

# Agriculture, Food Security and Nutrition in Vidarbha: A Household Level Analysis

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This paper is based on an assessment of agricultural practices and livelihoods of people in Vidarbha, one of the most distressed regions in India. Using the data generated from a baseline survey on a sample of 6,990 households covering six districts, this paper attempts to assess the relationships between agriculture, food security and nutrition for children, adolescents and married women of reproductive age. The study indicates that (i) overall under-nutrition amongst children, adolescents and married women in the study area is substantial and it does not differ significantly between different socio-economic groups, (ii) higher the food crops production, lower are under-nutrition levels, and (iii) the public distribution system contributes significantly to the food security of poor families and it must be extended to include families above the poverty line as well.

Agriculture-based strategies have been proposed or used to address malnutrition by researchers, governments and international organisations for over two decades (Levin et al 2003). According to the World Bank (2007), the food supply chain linking food production with food consumption and human nutrition can be considered in terms of five pathways, namely, (1) subsistence-oriented production for the household's own consumption, (2) Income-oriented production for sale in markets, (3) reduction in real food prices associated with increased agricultural production, (4) empowerment of women as agents instrumental to household food security and health outcomes, and (5) indirect relationship between increasing agricultural productivity and nutrition outcomes through the agriculture sector's contribution to national income and macroeconomic growth. Additionally, health status, access to safe drinking water and sanitation, and larger global and national political processes and policies are also acknowledged to have an impact on the nutritional status of a person. Many also note that gender mediates intra-household relations, employment and income opportunities, and determines who has access to resources, and consequently, consumption (Levin et al 2003). Nutritional outcomes of changes in agricultural patterns and incomes for women and children are likely to be determined by factors such as control over resources, health infrastructure and facilities, labour allocation of the primary caregiver, etc.

While the pathways from agriculture to nutrition are many and multidimensional, one linkage is the increase in food production that agricultural development allows, which in turn produces energy and nutrients essential for human health and well-being. Some, however, caution against adopting a purely production-oriented approach to the question of food and nutrition, arguing that it is not only low food availability in an economy as a whole that is responsible for reduced consumption (Devereux 1993; Watts and Bohle 1993; both cited in Young 2004). Sen (1981) instead argues that it is a lack of entitlements, and the ability to command resources with which food can be accessed that causes hunger.

Furthermore, it is increasingly coming to be recognised that it is not just energy deficiency but micronutrient deficiencies that limit human growth and development. Hunger amongst the poor is increasingly manifesting itself through excessive consumption of energy-rich, but nutrient-poor foods. The result is a double burden of under-nutrition (deficiencies of energy, micronutrients, or both) and over-nutrition (poor diet quality leading to diet-related chronic illnesses) (Hawkes and Ruel 2006). Thus

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the relationship between agriculture and human nutrition is far more complex than the relationship between food production and food consumption, or the economic relationship between food supply and food demand (World Bank 2007).

**Table 1: Landholding Pattern of Households by Religion, Caste Class and District**

Background Characteristics	Households	Own/Entitled/Possess Land	Possess Cultivated Land	Type of Farmer (Cultivated Holding in Acres)					Irrigated Land	
				Marginal (<=2.5)	Small (2.6-5.0)	Semi-Medium (5.1-10)	Medium/Large (10.1+)	Mean Cultivated Holding*	As % of Cultivated Holding HHs	Mean Irrigated Holding*
Total	6,690	59.6	53.8	29.0	37.6	20.8	12.5	5.81	19.0	5.51
Religion										
Muslim	471	42.9	36.9	38.5	32.8	20.7	8.0	4.82	16.7	4.52
Buddhist	995	47.8	42.5	37.4	40.4	17.3	5.0	4.23	11.6	3.97
Hindu/Other	5,224	63.3	57.4	27.3	37.5	21.3	13.9	6.09	20.1	5.68
Caste Class										
SC	1,246	45.7	40.0	37.1	41.5	16.6	4.8	4.21	12.0	3.78
ST	1,084	45.6	38.8	17.8	49.4	23.8	9.0	5.39	11.9	4.95
NT/DNT	937	62.2	57.7	29.9	39.0	21.1	10.0	5.44	15.0	5.52
OBC/SBC	2,861	71.8	65.9	29.2	34.4	20.9	15.5	6.25	23.7	5.68
General	562	50.9	44.5	28.4	31.6	23.2	16.8	7.17	17.6	6.68
District										
Akola	1,593	60.8	54.4	35.0	31.8	18.1	15.1	6.22	7.6	5.74
Amravati	1,789	58.1	53.7	39.0	33.9	18.3	8.9	4.98	27.0	5.47
Buldana	198	73.2	65.2	42.6	35.7	14.0	7.8	4.44	14.7	5.79
Wardha	932	57.8	52.8	28.0	39.6	21.1	11.2	5.64	24.2	6.05
Washim	476	54.6	49.2	39.3	33.8	16.2	10.7	4.96	34.2	4.00
Yavatmal	1,702	60.7	53.8	9.0	47.3	27.9	15.8	6.79	15.2	5.84

\* Means are per cultivated/irrigated landholding household, as the case may be.

The Vidarbha region of Maharashtra state is known to be facing severe agrarian distress. The Sir Ratan Tata Trust (SRTT) and the Sir Dorabji Tata Trust (SDTT) in collaboration with local non-governmental organisations (NGOs) have been jointly promoting a holistic livelihoods strategy in 320 villages of the six high distress districts, namely, Amravati, Akola, Buldana, Washim, Yavatmal and Wardha as part of their "Sukhi Baliraja Initiative" (SBI), with interventions in agriculture promotion and crop diversification, dairy development, development of market linkages, etc. In order to assess the current agricultural practices and livelihoods of the people in the SBI project area, at the instance of the trusts, the Tata Institute of Social Sciences (TISS), Mumbai conducted a baseline survey on a sample of 6,990 households distributed in 71 villages covering the six districts.

In the household survey, besides information on socio-economic, demographic characteristics of the study population and agricultural practices of the households, an assessment of nutritional status of young children (below 60 months), adolescents (both male and female in the age group of 13-19 years), and ever married women in the reproductive age group (20-44 years) was also made. The survey was conducted between August-November 2009. Using the data obtained in the survey, this paper attempts to assess the relation between agriculture, food security and nutrition among children, adolescents and ever married women of reproductive ages.

## Background Characteristics

Within the study population, more than 80% of households are nuclear families. The average number of members per household is 4.5 the exception being Muslim households with 5.7 members per household. Amongst the household population, only 26% of

members are in the age group of 0-14 years, while nearly 9% are aged 65 years and above. The 0-9 age group population is smaller than the population age of 10-19 years indicating a recent decline in fertility. Total fertility rate was 1.95 children indicating

attainment of below replacement level fertility; and the infant mortality rate (IMR) was 27.8 per 1,000 live births. The speed of demographic transition and value attached to children in Vidarbha is truly outstanding.

