

# Malnutrition among High School Tribal Children in Selected Blocks of Chhattisgarh

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## Abstract

*This study grew out of new curricular exercises for social science in Chhattisgarh. At a workshop for tribal schools, the teachers were introduced to the idea of nutrition, measurement of Body Mass Index (BMI) and how it is linked to understanding food security. The training emphasised how this could be used in their own schools. The collation and analysis of data from these sample schools located across tribal blocks led to surprising results. What is clearly evident from the data about the children's heights and weights is that the students of the government tribal schools in Classes IX and X are significantly malnourished. While overall one in four (27 per cent) students is undernourished, boys are more undernourished as compared to girls. Among boys, 39 per cent are undernourished, as compared to 15.7 per cent among girls. Further investigations indicate the evidence of skipping meals and hidden hunger at home. While evidence should be collected on a larger scale, there is an urgent need to introduce Midday Meal (MDM) for high schools in Chhattisgarh, similar to the efforts in some other states.*

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## INTRODUCTION

India has the dubious distinction of being home to one of the largest number of malnourished people in the world. The Global Hunger Index (GHI) uses four indicators to describe the state of a country's hunger situation. These are—proportion of overall population that is

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undernourished (including adults and children), under-five wasting, under-five stunting, and under-five mortality rate. According to the GHI 2016, India is ranked 97 among 118 countries, better only than Pakistan (rank 107) in the South Asian region. The hunger situation is classified as 'serious', marginally better than 'alarming'. In the 2018 report, India has slipped to the rank 103 from among 119 countries, with Pakistan at 106.

Hunger leads to undernutrition. Undernutrition in children younger than five years is the underlying cause of approximately 60 per cent of deaths in this age group. Malnutrition in early childhood leads to impaired physical and mental development, with reduced capacity for learning and 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 undernutrition. For children between 5–19 years of age, age-specific BMI curves are used to compare a child's BMI with.

While information on the 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 2011–12 which showed that boys and girls between 13–15 years of age were consuming half or less than half of recommended daily allowance of oils and protein. 35 per cent of the boys and 20 per cent of the girls in this age group were undernourished.

While data on tribal undernutrition from National Family Health Survey (NFHS)-4 (2015–16) is not yet available, the third survey conducted in 2005–06 shows that in both children and adults, the levels of malnutrition among tribals is the highest when compared to the 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 healthcare 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 cover.

As per the Census 2011, the Scheduled Tribes (ST) constitute nearly one-third (31.8 per cent) of the population of Chhattisgarh.

### **HOW THE SURVEY EVOLVED**

'Food security' is one of the chapters in the new social science textbooks for Chhattisgarh for Class X. 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 results. 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 the children in 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 and worked out the BMI for each. From the collated data, using WHO guidelines, the percentage of undernourished children 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 per cent, 24 per cent and 60 per cent

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 were 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 mid-day meal being served to Class IX and X students.

Some months later, as part of a separate programme, the National Council of Educational Research and Training (NCERT) and State Council of Educational Research and Training (SCERT), Chhattisgarh collaborated to organise a six-day Capacity Building Programme for social science teachers. This was for the 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 were done with these teachers. After the training, twelve teachers carried out this exercise with their students in their own school and sent us the data. The following analysis is based on this. The schools who responded were from the following Blocks and districts—Dharmjaigarh, Kharsiya from Raigarh; Odagi, Pratappur, Bhaiya Than and Surajpur block from Surajpur; Manendragarh and

Khadgawan from Koriya; Kusmi and Shankargarh from Balrampur; Bagicha from Jaspur; Chhuikhadan from Rajnandgoan.

### METHODOLOGY OF SURVEY

The 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, that is, the child should look straight ahead, and not tilt one's 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, it is not large enough to significantly alter the findings.

The Body Mass Index (BMI) is an internationally accepted and commonly used measure to estimate the nutritional status of those over five years of age. It is computed by measuring body weight in kilograms and 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 overweight 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.

**Table 1**  
**Sample Field Table for Boys' BMI for age 5–19 Years.**

#### Simplified field tables

<b>BMI-for-age BOYS</b> <b>5 to 19 years (z-scores)</b>					 <b>World Health Organization</b>			
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

Teachers were provided with the WHO age and gender-specific BMI simplified field tables and taught how to read it. They 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 Plus software and analysed.

