold to realize money for agricultural operations. Availability of other cereals such as ragi, maize and little millet showed a varying pattern.

A maximum of households reported the availability of finger millets (ragi) during six months of the study period. Thirty eight (81%), 40 (85%), 42 (86%) of households reported the availability of ragi during March, April and June. In August, 42 (86%)

TABLE III
Type of Agricultural Land and the Crops they Support

Crops grown	Upland	Middleland	Lowland	Sowing season	Harvesting season
Cereals					
Paddy					
Traditional variety	✓	-	-	July – August	September – November
Hybrid variety	✓	✓	✓	July – August	November – January
Finger millet	✓	-	-	July – August	September – November
Little millet	✓	-	-	July – August	November – December
Maize					
Traditional variety	✓	-	-	July – August	November – December
Hybrid crop				June – July	September – October
Pulses					
Black gram (Biri)	✓			June – July	October – November
Green gram (Moong)	-	✓	✓	January – February	April – May
Horse gram (Kolatha)	✓	-	-	July – August	October – November
Pigeon pea / Arhar (Kandula)	✓	✓	-	June – July	October – November
Cow pea (Jhudang)	✓			July – August	October – November
Vegetables					
Other vegetables	✓	✓	✓	All round the year	3 – 4 months after planting

households and 41 (84%) each in November and December respectively reported the availability of ragi. This is a staple and all households with upland usually opt to cultivate ragi. The peak availability during August is when seeds are sourced for cultivation and

during November and December due to harvesting. Discussion with the community revealed that the harvest usually lasts for about three or four months after which households buy it from the open market. Though grain banks reported having ragi stocks

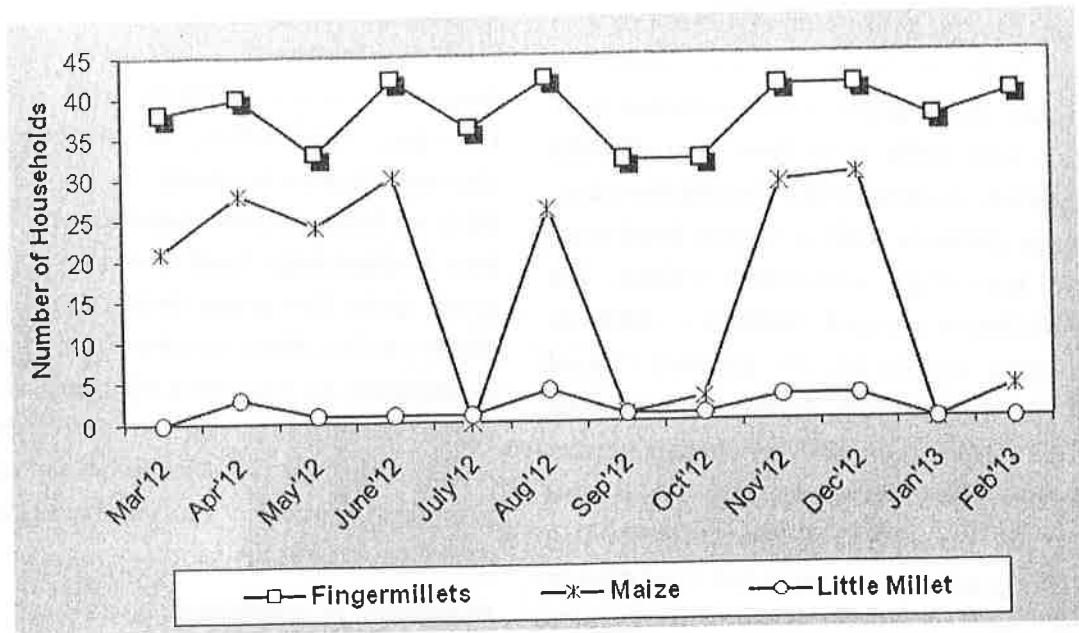


Figure 1
Availability of cereals in households (Mar. 2012 - Feb. 2013)

throughout the year, only seven households had accessed ragi, the reasons for which are not clearly known.