The sample households comprised 78% Hindus, 15% Buddhists and 7% Muslims. The caste-wise break-up of the households revealed 19% scheduled castes (SC), 16% scheduled tribes (ST), 14% notified/denotified tribes (DNT), 43% Other Backward Classes (OBC), and below 8% general category (Hindu forward castes and non-Hindus). The overall literacy level for the 7+ age group is 89% among males and 75% among females. The proportion of males and females studying

in the age group of 6-14 years is 96%. Economic activity amongst children below the age of 15 is almost absent, indicating the absence of, or negligible, child labour. Economic activity of males is the highest (92-98%) in the age group of 25-59 years and that of females is the highest (75-80%) in the age group of 30-54 years. Own farming and agricultural labour are the predominant economic activities amongst landholding and landless households, respectively. However, the majority of males and females engaged in own farming also work as agricultural labourers.

**Table 2: Land Cultivation by Households**

Cultivated Holding and Land Cultivation Pattern	Cultivated Landholding (Acres)				
	All Sizes	<=2.5	2.6-5.0	5.1-10.0	10.1+
Households (HHs)	3,597	1,044	1,353	749	451
Cultivated land (Cland)					
Per cent distribution of HHs	100.0	29.0	37.6	20.8	12.5
Mean Cland area /Cland HH	5.81	1.84	3.88	7.55	17.90
Irrigated land (Iland)					
Iland HHs as % of Cland HHs	19.0	10.8	15.0	24.2	41.0
Mean Iland area /Iland HH	5.51	1.80	3.56	5.66	9.76
Mean Iland area /Cland HH	1.04	0.19	0.54	1.37	4.00
Per cent of Iland to Cland	18.0	10.5	13.8	18.1	22.4
Cultivate in 2008-09*					
Cultivating HHs as % of Cland HHs	97.6	96.6	96.9	98.8	99.6
Mean cropped area/cultivating HH	5.63	1.83	3.84	7.45	17.32
Per cent of cropped area to Cland	96.5	96.1	95.9	97.5	96.3
Cultivate in Kharif season					
Cultivating HHs as % of Cland HHs	97.0	96.2	96.3	98.3	99.1
Mean cropped area/cultivating HH	5.46	1.82	3.79	7.29	16.84
Per cent of cropped area to Cland	94.1	95.0	94.0	95.0	93.2
Cultivate in Rabi season					
Cultivating HHs as % of Cland HHs	20.5	12.5	15.4	27.5	42.8
Mean cropped area/cultivating HH	0.66	1.65	2.19	3.16	5.53
Per cent of cropped area to Cland	11.4	11.2	8.7	11.5	13.2

\* Kharif, rabi and/or plantation crops.

**Landholding and Agriculture**

The landholding pattern of households by religion, caste class and district is given in Table 1 (p 43). It is seen from the table that in the study population, 60% of households possess agricultural land (owned, entitled, leased-in or by way of long use), but only 54% cultivate land (farmers). For rural Maharashtra, the proportion of households which own agricultural land was 58% as per the National Family Health Survey-3 (obtained by processing household data). Among the farmers in Vidarbha, 29% are marginal farmers (with up to 2.5 acres of agriculture land), 37% are small farmers (with 2.6-5.0 acres), 21% are semi-medium farmers (with 5.1-10.0 acres), 11% are medium farmers (with 10.1-25.0 acres) and just 2% are large farmers (with more than 25 acres).

Though a larger proportion of 57% of Hindus possess cultivated land, around 40% of Muslims and Buddhists also possess cultivated land. Similarly, the proportion of marginal and small farmers among all farmers accounted for 65% among Hindus, but 71% among Muslims and 78% among Buddhists. However, 60-67% of farmers are marginal and small farmers in all caste groups, except among the sc (largely Buddhist) where it was 78%. The pattern is similar in the different districts of the Vidarbha region. The average cultivated holding is 5.8 acres per farmer. Though 54% of the households possess cultivated holdings, only 10% of the households possess irrigated land accounting for 19% of all farmers. That means more than 80% of the farmers possess only non-irrigated land. Furthermore, the proportion of farmers having irrigated land was less than 15% in Akola, Buldana and Yavatmal districts and it was 25-35% in the other three districts.

Table 2 (p 43) indicates that of the total land possessed by the farmers, 82% is non-irrigated. The proportion of irrigated land to total land area is only 10% amongst marginal farmers and 22% amongst medium/large farmers. Furthermore, the average amount of irrigated land possessed by a farmer is just 1 acre (this figure is below 0.2 acres per marginal farmer, but 4 acres per medium/large farmer), indicating that irrigated land is mainly concentrated amongst larger landholders.

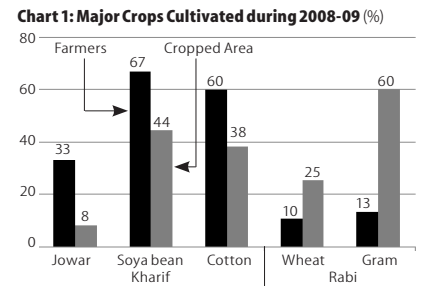
Most farmers cultivate almost their entire cultivable land. During the agricultural year 2008-09, almost 98% of the farmers cultivated land. The cropped area during the kharif season was 94% of the cultivated land. During the same year, the proportion of farmers cultivating land during the rabi season was only 20% and the area under cultivation was just 11%. However, the proportion of farmers cultivating land during the rabi season and the amount of land

cultivated increased as the size of cultivated holding increased. It was just 12% of marginal farmers with an average of 1.65 acres of land to over 40% of medium/large farmers with an average of 5.5 acres of land cultivated during rabi season. But the proportion of land under rabi crops to total cultivated land remained at around 12% for all categories of farmers. Plantation crops were reportedly cultivated by just 4% of the cultivated-holding households. This figure was the highest in Amravati district (12%) and the crop cultivated was mainly orange (Rajaretnam et al 2010).

**Food Crops and Food Production**

Table 3 outlines the crops cultivated during 2008-09. In the kharif season, soya bean and cotton was cultivated by 60-65% of the farmers (crop-cultivating households), followed by jowar (sorghum) by 27% of the farmers as their main crop. However, if we consider both the main crop and intercrop, the proportion of farmers cultivating jowar increases to 33%. The proportion of area under these crops was 44% soya bean, 38% cotton, and just 8% jowar. Tur dal was grown by about 90% of the farmers, but mainly as an intercrop.

