

Malnutrition among high school tribal children in selected blocks of Chhattisgarh.

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Background

India has the dubious distinction of being home to the one of the largest number of malnourished people in the world. The Global Hunger Index¹ uses four indicators to describe the state of a country's hunger situation. These are proportion of overall population that is undernourished² (including adults and children), under-five wasting³, under-five stunting⁴, and under-five mortality rate. According to the GHI 2016, India is ranked 97 among 118 countries, better only than Pakistan (rank 107) among South Asian countries. The hunger situation is classified as "serious", marginally better than "alarming". In the 2017 report, India has slipped to 100th rank from among 119 countries.

Hunger leads to under-nutrition with all its consequences. Under-nutrition in children younger than five years is the underlying cause of approximately 60% of deaths in this age group. Malnutrition in early childhood leads to impaired physical and mental development, with reduced capacity for learning and for physical work. Malnourished adults would understandably have diminished work capacity. They are also more susceptible to more severe infections, compared with healthy adults.

In children under five, various indicators like weight-for-age (underweight); height for age (stunting); and weight-for-height (wasting) are used to assess acute and chronic hunger. In those over five years of age, the Body Mass Index is commonly used to estimate under-nutrition or thinness, in addition to other indicators like stunting. The Body Mass Index is a ratio of the person's weight (measured in kilograms) and their height (in metres) squared. In adults, a BMI below 18.5 signifies under-nutrition. For children between 5-19 years of age, age-specific BMI curves are used to compare a child's BMI with.

While information on prevalence of child malnutrition and adult malnutrition is available through national level surveys, there is no recent national level data on adolescent nutritional status. The most recent information available is from the National Nutritional Monitoring Board's Rural Third Repeat Survey of 2011-12⁵, which showed that boys and girls between 13-15 years of age were consuming half or less than half of recommended daily allowance of oil and protein. 35% of the boys, and 20% of the girls in this age group were undernourished.

¹<http://ghi.ifpri.org/>

² Weight less than -3SD when compared to the standard normal population.

³ Weight for height less than -3SD when compared to the standard normal population.

⁴ Height for age less than -3SD when compared to the standard normal population.

⁵<http://nmbindia.org/NNMBREPORT2001-web.pdf>

While data on tribal under-nutrition from NFHS-4 (2015-16) is not yet available, the third survey conducted in 2005-06 shows that in both children and in adults, the levels of malnutrition among tribals is the highest when compared to General caste, Other Backward Castes, and Scheduled Castes.

Tribals in India face multiple disadvantages – being poorer than other communities (and therefore poorer purchasing power for food); living in remote areas with health care and other services difficult to deliver and to access; loss of access to forest foods and their traditional livelihoods of gathering and selling minor forest produce owing to displacement, restrictions and loss of forest cover⁶.

As per Census 2011, ST constitute nearly 1/3 (31.8%) of population of Chhattisgarh.

How the survey evolved:

“Food Security” is one of the chapters in the new social science textbooks for Chhattisgarh for Class 10. Apart from examining the macro data and other conceptual issues this chapter deals with understanding BMI (Body Mass Index) for growing children. It also has an exercise where children find out their BMI and read the table to interpret their result. Hence a real sense of their own nutrition status is obtained. The teacher is expected to summarise the results of the students in the class in a tactful manner and also discuss the diet pattern of children of her class.

During the course of development of this chapter three resource teachers from different remote blocks conducted trials in their own school situation. They took the height and weight of a sample of children from their school & worked out the BMI for each. From the collated data, using WHO guidelines, the percentage of children undernourished was arrived at. This was done under the guidance of Dr Ramani, a specialist in community medicine. The results were quite surprising to all. The range of undernourishment was 16%, 24% and 60% for these three schools. The teachers discussed their individual situation with Dr Ramani who suggested that they find out if children have been hungry any time in the last week, their normal diet pattern and whether any supplements of fruit, meat or egg was available. One of the teachers suggested that children bring tiffin which they would eat together. They were probably coming hungry to school and there was no midday meal being served to class 9 and 10 students.