Cultivation of maize is a matter of choice and sourcing of grains begin in June with sowing in July - August. Harvest is during September to October and depending on quantity of yield and market demand the harvest may last up to February of the following year. Forty three, 60 and 48% of households reported having maize during March to May of 2013. Maize was available in 61 and 53% of households in June and August and in 60% of households in November and December respectively. It is likely that about 60% of study households had sourced maize in June,

cultivated during the rainy season and enjoyed the harvest in November and December. After that very few households reported its availability. The harvest had mostly been sold. Little millet was found in less than five households throughout the study period (Fig. 1).

Availability of pulses

Pulses are sown after harvesting paddy, making use of the residual soil moisture. Of the five varieties of pulses, three, namely, green gram, horse gram and black gram are grown, while lentils and Bengal gram are purchased from the market. It was found that lentil was the commonest pulse available in 63 to 88% of households during the whole

year. Bengal gram was available in 2 to 34% of households. Of the cultivated pulses, black gram is not a choice food crop and only very few households reported its availability during the year. Green gram is both a choice food crop and has high economic value. Its availability ranged from 4 - 33% in summer and in 10, 26, 21 and 19% of households in July, August, September and October respectively. During winter months after harvest, only 19, 8 and 15% of households reported having green gram. It was reported that due to low yield consecutively during two agricultural seasons, the grain bank stock had also not been replenished.

Horse gram, which is consumed by tribal households but which does not have high economic value was available in 21, 34, 38 and 22% of households during the summer months from the previous cropping season. During the

sowing period of July to September it was available in 2, 17 and 19% of households respectively and during October, November, December and January it was available in 16, 23 and 23% of households respectively. Only two households had borrowed horse gram from the grain bank during the study period. Since cultivation of pulses is subject to vagaries of production, most households resort to purchase of lentil which is the cheapest available pulse in the market rather than risking cultivation (Fig.2).

Availability of vegetables

Among vegetables, potato was a staple crop and was available in almost all households throughout the year. This was purchased from the market. Onions were also available throughout except for October. Percentage of households having onions ranged from 53 - 98% (Fig. 3). Price of onion

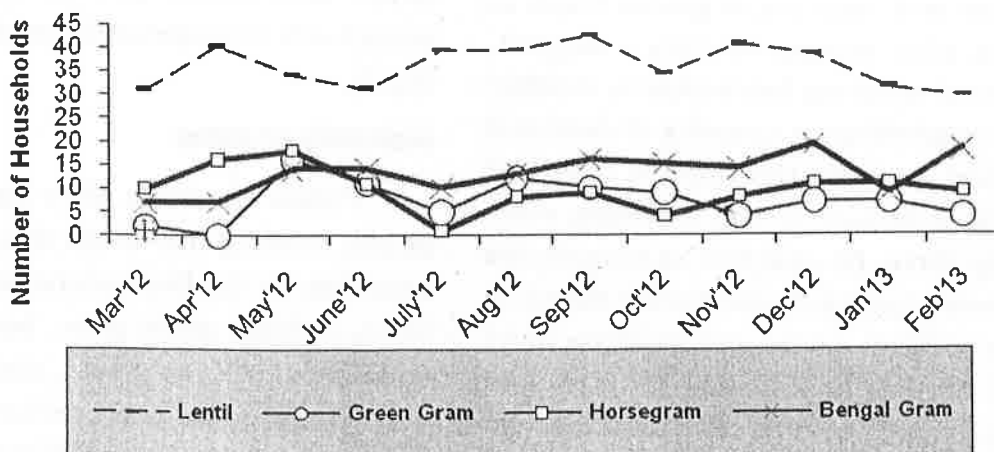


Figure 2
Availability of pulses in households (Mar. 2012 - Feb. 2013)

determined its purchase and availability. Radish, a cultivated crop, was available during the rainy and winter seasons. Yam was available in 21 and 17% of households respectively in September and October and in about 50% of households in October.