Very few households cultivate a second crop in the rabi season and the major crops grown in this season are gram (chana) and wheat, which were cultivated by 13% and 10% of the households respectively (Chart 1). Both crops together account for 85% of



**Table 3: Crops Cultivated during 2008-09 Kharif and Rabi Seasons**

Crops Cultivated	Kharif Crops		Rabi Crops		Crop Yield (Only Main Product of Kharif+Rabi Crops)					
	Main Crop Only		Main/Mixed Crops	Main Crop Only		%HHs Cultivating	% of HHs Reported Yield	Mean Qty/ Reported HH	Mean Qty/ Cland HH	% Qty of Yield Sold*
	%HHs Cultivating	% of Cropped Area	%HHs Cultivating Crops	%HHs Cultivating	% of Cropped Area					
Cultivating HHs	3,509	100.0	3,509	3,509	100.0	3,509	-	-	3,597	-
Foodgrains										
Jowar (Sorghum)	27.1	8.2	33.1	0.7	1.8	34.0	31.7	648.0	200.3	41.6
Wheat	0.2	0.0	0.4	10.5	25.4	10.9	10.9	973.1	103.3	35.1
Paddy	0.1	0.0	0.1	0.0	0.0	0.1	0.1	262.5	0.3	100.0
Grams/Dal										
Tur (Pigeon-pea)	1.7	0.7	89.5	0.3	1.7	89.8	85.2	314.4	261.2	86.5
Gram (chana)	1.3	0.5	1.7	13.3	59.8	14.9	14.4	954.3	134.5	90.7
Moong dal	6.0	2.6	14.1	0.2	0.6	14.6	11.0	248.6	26.7	100.0
Black gram (urud)	2.4	0.5	7.3	0.2	0.3	7.6	5.8	101.9	5.8	100.0
Vegetables										
Vegetables	0.4	0.1	0.5	0.2	0.3	0.9	0.9	1039.8	9.3	100.0
Onion	0.1	0.0	0.2	0.6	0.9	0.9	0.9	3640.6	32.4	95.9
Chillies	0.5	0.1	0.7	0.2	0.4	1.0	0.9	571.0	5.1	100.0
Potato	0.0	0.0	0.0	0.03	0.02	0.03	0.0	250.0	0.1	100.0
Oilseeds										
Soya bean	65.2	44.3	66.7	0.1	0.3	66.9	63.3	1082.3	668.3	100.0
Sunflower	5.3	3.9	5.4	0.4	2.2	5.8	5.7	1343.6	75.1	100.0
Groundnut	0.0	0.0	0.1	0.3	1.0	0.3	0.3	1220.5	3.4	98.2
Til	0.3	0.0	1.3	0.0	0.1	1.3	1.1	39.7	0.4	29.9
Other										
Cotton	58.7	38.3	60.0	0.1	0.5	60.0	58.6	1137.2	650.7	100.0
Sugarcane	0.2	0.1	0.2	0.1	0.1	0.3	0.2	19312.5	43.0	100.0
Other	1.5	0.6	2.5	0.8	4.7	3.6	3.3	923.7	17.6	100.0

\* Only approximate (as some quantity might have been carried forward from previous season). Also excludes quantities of casual use particularly of vegetable items.

the cropped area in the rabi season. Paddy cultivation is almost absent in the study area. Vegetables, onion, chilli and potato are grown by very few farmers during the kharif and rabi seasons.

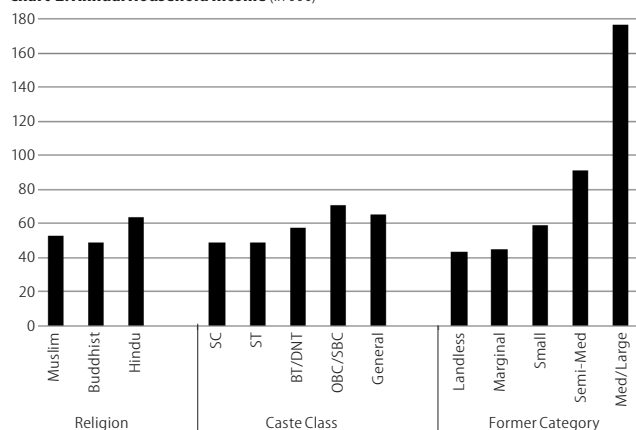
It is clear that jowar and wheat are the only two staple food crops cultivated in the study area. However, jowar is cultivated by only one-third of the farmers (crop-cultivating households) during the kharif season either as main crop or as intercrop and wheat is cultivated by just one-fourth of the farmers during the rabi season. The quantity of jowar and wheat production is 650 kgs and 1,000 kgs per respective crop-cultivating household, which amounts to just 200 kgs and 100 kgs per cultivated-holding household respectively. In other words, the per-household (including landless households) production of jowar and wheat in the study area is a meagre 100 kgs and 50 kgs respectively. Though 35-40% of the jowar and wheat produced are reportedly sold by the households, the remaining 60-65% may be assumed to have been used for household consumption and other purposes.

Amongst the gram/dal items, tur is the only major crop cultivated by as many as 90% of the farmers and it is cultivated mainly as an intercrop, often with cotton and soya bean. The production of tur dal during 2008-09 was 315 kgs or 260 kgs per cultivated holding household. The next gram/dal item grown is chana and was cultivated by less than 15% of the farmers. The mean yield per chana-cultivating household was 950 kgs and it worked out to 135 kgs per farmer. On the other hand, production of other food items like moong dal, black gram, vegetables, onion, potato and chillies is very less, and per capita availability through local production is negligible. Furthermore, the data indicates that much of the produce is sold in the market at remunerative prices.

### Household Income

The mean income per household for the one year 2008-09 (approximately the kharif and rabi agricultural seasons) is Rs 61,000 but the median income is only Rs 39,000 (Chart 2). The average annual income per household is relatively higher for Hindus at Rs 64,000 as compared to around Rs 50,000 for Muslims and Buddhists. With respect to caste and class, OBC/SBCs and general category households demonstrated a mean income of Rs 66,000-70,000 (median income being around Rs 40,000) as compared to

Chart 2: Annual Household Income (in 000)



Rs 57,000 for NT/DNTs and below Rs 50,000 for SC/STs (median income being between Rs 30,000 and Rs 37,000). With regard to cultivated holding, as the size of the cultivated holding increased the annual household income also increased – Rs 43,000 for landless households, Rs 45,000 for marginal farmers, Rs 59,000 for small farmers, Rs 91,000 for semi-medium farmers and Rs 1,77,000 for medium/large farmers. The median income ranged from Rs 32,000 to 1,35,000. Except for medium and large farmers, the median per capita annual income was in the narrow range of Rs 8,000-10,000. Further, the per capita income for Muslims was only Rs 6,700 as against the overall median of Rs 9,400.

### Food Consumption

In order to assess food consumption, the following procedure was adopted. A rural household may get food items from different sources such as farm, public distribution system (PDS), friends/relatives, compensation for work and open market. Thus, for a pre-specified list of food items/products (similar to National Sample Survey format) the households were asked to give details of food items consumed from different sources in the last one year (asked per month and cumulated for one year). With respect to each source the quantity used per year and its value or price were ascertained. It is to be noted that households are categorised into antyodaya families (very poor families), families below poverty line (BPL families) and families above poverty line (APL families) and the quantity and price of food items supplied to them through the PDS varies according to the category. The usual food items supplied through the PDS are rice and wheat, and occasionally sugar, edible oil/vanaspati and gram/dal.

Table 4 gives the percentage of households that consumed select food items and mean quantity consumption (in kgs) in one year by type of family card (ration card) possessed.