Some months later, as part of a separate programme, NCERT and SCERT Chhattisgarh collaborated to organise a 6-day Capacity Building Programme for Social Science Teachers. This was for teachers working in schools run by Tribe Welfare Department in Chhattisgarh during **14-19 November 2016**. These schools predominantly cater to tribal children. The “Food Security” chapter along with the exercises on BMI was done with these teachers. After the training, twelve teachers carried out this exercise with their students at their own

⁶<http://dx.doi.org/10.1080/21683565.2016.1189475>

school and sent us the data. The following analysis is based on this. The schools who responded were from the following blocks & districts- Dharmjaigarh, Kharsiya from Raigarh; Odagi, Pratappur, Bhaiya Than and Surajpur block from Surajpur; Manendragarh and Khadgawan from Koriya; Kusmi and Shankargarh from Balrampur; Dharamjaigarh from Raigarh; Bagicha from Jaspur; Chhuikhadan from Rajnandgoan.

Methodology of survey

Teachers were taught how to measure weight and height. Weights were measured using a standard bathroom scale after checking for zero error before each reading. Heights were marked up to half centimetre on one of the walls of the classroom. Children had to stand against this, barefoot, with feet together and heels touching the wall. The buttocks and shoulders should also touch the wall, as well as the most prominent part on the back of the head (the occiput). The eyes should be in line with the top of the ear, ie, the child should look straight ahead, and not tilt his / head upwards. A ruler or notebook was placed on top of the head and the reading read off the height scale. It must be mentioned here that inter-observer variation among the readings is likely but, we hope, not large enough to significantly alter the findings.

The Body Mass Index (BMI) is an internationally accepted and commonly used measure to estimate nutritional status of those over five years of age. It is computed by measuring body weight in Kg, and the height in metres. In adults, a standard value of 18.5 is used as the cut-off for normal nutrition – those below 18.5 are considered undernourished, or thin.

In children and adolescents (5-19 years) their body height keeps changing, so the ratio of their weight to their height keeps changing too. The World Health Organization has standard BMI for age curves showing normal, undernourished and over-weight values of BMI at a particular age. These are simplified into tables for field use. This is the reference that was used by the teachers. A sample is shown below.

BMI table for adolescent boys - sample sheet.

Simplified field tables


BMI-for-age BOYS 5 to 19 years (z-scores)		 World Health Organization						
Year: Month	Months	-3 SD	-2 SD	-1 SD	Median	1 SD	2 SD	3 SD
5: 1	61	12.1	13.0	14.1	15.3	16.6	18.3	20.2
5: 2	62	12.1	13.0	14.1	15.3	16.6	18.3	20.2
5: 3	63	12.1	13.0	14.1	15.3	16.7	18.3	20.2
5: 4	64	12.1	13.0	14.1	15.3	16.7	18.3	20.3
5: 5	65	12.1	13.0	14.1	15.3	16.7	18.3	20.3
5: 6	66	12.1	13.0	14.1	15.3	16.7	18.4	20.4

Figure 1 Sample field table for boys' BMI for age.

Teachers were provided with and taught to read the WHO age and gender-specific BMI simplified field tables, and could check their students' BMI for age to find out their nutritional status.

For the twelve schools who responded and sent us back their recordings, the data was checked for missing entries and errors, and sent back for correction. All complete entries were then entered into WHO Anthro Plus⁷ software and analysed.

Findings

Data on weight, height and date of birth was entered for 267 students – 133 boys and 134 girls

Height for age

Overall, 27% of students were too short for their age, ie, they were stunted. 3.4% were severely stunted. (Figure 2)

Boys showed slightly more stunting than girls – 30% of boys were stunted, compared to 24% of girls.