Among green leafy vegetables, while drumstick, amaranthus, pumpkin and radish leaves were available practically throughout the year, a majority reported availability only during the rainy season. Eighty to ninety per cent of households reported having drumstick in June and August, while more than 50% of households in July and September (Fig.4). Similarly pumpkin leaves were available in more than 50% of the households in the rainy months of August, September, October

and November. Fifty per cent of households reported having amaranthus in May, while more than 60% had radish leaves in July and November. Cauliflower leaves were available in 48, 72 and 53% of households respectively in November, December and January. Colocasia leaf and wild green were available in less than 10 and 25% of households, in winter. Forty per cent of households reported onion stalk in December and another 53% had cabbage in February. Tomato fruit, brinjal, pumpkin and chillies were available throughout (Fig. 5). Except tomatoes, which was the most popular with more than 60% of households reporting availability during any month, the rest were cultivated. Bitter gourd, spine gourd, broad beans,

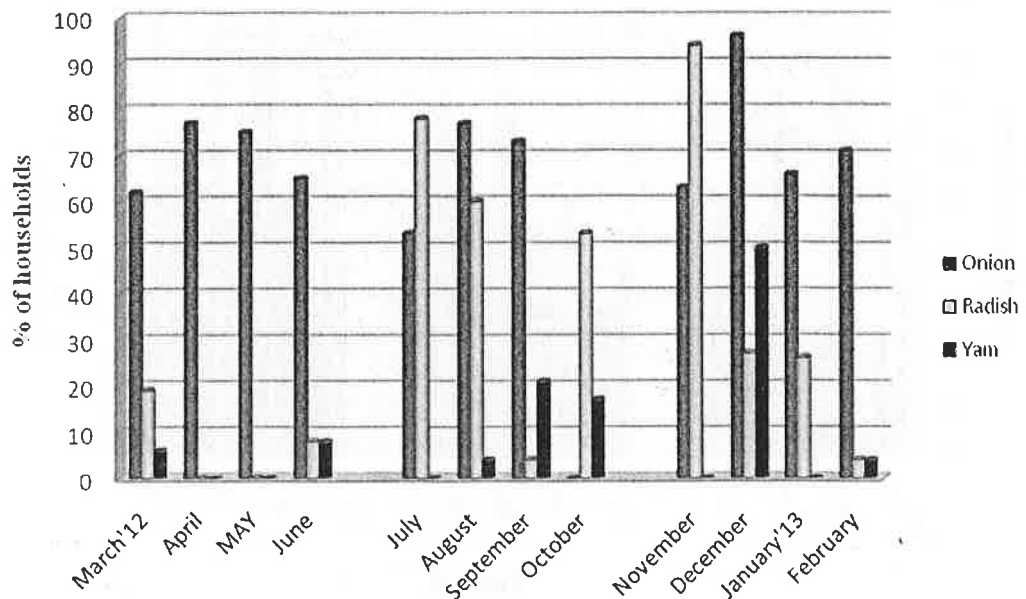


Figure 3
Availability of root vegetables in households (Mar. 2012 - Feb. 2013)

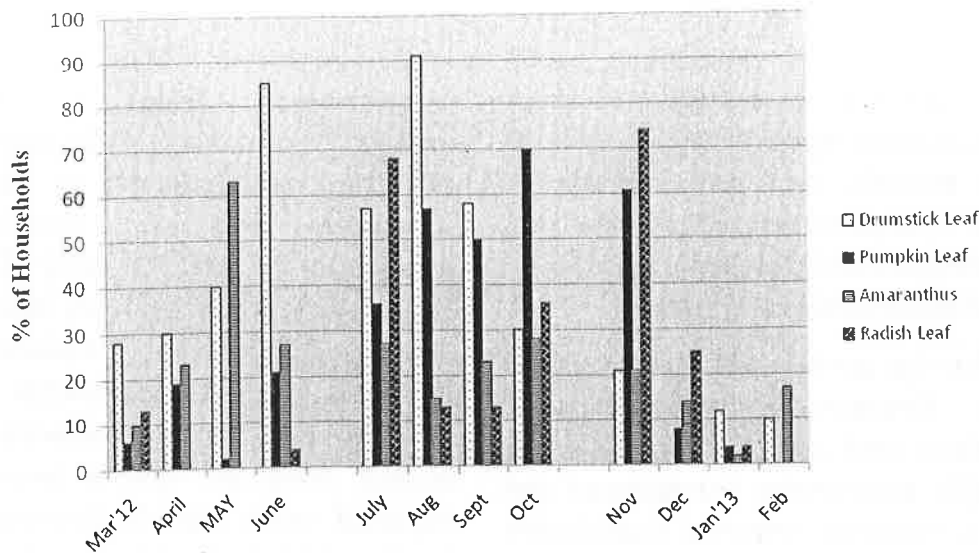


Figure 4
Availability of green leafy vegetables in households (Mar. 2012 - Feb. 2013)