Table 4: Households by Level of Consumption and Source of Food

Food Items	All		APL Card		BPL Card		Antyodaya card	
	% HHs	Mean Qty*	% HHs	Mean Qty*	% HHs	Mean Qty*	% HHs	Mean Qty*
Households	6,690	-	3,529	-	2,131	-	1,030	-
From HH Produce								
Wheat	5.9	481.6	8.5	492.2	3.7	477.6	1.6	303.1
Jowar	15.9	335.8	17.1	337.5	15.8	347.1	12.4	297.7
Gram/Dal/Pulses	33.6	93.5	36.7	101.5	34.5	84.1	21.4	78.0
Vegetables/related	0.6	46.3	0.7	51.3	0.7	44.5	0.3	15.0
Milk/milk products	12.7	175.5	14.4	192.8	13.0	151.2	6.3	144.1
Fruits and nuts	0.4	45.9	0.5	72.7	0.4	5.7	0.4	29.3
Egg (nos)	1.1	60.5	0.9	46.4	1.3	62.0	1.7	81.9
From PDS								
Rice	49.6	120.6	13.1	78.3	89.3	114.7	92.6	153.1
Wheat	49.0	192.7	12.1	140.0	88.9	191.9	92.6	217.8
Gram/Dal/Pulses	1.0	2.5	0.1	2.0	2.3	2.4	1.6	2.9
Edible oil/vanaspati	6.2	2.5	0.7	7.4	12.0	1.9	12.6	2.6
Sugar	5.7	6.9	1.0	9.2	11.3	7.3	9.9	5.2
Price of PDS/kg								
Rice	NA	5.40	NA	8.32	NA	6.36	NA	3.23
Wheat	NA	4.50	NA	7.28	NA	5.25	NA	2.38
Gram/Dal/Pulses	NA	51.24	NA	55.00	NA	54.50	NA	42.55
Edible oil/vanaspati	NA	31.92	NA	34.65	NA	34.11	NA	28.46
Sugar	NA	15.30	NA	17.11	NA	14.77	NA	15.90

\* Mean quantity is per household that consumed the respective food item and not all households.

**Table 5: Contribution of Own Production and PDS to Total Food Consumption**

Food Item	Contribution of Food Items Produced by HH to Total Consumption			Contribution of Food Items from PDS to Total Consumption			Contribution of Food Items from Own Production and PDS to Total Consumption		
	Yes	50%	90%	Yes	50%	90%	Yes	50%	90%
<b>All families</b>									
Rice/flour	0.06	0.06	0.01	49.6	44.1	30.8	49.6	44.1	30.9
Wheat/flour/maida	5.9	5.5	4.2	49.0	38.4	21.2	53.6	43.9	26.5
Jowar/flour	15.9	14.1	11.6	NA	NA	NA	15.9	14.1	11.6
Rice/wheat/jowar	19.9	9.5	0.7	50.2	28.4	5.8	61.4	40.4	10.2
<b>APL families</b>									
Rice/flour	0.03	0.03	0.03	13.1	9.5	5.9	13.1	9.5	5.9
Wheat/flour/maida	8.5	8.1	7.3	12.1	6.6	3.9	20.2	14.8	11.4
Jowar/flour	17.1	15.2	12.5	NA	NA	NA	17.1	15.2	12.5
Rice/wheat/jowar	22.8	12.5	1.2	13.8	4.2	1.0	33.7	17.2	3.0
<b>BPL families</b>									
Rice/flour	0.05	0.05	0.00	89.3	79.9	53.9	89.3	80.0	54.0
Wheat/flour/maida	3.7	3.3	1.1	88.9	69.1	35.5	90.0	72.5	39.0
Jowar/flour	15.8	14.1	11.8	NA	NA	NA	15.8	14.1	11.8
Rice/wheat/jowar	18.1	7.6	0.3	89.9	48.1	7.8	91.6	61.2	15.2
<b>Antyodaya families</b>									
Rice/flour	0.19	0.19	0.00	92.6	88.3	68.3	92.6	88.5	68.5
Wheat/flour/maida	1.6	0.8	0.2	92.6	83.5	51.2	92.8	84.5	52.5
Jowar/flour	12.4	10.3	8.3	NA	NA	NA	12.4	10.3	8.3
Rice/wheat/jowar	13.3	3.1	0.0	92.9	70.7	18.3	93.7	77.1	24.3

It is seen from the table that around one-third of all households consumed gram/dal/pulses from farm produce, but only 16% have consumed jowar (sorghum) and just 6% consumed wheat obtained from farm. It is to be noted that the percentage figures double if only cultivated holding households are considered, irrespective of the type of card possessed (table not shown). It is to be noted from Table 3 that only 32% and 11% of the households produced jowar and wheat respectively and of the quantity produced only 42% and 35% was sold, and the rest may be considered as used for household consumption. Further, the percentage of households that produced jowar and wheat and percentage quantity sold was only slightly lower amongst BPL families, but substantially lower amongst antyodaya families as compared to APL families. The average quantity consumed in one year per household from farm produce (the food item consuming household) was 80-100 kgs of gram/dal/pulses, 300-350 kgs of jowar and about 500 kgs of wheat, except antyodaya households for whom the quantity consumed was about 300 kgs of wheat. Further, 13-14% of the households also consumed milk and milk products obtained from their own livestock except antyodaya households in which it was only 6%. Fruits and eggs obtained from farm/houses were consumed by just around 1% of the households. It appears that most of the households who produce grain, pulses or milk, consume at least part of them. Few

households possess, and therefore benefit from, livestock, poultry and plantations.

Nearly 50% of the households reportedly received wheat and rice from the public distribution system (PDS) – 90% of BPL and antyodaya families received highly subsidised foodgrain as compared to just 12-13% among APL families. Further, antyodaya families may access more grain than BPL and APL families. Though gram, dal, pulses, edible oil/vanaspati and sugar are also to be distributed at uniform rates through the PDS, they are rarely supplied.

**Food Security**

Table 5 depicts the relationship between household production of grain and household consumption and the PDS. About 5% and 4% of the households met up to 50% and up to 90% respectively of their annual wheat consumption out of own farm production. The corresponding figures for jowar are 14% and 12% respectively. It is to be noted that the proportion of households consuming rice out of own farm production was less than 1%. Assuming equal weightage to rice, wheat and jowar, for all the three foodgrains combined, the proportion of households consuming foodgrains out of their own farm production was 20%. In 10% of all households at least 50% of their annual consumption was satisfied with their own farm production. However, only in less than 1% of the cases were at least 90% of a household's annual requirements met. The pattern is almost the same for different types of family cardholders but the proportion of households consuming foodgrains obtained from own farms was low for BPL families and even less for antyodaya families.