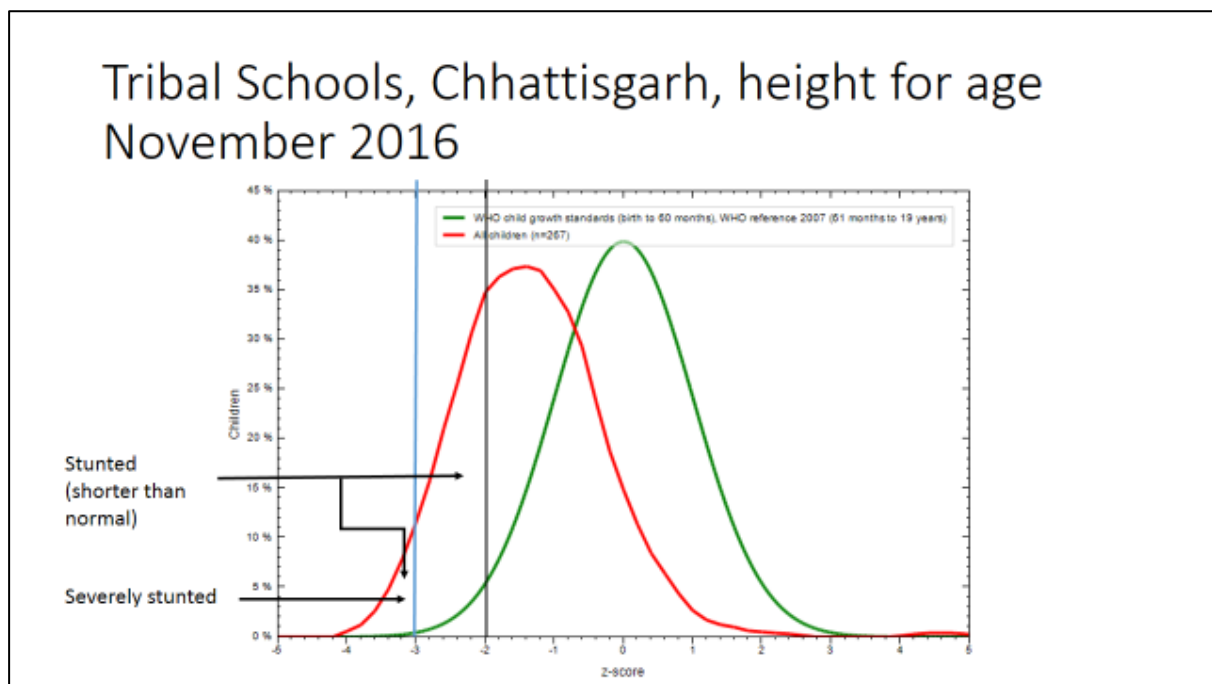


Figure 2 Stunting among high school children, Chhattisgarh. 27% are stunted; and 3% are severely stunted.

Stunting was similar in boys and girls, as shown below (Figure 3)

⁷<http://www.who.int/growthref/tools/en/>

Height-for-age by sex, CG tribal schools, November 2016

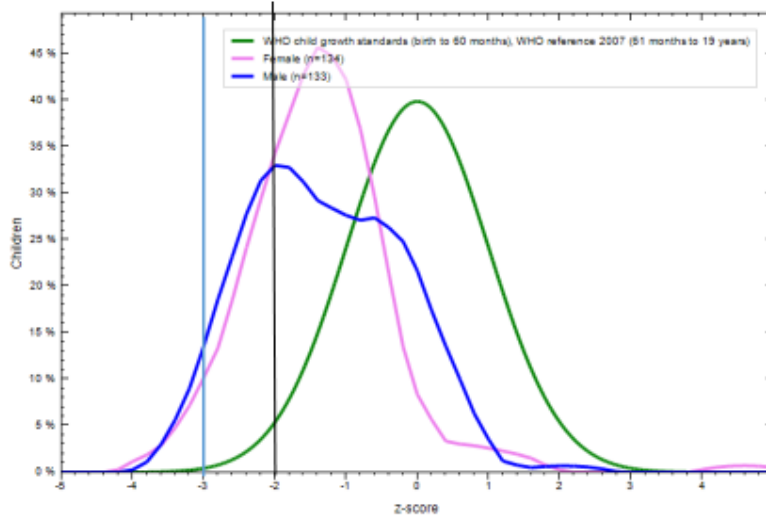


Figure 3 Stunting among boys (blue) and girls (pink) among high school children, CG. Rates are similar, with boys showing a slightly higher percentage of stunting.