cucumber and pigeon pea were available in less than 15% of households. Papaya and cauliflower were available during the rainy and winter seasons, while jack fruit in summer. Bamboo shoot, popular

in tribal households was available in 73% of households in August. In general, vegetables were cultivated during the rainy season and harvested during the same period or in winter.

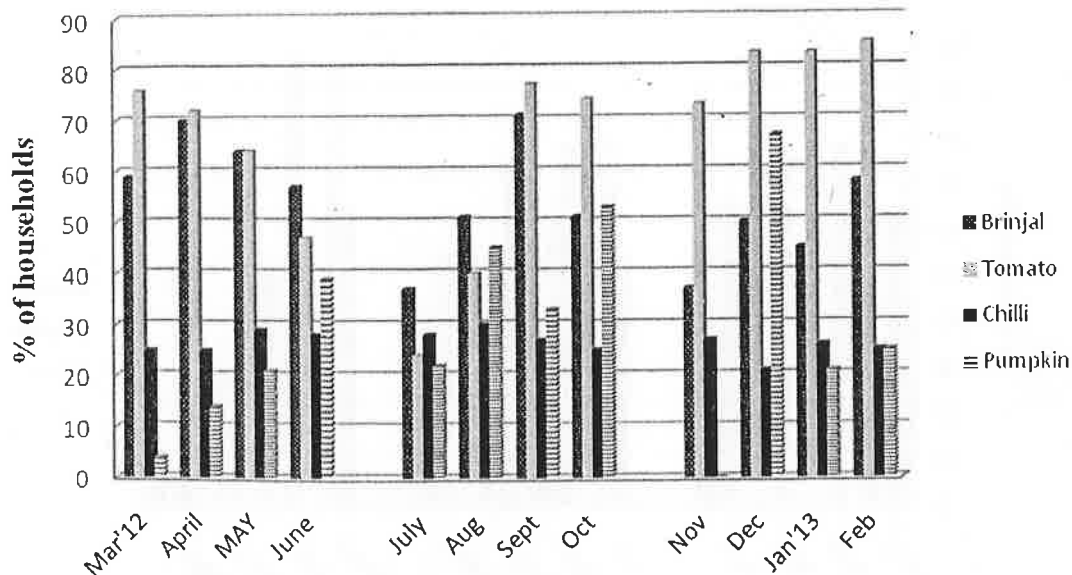


Figure 5
Availability of other vegetables in households (Mar. 2012 - Feb. 2013)

Probable reasons for the wide variability among households could be availability of land, water, seeds and time.

Availability of animal food and value added products

Animals were reared primarily for agricultural and economic purposes. Milk was not consumed and sold to private vendors or Government. Pigs were reared in 23 Paroja households mainly in Gunthaguda village. Since, rearing of sheep and goat were time and labour consuming only 6 and 17 households had sheep and goats respectively. On the other hand, country fowls were very popular in 91% of households, since they required less care, were hardy and had a good market

demand. However, in private conversations and FGDs several households reported periodic consumption of small game, maggots and pigs, quantification of which was difficult.

Biscuit was the most popular of all snack foods with 26 to 81% of study households having biscuits throughout the year (Table IV). When compared to other snack foods, biscuits are widely available. They are the preferred snack food for young child. Rice cakes were usually made at home and it was found only during the summer months in less than 50% of households. Though women are free of agricultural operations in summer they are nevertheless busy