**Table 6: Household Expenditure on Food Items in One Year by Type of Household Card Possessed**

Food Items	All		APL		BPL		Antyodaya	
	%HHs Expending	HH Expenditure	%HHs Expending	HH Expenditure	%HHs Expending	HH Expenditure	%HHs Expending	HH Expenditure
Households	6,690	-	3,529	-	2,131	-	1,030	-
Rice/flour	99.6	1,464	99.4	1,732	99.8	1,281	99.9	925
Wheat/flour/maida	99.5	3,038	99.3	3,717	99.8	2,607	99.9	1,619
Jowar/flour	84.7	1,869	85.5	1,847	84.8	1,951	81.6	1,779
Other grain/cereal items	53.5	889	55.3	922	52.2	820	50.1	915
Pulses/pulse products	99.2	2,921	99.2	3,130	99.3	2,785	98.8	2,480
Spices/kirani items	99.3	2,018	99.0	2,128	99.7	1,953	99.4	1,772
Edible oil and vanaspati	99.8	2,511	99.7	2,638	100.0	2,461	99.7	2,180
Sugar/gaur/candy/honey	99.7	1,724	99.6	1,782	99.7	1,727	99.8	1,522
Tea/coffee/etc	99.0	848	99.0	887	99.1	832	98.5	747
Vegetables/garlic/ginger	98.5	3,048	98.7	3,168	98.2	3,007	98.3	2,718
Milk	86.7	1,507	88.5	1,790	86.7	1,261	80.5	990
Chicken/meat/fish	52.3	1,690	50.1	1,713	52.0	1,620	60.5	1,751
Fruits and nuts	78.9	630	81.1	726	78.7	531	71.6	480
Milk products/baby food	13.9	842	15.3	940	12.2	712	12.6	691
Bakery products/biscuits	62.2	632	65.7	713	58.8	548	57.3	493
Hotel/cooked food	6.0	665	6.7	756	5.3	530	4.8	532
Other bakery/hotel items	26.2	577	26.2	627	26.2	520	26.2	525
Ghee/butter/curd	68.4	545	69.6	621	69.5	466	61.9	436
Egg	46.7	435	45.1	446	46.9	428	51.8	416
Other general items	89.3	3,490	89.1	3,786	89.6	3,253	89.5	2,975
Other veg/meat items	34.7	1,040	34.3	1,116	34.4	977	36.4	919
Total (per HH per year)	NA	26,949	NA	29,373	NA	25,335	NA	21,980
Per capita expenditure	NA	5,990	NA	6,490	NA	5,526	NA	5,198
% expenditure on rice/jowar/wheat/other cereals	NA	26.9	NA	28.0	NA	26.3	NA	23.8

HH expenditure is per-household expenditure for the households that consumed the food item. Total expenditure excludes food items if any missed in the list. Value/price food items purchased from market, obtained from PDS and from household produce are as reported by households and not standardised.

With respect to PDS supply, only 13% of APL families and around 90% of BPL and antyodaya families (overall 50% of all households) have availed the services. For around 85% of antyodaya families the PDS rice and wheat individually fulfilled at least 50% of their annual total consumption and for 50-70% of the families they fulfilled at least 90% of their annual total consumption. However, rice and wheat combined satisfied 50% of annual staple food consumption (rice, wheat and jowar with equal weightage) for 70% of families and 90% of their requirements for only 18% of families. Similarly for BPL families, rice and wheat individually satisfied at least 50% of their total annual consumption for 70-80% of families and satisfied at least 90% of their annual consumption for 50-70% of families. Further, rice and wheat combined satisfied 50% of annual staple food consumption for nearly 50% of families and 90% of their requirements for just 8% of families. It is to be noted that the PDS supply has fulfilled grain requirements more for antyodaya families than for BPL families because the monthly PDS supply is lesser for BPL families than for antyodaya families. As far as APL families are concerned, not only is the PDS supply insufficient, but also the prices are substantially higher, and the proportion of families who availed PDS supply therefore being much less.

**Table 7: Nutritional Status Indicators for Children of Age 12-59 Months by Household Characteristics**

Background Characteristics	Weight-for-Age		Height-for-Age		BMI-for-Age	
	Under-weight	Severe Under-weight	Stunted	Severe Stunted	Energy Deficient	Severe Energy Deficient
Total	48.8	16.8	29.7	13.9	44.7	23.3
Sex						
Male	50.2	17.4	29.4	13.9	45.8	22.9
Female	47.1	16.0	30.0	13.9	43.4	23.7
Religion						
Muslim	48.5	18.4	27.5	11.8	52.3	21.6
Buddhist	51.9	16.5	31.3	15.4	46.3	23.9
Hindu/Other	48.2	16.6	29.7	13.9	43.4	23.4
Caste Class						
SC	51.5	17.8	31.1	14.8	46.3	24.5
ST	56.5	18.7	36.2	19.5	41.5	20.3
NT/DNT	43.6	13.2	30.7	14.3	39.4	22.1
OBC/SBC	46.2	16.6	27.5	11.8	44.4	24.1
General	49.7	18.4	23.2	10.9	58.0	24.6
Farmer category						
Non-farmer	49.4	16.3	29.8	14.3	44.4	23.1
Marginal	48.5	18.3	28.4	14.9	45.1	20.5
Small	50.2	18.6	33.3	16.8	42.9	23.1
Semi-medium	44.7	16.2	27.1	10.2	47.0	27.7
Medium/large	48.2	13.7	26.7	8.4	46.6	23.7
Family card						
Antyodaya card	59.6	24.0	35.4	13.7	52.8	29.2
BPL card	50.8	18.7	30.6	16.0	46.9	24.3
APL card	46.2	14.9	28.4	13.2	42.6	21.9
Per capita income						
Rs <5,000	52.7	19.5	35.6	17.3	42.6	23.7
Rs 5,000-9,999	49.5	16.9	29.1	13.4	47.1	23.8
Rs 10,000-29,999	48.9	16.1	28.2	12.4	44.6	23.0
Rs 30,000+	28.7	9.6	19.5	12.6	34.5	18.4
Per capita food expenditure						
Rs <3,500	48.6	18.8	42.0	19.6	33.9	16.3
Rs 3,500-4,999	51.0	16.8	26.2	12.0	48.8	24.8
Rs 5,000-6,999	50.5	19.3	26.2	12.2	50.9	29.0
Rs 7,000+	40.6	7.8	20.7	10.6	44.2	22.1

SC-Scheduled caste, ST-scheduled tribe, NT-notified tribe; DNT-denotified tribe, OBC-other backward classes, SBC-special backward class.

If we consider a household's food needs being met by the consumption of grain produced on their own farms and PDS-supplied grain, only 10% of the households are able to meet their staple food requirements. However, for 40% of the households at least 50% of their annual requirements of staple food are secured through own farm production and PDS supply. For APL families, farm produce and PDS supply together fulfilled at least 50% of their requirements for only 17% of households and 90% of requirements for just 3% of households (additional needs were met from the open market or other sources). On the other hand, for more than 60% of BPL families and 77% of antyodaya families own farm production and PDS supply satisfied at least 50% of their annual consumption. Further, for more than 15% of BPL families and 24% of antyodaya families, own farm production and PDS supply satisfied more than 90% of their annual consumption. As such the PDS is a major and often the only source of staple food for a large proportion of BPL and antyodaya families.