## FINDINGS

Data on weight, height and date of birth were entered for 267 students—133 boys and 134 girls.

### Height-for-age

Overall, 27 per cent of students were too short for their age, that is,

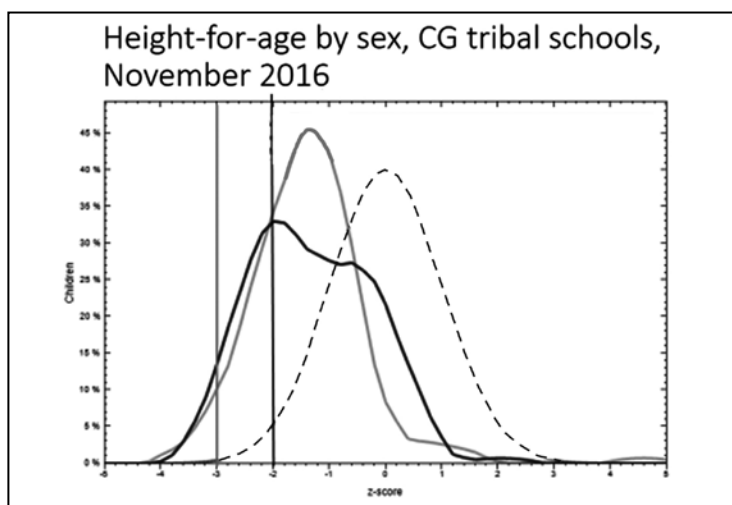
they were stunted. 3.4 per cent were severely stunted (Figure 1).

Boys showed slightly more stunting than girls—30 per cent of boys were stunted, compared to 24 per cent of girls.

### BMI-for-age

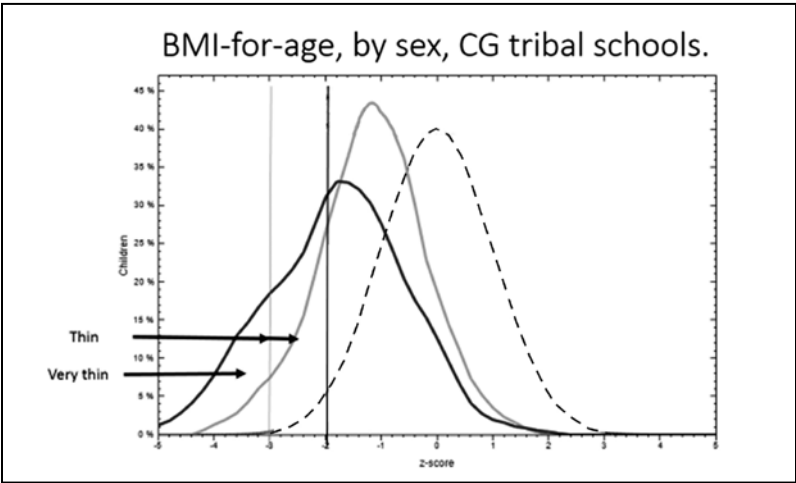
One in four students surveyed (27 per cent) were too thin for their age; that is, their BMI was less than 2 standard deviations of the median BMI for their age. 11 per cent had severe thinness (BMI less than 3 SD for age); they were extremely undernourished for their age (Figure 2).

Undernutrition and severe undernutrition was found to be more common in boys than in girls. 39 per cent of boys were found to be undernourished, while 11 per cent were severely undernourished.



- WHO child growth standards (birth to 60 months) WHO reference 2007 (61 months to 19 years)
- Female (n = 124)
- ... Male (n = 133)

Figure 1. Stunting among Boys and Girls among High School Children. CG Rates are Similar, with Boys Showing a Slightly Higher Percentage of Stunting.



— WHO child growth standards (birth to 60 months) WHO reference 2007 (61 months to 19 years)  
— Female (n = 134)  
— Male (n = 134)

Figure 2. Boys Show a Significantly Higher Degree of Undernutrition as Compared to Girls, CG Tribal High Schools, November 2016

Among girls, 15.7 per cent were undernourished and 3.7 per cent were very severely undernourished. These rates are less than half than that found in boys (Figure 2). In both boys and girls, the older adolescents—(14–19 years) were more undernourished than the younger adolescents (10–14 years). See Table 2.