BMI for age

One in four students surveyed (27%) were too thin for their age. That is, their BMI was less than 2 standard deviations of the median BMI for their age. 11% had severe thinness (BMI less than 3SD for age) – were extremely undernourished for their age. (Figure 4)

BMI for age, November 2016

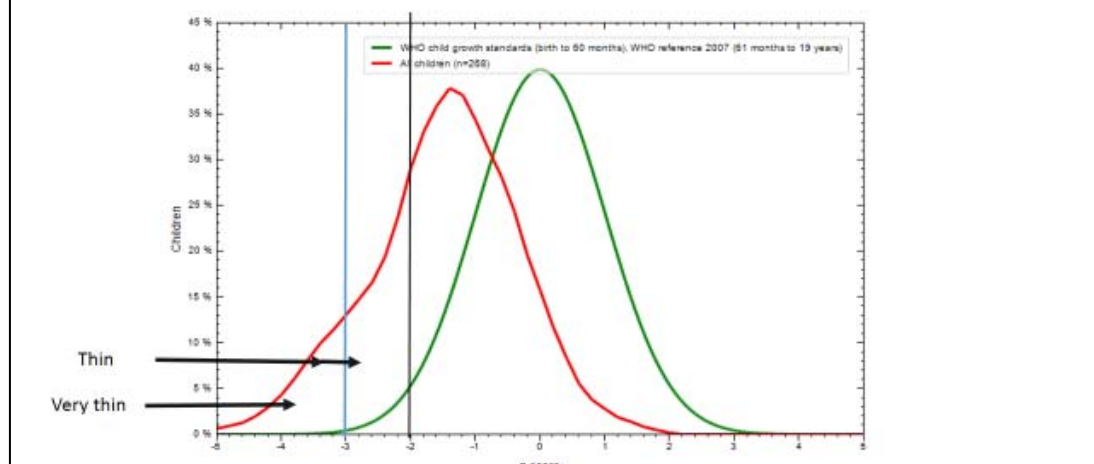


Figure 4 BMI for age. Overall, 27% are undernourished and over 10% are severely undernourished.

Undernutrition and severe undernutrition was found to be more common in boys than in girls. Nearly 40% (39%) of boys were found to be undernourished, while 11% were severely undernourished. Among girls, 15.7% were undernourished and 3.7% were very severely undernourished. These rates are less than half than that found in boys. (Figure 5)

In both boys and girls, the older adolescents - (14-19 years) were more undernourished than younger adolescents (10-14 years). See Table 1.

Table 1 Proportion of undernourished and severely undernourished among boys and girls, CG tribal schools, Nov 2016.

Age	Boys		Girls	
	Undernourished	Severely undernourished	Undernourished	Severely undernourished
Total	38.8	18.7	15.7	3.7
10-14 years	36.5	14.3	13.6	4.9
15-19 years	41.4	22.9	19.2	1.9

A more accurate estimate of thinness (undernutrition) and severe thinness (severe undernutrition) can be obtained when BMI is taken for a larger number of children.