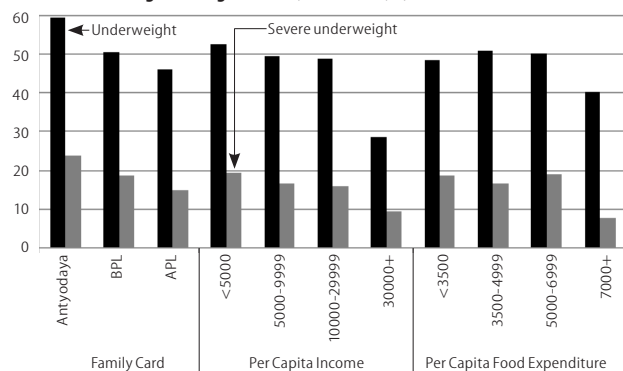
### Expenditure on Food Items

Table 6 (p 46) indicates the percentage of households who consumed different food items during the one year period preceeding the survey and the average value (if own produce) or expenditure incurred on the food items per household. It is to be noted that the value of food items consumed out of farm/household production, the price of PDS supply and the price of items purchased from market are as reported by the households and not adjusted for any standard. Accordingly, the value/expenditure on wheat consumed per household during the one year period before the survey is Rs 3,000 on the average, while the average value/expenditure on jowar is about Rs 1,900 and that of rice is nearly Rs 1,500.

Apart from the staple food items, on average the households have reportedly spent per year about Rs 3,000 each on pulses/pulse products and vegetables items; Rs 2,000 to Rs 2,500 each on spices/kiyani (shop) items and edible oil/vanaspati; around Rs 1,500 each on sugar related items, milk, chicken/meat/fish; and Rs 500-1,000 each on a variety of food items. The proportion of households who consumed different food items remained almost the same among APL, BPL and antyodaya families and the annual expenditures reduced only slightly. This indicates that the food habits and food consumption are more or less the same for different categories of families.

The estimates of expenditures on food items may be only approximate but the data show that the average household expenditure is to the tune of Rs 27,000, ranging from Rs 29,400 for APL families to Rs 25,300 for BPL families and Rs 22,000 for antyodaya families. It is clear that all categories of families expend on different food items and the expenditures are substantial. As per the data, if an APL family expends Rs 100 on food items, a BPL family expends Rs 86 and an antyodaya family expends Rs 75. Furthermore, the household expenditure on staple food items (rice, wheat, jowar and other cereals) is only around 25% of their total expenditure on food items and the slightly low figure for BPL and antyodaya families is partly due to the lower price of PDS supply. As such PDS applies to only around 25% of the food expenditures of the households. This indicates that the PDS needs to be extended to include more families (including APL families) under its ambit, and also be made more broad-based to cover

**Chart 3: Underweight among Children (12-59 months, %)**



more food items, not only of staple foods but also of balanced nutritious foods.

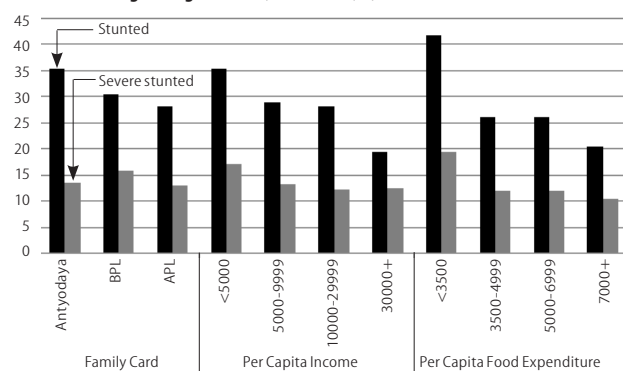
**Nutritional Status**

Using the information on sex, age (for children in months), weight in kgs and height in cms, Z-scores are derived using the “WHO AnthroPlus” software with WHO standard. With respect to weight-for-age, a Z-score less than -2 standard deviations (SD) is

**Table 8: Nutritional Status of Adolescents (13-19) and Ever Married Women (20-44)**

Background Characteristics	Height-for-Age		BMI-for-Age		BMI (EMWs)		
	Stunted	Severe Stunted	Energy Deficient	Severe Energy Deficient	Energy Deficient	Severe Energy Deficient	Over-weight
Total	23.4	5.8	50.0	23.0	50.8	15.0	5.7
Sex							
Male	28.9	7.7	60.1	32.0	NA	NA	NA
Female	18.0	4.0	40.0	14.1	NA	NA	NA
Religion							
Muslim	17.1	4.3	54.3	30.8	49.0	18.4	8.5
Buddhist	24.8	6.5	51.4	21.5	50.3	15.2	2.8
Hindu/Other	24.2	5.9	49.0	22.0	51.1	14.6	5.9
Caste class							
SC	24.6	6.6	50.7	21.6	51.9	16.2	3.0
ST	25.9	6.6	50.9	21.6	64.4	19.7	2.6
NT/DNT	26.0	6.2	45.2	19.7	55.1	16.9	3.3
OBC/SBC	22.5	5.3	49.8	23.2	45.5	12.0	7.3
General	17.7	4.9	54.3	30.8	44.6	16.3	11.8
Farmer category							
Non-farmer	23.6	6.3	51.1	23.9	55.8	17.7	4.7
Marginal	27.0	5.8	46.3	21.8	48.0	13.5	6.0
Small	23.1	4.9	50.4	22.3	49.5	13.2	5.3
Semi-medium	20.3	6.1	51.1	23.0	44.7	13.8	6.9
Medium/large	19.1	5.2	47.4	21.6	41.4	9.7	9.4
Family card							
Antyodaya card	27.4	6.2	48.4	20.5	58.8	17.6	4.1
BPL card	21.6	5.2	50.8	22.3	52.3	15.3	5.2
APL card	23.5	6.2	49.8	24.6	48.0	14.2	6.4
Per capita income							
Rs <5,000	27.1	8.5	54.6	28.5	53.8	16.5	4.1
Rs 5,000-9,999	22.9	4.8	50.5	22.9	56.3	17.6	4.2
Rs 10,000-29,999	22.7	5.8	47.0	20.0	46.3	13.2	6.6
Rs 30,000+	18.1	5.1	46.9	22.0	34.0	5.2	13.9
Per capita food expenditure							
Rs <3,500	25.4	7.0	53.0	24.4	55.5	17.0	4.9
Rs 3,500-4,999	23.8	5.1	49.3	23.1	51.8	16.5	5.1
Rs 5,000-6,999	22.1	5.6	50.8	23.6	50.5	14.2	5.6
Rs 7,000+	20.8	5.4	44.0	18.9	43.1	10.8	8.1

**Chart 4: Stunting among Children (12-59 months, %)**



considered as *underweight* and a Z-score less than -3SD is considered as *severe underweight*. Similarly, based on height-for-age, a Z-score less than -2SD is considered as *stunted* and a Z-score less than -3SD is considered as *severe stunted*. Further, based on body mass index (BMI)-for-age, a Z-score less than -2SD is considered as *energy deficient* and a Z-score less than -3SD is considered as *severe energy deficient*. For women of ages 20-44 years (age group 15-19 is included under adolescents), the body mass index (BMI) was calculated. A BMI value less than 18.5 is considered *energy deficient*, a value less than 16 is considered *severe energy deficient* and a value of 25 or above is considered *over-weight*.