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.

Meals Recall Survey

When asked to recall what the students had the previous week, it was found that several had skipped meals and eaten only twice during

Table 2  
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
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**Table 3**  
**What have the Children Eaten the Previous Week?**

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.

the day (Table 3). 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, eggs, 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

had encouraged students to bring tiffin on their own and eat together at school. The results of a sample of ten tribal children at this school show 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 (Table 4).

**Table 4**  
**Meals Recall Survey of Ten Tribal Children**

S. No.	Name of Student	Age in Years	Number of Days Meal Eaten During Past School Week (5 days)		
			<i>Breakfast</i>	<i>Lunch</i>	<i>Dinner</i>
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.	Suraj Patle	16	4.0	2.0	5.0
	<b>Average number of meals eaten</b>		<b>4.3</b>	<b>0.7</b>	<b>4.8</b>

### 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 from outside, one student had the following (Table 5).

As seen in Table 5, each family member consumes 8.3g of oil per day, 8.3g of daal and *chana* each day, as

**Table 5**

**Food Obtained from PDS and Food Purchased from Open Market in a Month**

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



well as 292g of cereal per day. This is grossly inadequate for Kavita, and the daily amount consumed is similarly inadequate as per Recommended Dietary Allowance (RDA) norms in other children as well (Table 6).

Table 6 shows that none of the children in this sample were consuming adequate proteins or fats or total calories per day. Kavita, for instance, was consuming half the calories she requires daily, a little less than half the protein she needs, and only 20 per cent of the fats she requires. These proportions are inadequate, especially in adolescents. The access to PDS for families in Chhattisgarh has greatly improved (Khera 2011); and is commendable but the overall quantity provided from the PDS 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.

### **WHAT DO THE FINDINGS INDICATE?**

Though there may be inter-observer variation and the findings are focused on a few districts, nevertheless, this gives an indication of the nutritional status of children in these schools.

It is clearly evident from the data about the children's heights and weights that the students in Class IX and X of the Government Tribal Schools are significantly malnourished. While overall one in four (27 per cent) students is undernourished, more

boys are undernourished compared to girls (among boys 39 per cent are undernourished, compared to 15.7 per cent among girls). This finding is consistent with the other studies (Banerjee et al, 2011; NNMB 2012) conducted amongst high school students. There too, more boys were found to be undernourished. However, another study conducted in Sagar town in Madhya Pradesh found girls to be more undernourished than boys (Thakur et al 2015). What is also a great concern is that 11 per cent (one in ten) students are severely undernourished.

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 per cent of students (a quarter) were stunted, and 3.4 per cent are severely stunted.

When asked about the food eaten during the past week, it was found that the diet was mostly rice-based with little daal, few vegetables, with no fruit, eggs, fish, or meat. The absence of variety in their diet also leads 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

Table 6  
Percentage of RDA of Fats, Proteins and Total Calories Consumed by Children

Girls 13-15 yrs								
Name	RDA protein (g)	Actual	RDA (%)	RDA Calories (Kcal)	Actual	RDA (%)	RDA visible fat (g)	Actual
Punita	51.9	22.8	44	2,330	1,207	52	40	5.6
Rambai		28.5	55		1,242	53		5.6
Anita Kumari		34.3	66		1,831	79		11.1
Kavita		25	48		1,184	51		8.3
Boys 13-15 yrs								
Name	RDA protein (g)	Actual	RDA (%)	RDA Calories (Kcal)	Actual	RDA (%)	RDA visible fat (g)	Actual
Bhagwan	54.3	20.2	37	2,750	870	32	45	4.8
Santosh		41.1	76		1,910	69		4.8

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 hungry.

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 (Classes I–VIII). Calorie and protein norms are currently 450 calories and 12g of protein daily for primary school students; and 700 calories and 20g 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 the implementation has been of variable quality, with issues of regularity, quality and quantity of food provided, leakage of funds and rations, etc., yet it does provide a much-needed meal to children during the day.

Currently, this scheme 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 per cent of the students are undernourished; older children are more undernourished than younger ones; and overall nutritional support at home is inadequate. Some states like 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 students' well-being and improve their learning.

We do require a systematic nutritional survey for Chhattisgarh

high school children repeated by National Institute of Nutrition (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 food grains 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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