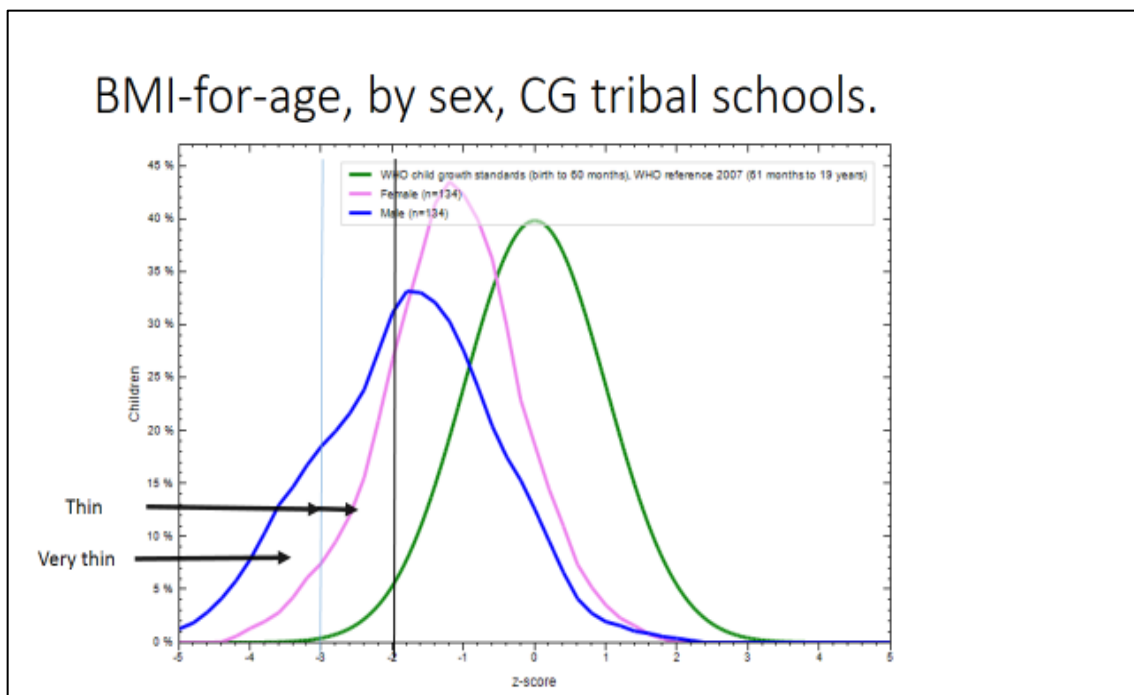


Figure 5 Boys show a significantly higher degree of undernutrition as compared to girls, CG tribal high schools, November 2016

Meals recall survey.

Day	Morning	Afternoon	Night
Today	Rice, chutney, pickle	Did not eat	Rice, pickle
Yesterday	Did not eat	Rice, daal	Rice, daal
2 days ago	Rice, sabji (potatoes)	Rice, chutney	Rice, potatoes, chutney
3 days ago	Rice, potatoes	Did not eat	Rice, some milk
4 days ago	Rice, daal, pickle	Did not eat	Rice, chutney
5 days ago	Rice, chutney	Rice, oil	Rice, vegetable
6 days ago	Rice, chutney	Did not eat	Rice, vegetable
7 days ago	Rice, daal, pickle	Did not eat	Rice, chutney

This child has missed six meals the previous week, with five out of eight afternoon meals not eaten.

Figure 6a What have the children eaten the previous week?

When asked to recall what the students had the previous week, it was found that several had skipped meals and eaten only twice during the day. One student had skipped an afternoon meal on five out of the past eight days. Most of the other meals consisted of rice, sometimes with daal or potatoes. Fruit and eggs, or milk, meat or fish did not figure in his diet, though their diet does include non-vegetarian food.

This is probably similar for other children. In general teachers reported that skipping meals was common. It was for this reason that one of them on their own had encouraged students to bring some tiffin and eat together at school. The results of a sample of ten tribal children at this school shows the following pattern. One meal is skipped by almost all. One child had eaten fish with dinner on one day. No other animal protein. Most children had a snack like a guava or a handful of chana for lunch. Breakfast for one child (Pinki) was mainly tea in the mornings.

Sl no	Name of student	Age in years	Number of days meal eaten during past school week (5 days)		
			Breakfast	Lunch	Dinner
1	Rajkumari	14	4.0	0.0	5.0
2	Pramila Singh	14	5.0	0.0	4.0
3	Pinki Singh	16	1.0	0.0	5.0
4	Shanti Singh	16	5.0	0.0	5.0
5	Priya Singh	16	4.0	1.0	5.0
6	Sukhmen Singh	16	5.0	2.0	5.0
7	Phulkunwer Singh	16	5.0	0.0	4.0
8	Pushpa Singh	14	5.0	2.0	5.0
9	Sunil Singh	15	5.0	0.0	5.0
10	SurajPatle	16	4.0	2.0	5.0

Average number of meals eaten	4.3	0.7	4.8
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Figure 6b- Meals recall survey for ten tribal children

Daily intake of specific nutrients.

As part of background information, during the curricular development phase, a small exercise was done in a few schools of how families of students in rural areas access the Public Distribution System (PDS). As an example of what families of the students get from the (PDS) and what they purchase outside, one student had the following (Figure 7) -

Name: Kavita. Members in family – 8

	Item	From PDS	Buy from market
1	Rice	35 kg	30 kg
2	Wheat	0	5 kg
3	Chana	0	2 kg
4	Sugar	1 kg	0
5	Oil	0	2 kg
6	Daal	0	2 kg
7	Salt	2 kg	0

Average daily intake of oil is 8.3 gm /person /day; intake of daal is 8.3 gm / person / day; chana is 8.3 gm / person / day; cereal is 292 gm/person/day

Figure 7 Food obtained from PDS and food purchased from open market in a month.