**Children**

Table 7 (p 47) highlights nutritional status of children aged 12-59 months by various social and economic factors. Amongst children aged between 12-59 months, about 50% of males and females are *underweight*, 30% of males and females are *stunted* and about 45% of males and females are *energy deficient*. Severe under-nutrition is below 20%. With respect to weight-for-age, 17% of males and 16% of females are *severe underweight*, 14% of males and females are *severe stunted* and 23% of males and females are *severe energy deficient* (Charts 3, 4).

Nutritional status of children did not differ substantially by religion, class and landownership. However, OBC/SBC and general castes had lesser proportion of children stunted and severe stunted compared to SC/SrS. However, type of family card possessed, per capita income and per capita expenditure on food have shown some differences in the extent of children undernourished. Generally, the proportion of children undernourished and sometimes the proportion of children facing severe under-nutrition also are lesser for children of APL families and for children of households with higher per capita income and higher per capita food expenditure.

An attempt is made to see whether households that cultivate grain crops (jowar and wheat) and dal/gram show lower levels of under-nutrition among children as compared to farmers who did not cultivate food crops (or cultivate cash crops only). It is seen from Chart 5 (p 49) that the cropped area does not show any relationship with proportion of children undernourished but as the amount of food crops (grain and dal/gram) harvested increases the proportion of children underweight, proportion of children severely underweight (and proportion of children severely stunted, figure not shown) decreases. It appears that

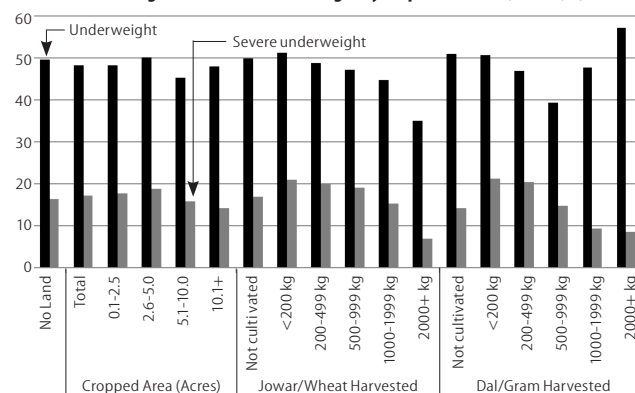
cultivation of food crops helps to improve the nutritional status of children to some extent.

### Adolescents and Women

Table 8 (p 48) indicates the percentage of adolescents of age 13-19 years stunted, severe stunted, energy deficient and severe energy deficient and percentage of ever married women (EMWs) of age 20-44 years energy deficient, severe energy deficient and overweight by sex, religion, caste, class, farmer category, type of family card possessed, annual per capita income and annual per capita expenditure on food.

Table 8 shows that both stunting and energy deficiency are higher amongst adolescent males than amongst adolescent females. Further both among adolescents (males and females combined) and ever married women as many as 50% are energy deficient and 23% among adolescents and only 15% among EMWs are severely energy deficient. Of adolescents 23% are considered stunted, with 29% of the boys and 18% among girls being stunted. Only 6% of adolescents exhibited signs of severe stunting.

Chart 5: Underweight and Severe Underweight by Crop Cultivation (children, %)



With respect to differentials in stunting and energy deficiency among adolescents and energy deficiency among EMWs, the data indicates that severe stunting, severe energy deficiency amongst both adolescents and EMWs and energy deficiency amongst adolescents does not appear to differ by socio-economic background

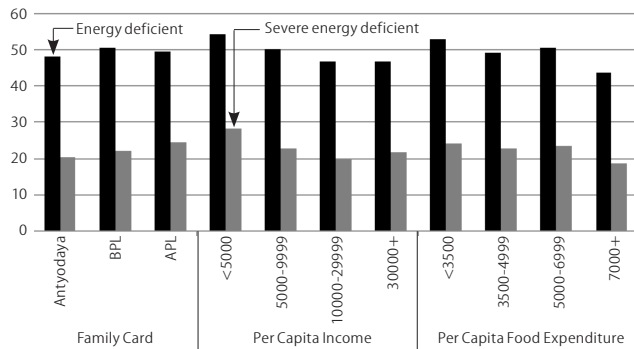
Table 9: The Logistic Regression Coefficients and Their Significance Levels for Underweight, Stunted and Energy Deficient among Children (12-59 Months), Adolescents (13-19) and EMWs (20-44)