TABLE IV
Availability of Value Added Products in Study Households

Months	Biscuit	Laddu*	Nada**	Mixture #	Bada / Pakudi #
March'12	12 (26%)	5 (10%)	2 (4%)	0	0
April	35 (74%)	25 (53%)	1 (2%)	4 (8%)	0
May	30 (63%)	14 (29%)	15 (25%)	3 (6%)	11 (23%)
June	31 (63%)	6 (12%)	7 (14%)	7 (14%)	1 (2%)
July	27 (55%)	1 (2%)	21 (43%)	12 (20%)	14 (29%)
August	33 (70%)	0	16 (34%)	0	12 (26%)
September	41 (85%)	0	26 (54%)	21 (44%)	8 (17%)
October	27 (57%)	0	12 (26%)	29 (62%)	5 (10%)
November	26 (53%)	1 (2%)	15 (24%)	28 (57%)	14 (29%)
December	25 (52%)	3 (6%)	21 (44%)	25 (52%)	11 (23%)
January'13	19 (40%)	0	22 (47%)	21 (44%)	9 (19%)
February	39 (81%)	9 (19%)	0	26 (54%)	2 (4%)

*sweet dish made from pulse

**savory made from rice

savory made from gram flour

with collecting and stocking firewood for the rainy season. Further mothers with young children may not have the time to prepare additional food unless there is support from other family members. Household availability of other food items such as nada, mixture and pakudi varied widely since they were bought from the local shop or weekly market depending on availability of cash. With regard to the supplementary mix given by ICDS centres, there was no supply during the period April to August 2012. Once the supply resumed, all households had obtained the mix.

Food count

With regard to diversity of food, the average number of food items ranged from 14 to 20 across seasons and was lesser for the landless households. While it was highest during winter for all households, the small farmer households had a higher food count over other households in summer and rainy seasons. Using ANOVA, the average food count of small farmer households during

rainy season was found significantly higher than the rest (Table V).

This was primarily due to vegetable crops, since the cultivation and harvesting cycle for vegetables especially green leafy vegetables is completed during the rainy season. Marginal farmer households had a higher food count over landless households but the difference was not statistically significant.

With regard to iron and vitamin A rich food, drumstick leaf was available in more than 50% of households during seven months in a year while amaranthus was found only in May. Fruits, except for tomatoes were absent. Analysis was done to find out if at least four food groups were available in more than 50% of household during the whole year. For seven months namely May, June, July, August, September, November and December more than 50% of households reported availability of four food groups namely cereals, pulses, vegetables and hen.

TABLE V
Seasonal Average Food Count for Households According to Land Holding

Type of households	Summer		Rainy		Winter	
	Number	Average food count with SD	Number	Average food count with SD	Number	Average food count with SD
Landless	38	14 ± 2.79	39	18 ± 1.64	36	19 ± 1.61
Marginal	87	15 ± 1.79	91	19 ± 2.17	86	20 ± 2.51
Small	64	17 ± 2.63	48	20* ± 2.86	66	20 ± 2.83

*Obtained *F* value of 5.28 higher than critical value of 3.26.

Considering that animal foods were rarely consumed, it may be postulated that only three of the four food groups are likely to be consumed on a daily basis and that the 'minimum threshold' of four food groups in the daily diet, is not likely to be met with.

Policy implications

Reduction in under nutrition among children below three years is dependent on but not restricted to household food security. The findings of the study indicate that in the given tribal households with children below three years, though there is no starvation, there is scope for improving dietary diversity. Lack of technological inputs for cost effective cultivation of pulses suggest the need for agricultural extension services to be stepped up. While poultry rearing is a choice economic option, it is managed at the individual household level. There is tremendous scope for forming organized co-operatives for poultry as in Namakkal, Tamil Nadu to undertake organized marketing and also awareness programmes for nutrition

literacy to encourage consumption of animal and animal products. The Odisha Government follows the Targetted Public Distribution System (TPDS) and classifies households according to BPL and APL categories. Fifty per cent of households lacked a ration card pending classification. When more than 70% of the population is poor, it would be cost effective to introduce the universal PDS rather than on identifying households which are ineligible. Under the provisions of the National Food Security Act (2013) the scope of the PDS in Odisha could be expanded to include ragi. In addition, one pulse and an essential oil could be included to improve dietary diversity to marginalized households. From food security the PDS should move towards ensuring nutrition security. Supply of grains through PDS should be based on local food habits and preferences, since large scale diversion of wheat supplied through the PDS has been reported in Koraput¹¹. The Tamil Nadu universal PDS model, is a good example of inclusion.

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