As seen in Figure 8 below, each family member consumes on a daily average, only 8.3 gm of protein and 8.3 gm of oil. Total calorie consumption is around 1255 Kcal/day, which is grossly inadequate for anyone except a small child, and certainly insufficient for Kavita in her adolescent years. The access from PDS for families in Chhattisgarh has greatly improved⁸ and is commendable but the quantities provided from the PDS overall per person may be much lower than the recommended daily intake, as in the above case, especially as the family is unable to purchase the balance amount from the open market.

⁸Khera, R., *Economic and Political Weekly* 46 (44-45), 5 November 2011

A random check of a few other student samples leads to the same conclusion.

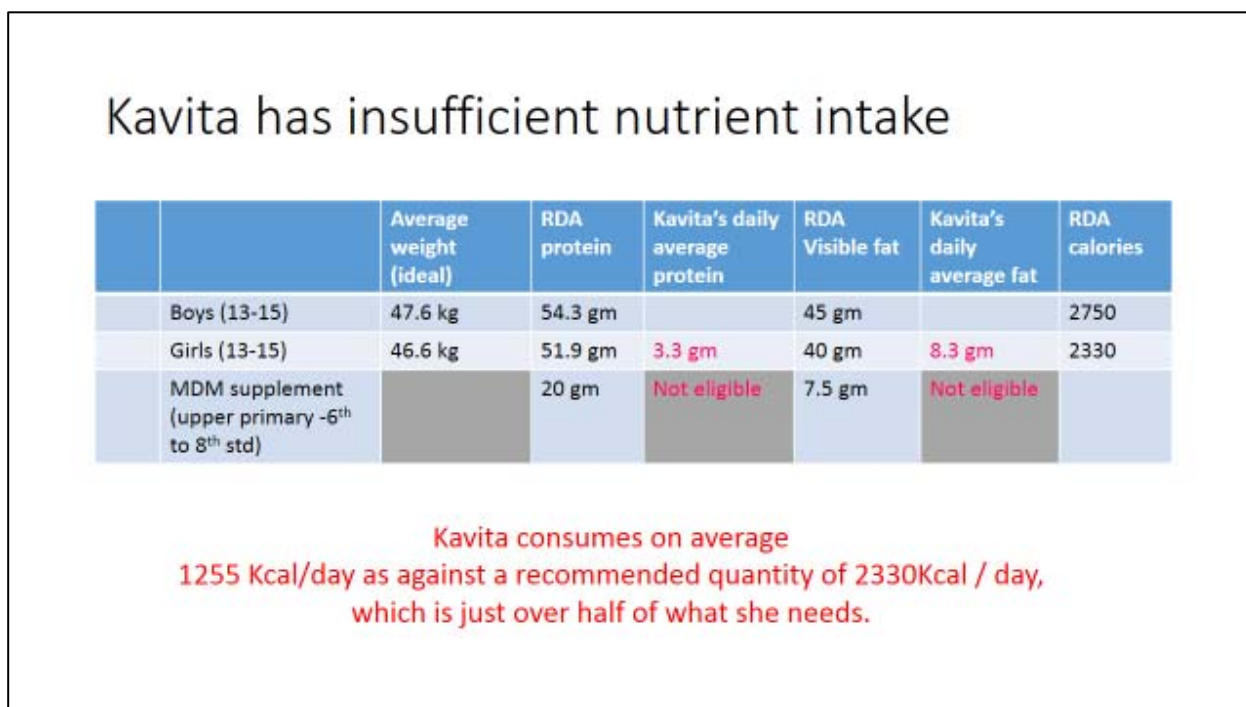


Figure 8 Kavita's average daily intake of protein, oil and total energy, all of which are grossly insufficient for her.

What do the findings indicate?

We present here the findings of a small survey conducted by school teachers on students of standards 9 and 10 as part of their curriculum, in some tribal schools in Chhattisgarh. Though there may be inter-observer variation and the findings focused on a few districts, this nevertheless gives an indication of the nutritional status of children in these schools.