Variables and Groups	Children (12-59 Months)						Adolescents (13-19)				EMW (20-44)	
	Underweight		Stunted		Energy Deficient		Stunted		Energy Deficient		Energy Deficient	
	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig	Coef	Sig
Religion		0.96		0.92		0.95		0.63		0.21		0.31
Buddhist	0.11	0.79	-0.20	0.68	0.13	0.76	0.26	0.40	-0.24	0.38	-0.38	0.14
Hindu/other	0.04	0.89	-0.11	0.74	0.08	0.80	0.21	0.35	-0.32	0.09	-0.15	0.41
Caste class		0.09		0.40		0.18		0.26		0.21		0.00
ST	0.25	0.41	0.14	0.68	-0.18	0.56	0.13	0.55	0.27	0.16	0.33	0.06
NT/DNT	-0.24	0.42	-0.08	0.81	-0.26	0.40	0.24	0.28	-0.04	0.85	0.05	0.77
OBC/SBC	-0.13	0.66	-0.16	0.61	-0.09	0.76	-0.01	0.96	0.12	0.50	-0.29	0.08
General	0.01	0.98	-0.45	0.34	0.51	0.23	-0.13	0.67	0.03	0.89	-0.50	0.03
Farmer category		0.34		0.40		0.41		0.07		0.42		0.20
Marginal	0.24	0.21	-0.28	0.20	0.20	0.30	0.30	0.03	-0.09	0.44	-0.20	0.05
Small	0.34	0.06	-0.05	0.83	0.15	0.43	0.04	0.78	0.10	0.43	-0.11	0.28
Semi-medium	0.17	0.44	-0.38	0.14	0.38	0.09	-0.04	0.82	0.15	0.36	-0.25	0.05
Medium/large	0.43	0.09	-0.32	0.28	0.43	0.10	-0.19	0.45	-0.07	0.72	-0.26	0.08
Family card type		0.01		0.64		0.00		0.10		0.40		0.03
BPL card	-0.31	0.11	-0.20	0.34	-0.26	0.19	-0.24	0.05	0.14	0.19	-0.05	0.61
APL card	-0.53	0.00	-0.13	0.51	-0.61	0.00	-0.08	0.52	0.13	0.23	-0.21	0.04
Per capita income		0.16		0.06		0.26		0.00		0.11		0.00
5,000-9,999	-0.08	0.73	-0.39	0.12	0.11	0.65	0.60	0.00	-0.22	0.19	0.01	0.93
10,000-29,999	-0.21	0.30	-0.50	0.02	0.19	0.38	0.14	0.42	-0.21	0.13	0.08	0.52
30,000+	-0.40	0.06	-0.62	0.01	-0.07	0.75	0.13	0.46	-0.35	0.02	-0.30	0.02
Per capita food expenditure		0.25		0.00		0.00		0.34		0.17		0.05
3,500-4,999	0.27	0.05	-0.62	0.00	0.71	0.00	-0.04	0.75	-0.12	0.23	-0.07	0.41
5,000-6,999	0.20	0.17	-0.63	0.00	0.76	0.00	-0.16	0.17	-0.14	0.15	-0.12	0.18
7,000+	0.05	0.87	-0.84	0.03	0.81	0.01	-0.39	0.16	-0.47	0.04	-0.47	0.01
Percentage of food met from HH/farm		0.02		0.04		0.71		0.49		0.58		0.37
1-19	-0.44	0.01	0.12	0.54	-0.20	0.25	-0.15	0.25	-0.10	0.35	-0.04	0.68
20-39	-0.19	0.37	0.57	0.02	-0.11	0.63	-0.06	0.74	0.06	0.67	-0.09	0.44
40+	0.02	0.93	0.59	0.03	-0.17	0.50	0.08	0.68	-0.06	0.72	0.14	0.32
Age group		0.00		0.07		0.06		0.00		0.00	NA	NA
24-35m/15-16/30-44	0.21	0.16	-0.01	0.93	0.23	0.14	-0.35	0.00	-0.27	0.00	-0.44	0.00
36-47m/17-19	0.34	0.02	-0.11	0.52	0.31	0.05	-0.34	0.00	-0.58	0.00	NA	NA
48-59m	0.54	0.00	-0.39	0.02	0.42	0.01	NA	NA	NA	NA	NA	NA
Female	-0.15	0.14	0.05	0.66	-0.12	0.25	-0.64	0.00	-0.88	0.00	NA	NA
Constant	0.22	0.62	0.45	0.38	-0.65	0.18	-0.87	0.01	1.20	0.00	1.00	0.00

Reference Categories: Religion: Muslim, Caste class: SC, Farmer category: Non-farmer, Family card type: Antyodaya card, Per capita income: Below Rs 5,000, Per capita expenditure on food: Below Rs 3,500, Percentage of food expenditure met out of household/farm produce: Nil, Age group: 12-23 months for children, age 13-14 for adolescents and age 20-29 for EMWs, Sex: Male. For each category of a variable, the comparison is against the reference category. The categories that are significantly different from the reference category are highlighted (marked italics).



Chart 6: Energy Deficiency among Adolescents (13-19, %)



of the households. On the other hand stunting among adolescents and energy deficiency among EMWs appear to differ by caste class, farmer category, per capita income and per capita food expenditure. Generally stunting among adolescents and energy deficiency amongst EMWs are lower amongst OBC/SBC (special backward castes) and general caste classes, large land-holding households (medium/large farmers), APL families, higher per capita income households and families with higher per capita expenditure on food (Charts 6, 7).

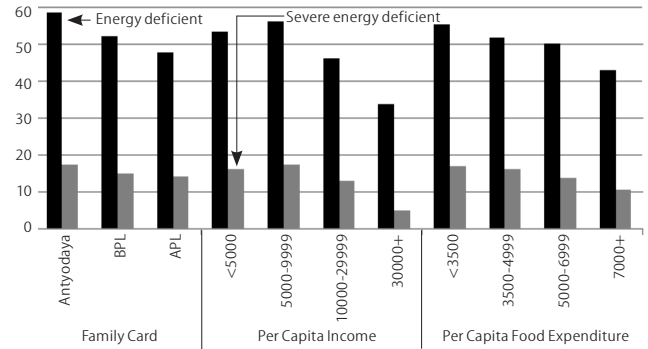
### Factors Determining Level of Nutrition: A Multivariate Analysis

An attempt is made to understand the effect of socio-economic and agriculture-related factors on the nutritional status of the children, adolescents and EMWs. For this, binary logistic regression analysis was attempted with nutritional status factors like underweight, stunted, energy deficient (as applicable) as dependent variables and sex and age, caste class, religion, farmer category, family card possessed, per capita annual income, capita annual expenditure on food and percentage of food expenditure met out of own farm/household produce as independent variables. Separate analysis was made for each dependent variable and the results are given in Table 9 (p 49). The analysis indicated that no socio-economic and agriculture-related variable is consistently related to under-nutrition among children, adolescents and ever married women. However economic variables like per capita annual income, per capita expenditure on food and percentage of food expenditure met out of household and farm produce are related to select under-nutrition indicators. More prominently it is seen from the table that per capita expenditure on food has shown a significant relation with most of the nutritional status indicators and the relationship is negative though there are exceptions specifically with respect to energy deficiency among children. In general, as the per capita expenditure on food to a great extent and per capita income to some extent increases, the proportion of undernourished children, adolescents and ever married women tends to decrease.

### Conclusions

Overall under-nutrition amongst children, adolescents and ever married women in the study area is substantial and it did not differ much between different socioeconomic groups. However, severe under-nutrition amongst all these groups is only moderate. Households with large cultivated holding (medium and large

Chart 7: Energy Deficiency among EMWs (20-44, %)



farmers with more than 10 acres) are no better than households with small or marginal cultivated holding or even landless households in containing under-nutrition among children, adolescents and ever married women. Religion and caste class also do not show any relationship with nutritional status of children. Per capita income of households shows the same pattern of relationship with nutritional status. Furthermore, a consistent relationship was observed between the per capita expenditure on food items and the nutritional status of children, adolescents and ever married women. The relationship is that other things being equal, the higher the expenditure on food items, lower the proportion of children, adolescents and ever married women undernourished.

With respect to the relationship between agriculture and nutrition the data indicates that the higher the food crop production, lower the under-nutrition. It must be noted, that food crop diversity is very limited and is confined to a small proportion of farmers. A large proportion of farmers opting for commercial (cash) crops instead of food crops but still facing malnutrition implies that this visible change in agricultural patterns as such cannot be taken as an indicator of better nutritional status of household members. It also indicates a need for greater research on the role of whether the adoption of food crops in areas facing nutrition problems is advisable, how price effects in production and consumption are affected by changing agricultural patterns. There is also a need to interrogate whether increased production of food crops at the local level will mitigate price effects, and whether this will in turn benefit the general populace.

Finally, a gendered analysis of access to productive resources, decision-making powers and intra-household allocation of work responsibilities is also needed to draw clearer linkages.

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