What is clearly evident from the data about the children's heights and weights is the students in Standards 9 and 10 of the Government Tribal Schools are significantly malnourished. While overall one in four (27%) students is undernourished, more boys are undernourished compared to girls (among boys 39% are undernourished, compared to 15.7% among girls). This finding is consistent with other studies^{9, 10} conducted in high school students where also more boys were found to be undernourished. However another study conducted in Sagartown in Madhya Pradesh found girls to be more undernourished than boys¹¹. What is also concerning is that 11% (one in ten) of students is severely undernourished.

⁹Banerjee S. et al, *Natl Med J India* 2011; 241(1): 8-11

¹⁰nnmbindia.org/1_NNMB_Third_Repeat_Rural_Survey___Technicl_Report_26.pdf

¹¹Thakur R, Gautam RK. *Anthropological Survey*. Vol 78 (2); 197-212 (2015)

Prolonged hunger, or insufficient food intake in childhood also results in bones not growing to their full potential: hence these students are shorter than they should be. This is called stunting, and in this current sample, 27% of students (a quarter) were stunted, and 3.4% are severely stunted.

When asked about food eaten during the past week, it was found that the diet was mostly rice-based with little daal; few vegetables; no fruit, and no eggs, fish, or meat. The absence of a variety in the diet leads also to malnutrition. More significantly, many had skipped a meal during the day. In the example shown, this particular student had skipped five meals in seven days: morning meal once; and afternoon meal on four days. Thus on five days of the week when he came to school, he was either hungry from the morning, or got hungry or remained hungry for all the afternoon sessions. Skipping meals appears to be a regular phenomenon even though the number of times this happens during the week would vary across students.

Hunger in children leads to irritability, inability to concentrate, impaired learning, depression and suicidal ideation. Since the mind is focused on food, their ability to concentrate on school work is limited. Severe hunger can also lead to chronic diseases in adulthood. Their academic achievement is worse than other students who are not hungry¹².

Nutritional support at home is inadequate as indicated in the case studies cited above. Children are skipping meals and the total availability of food both from the market and PDS is much lower than required.

Such a large proportion of students being chronically hungry and underweight means that their ability to focus in class and their interest in their studies as well as their academic achievement, would be adversely affected.

The Government of India introduced the mid-day meal in primary schools initially in 1995 to improve enrolment, retention and attendance as well as to improve the nutritional status of students. In 2001 it became a cooked Mid-Day Meal Scheme in which every Government and Government-aided Primary School child would be provided a cooked meal with specified daily protein and calorie content. Currently it is extended all over India to cover all elementary schools (1-8th standard). Calorie and protein norms are currently 450 calories and 12 gm of protein daily for Primary; and 700 calories and 20 gm of protein daily for Upper Primary school students. The costs are shared between the Centre and the States in a ratio of 60:40.

Though implementation has been of variable quality, with issues of regularity, quality and quantity of food provided, leakage of funds and rations etc, it does provide a much-needed meal to children during the day.

This scheme currently does not extend to high school students. From the above discussion it is apparent that high school students in Chhattisgarh require this nutritional support. This is because 27% of students are undernourished; older children are more undernourished than younger ones; and overall nutritional support at home is inadequate. Some states like

¹²<http://www.apa.org/advocacy/socioeconomic-status/hunger.pdf>

Telangana and Karnataka have extended it to high school students about two years ago whereas Tamil Nadu has had this coverage for many years. It is useful to remember that we should not wait for distress to overcome us but be quick in response to a situation that can only enhance wellbeing and improve learning.

We do require a systematic nutritional survey for Chhattisgarh high school children repeated by NIN so that comparable data is available. The important question to examine is the indication that the current purchasing power and allocation for PDS is not sufficient to provide the food security as desired. Given the nutritional urgency of the situation we should move fast towards examining an increase in the quota given through the PDS, as well as the variety of foodgrains provided. Meanwhile, extending the mid-day meal scheme to high school students in Chhattisgarh will address some level of hunger and nutritional deficiency among them.

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(We would like to thank the teachers who participated in the survey and especially B P Singh for initiating this at his school.)