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Research Article

Health of Children in Rural Tribal Communities of a Hilly Forestry Region with Extreme Poverty

S Chhabra*

Emeritus Professor, Obstetrics Gynaecology,Mahatma Gandhi Institute of Medical Sciences, Sevagram, Officer On Special Duty, Dr. Sushila Nayar Hospital, Utavali, Melghat, Amravati Chief Executive Officer, Aakanksha Shishugruh Kasturba Health Society, Sevagram, Wardha, Maharashtra, India

***Corresponding Author:** S Chhabra, Emeritus Professor, Obstetrics Gynaecology,Mahatma Gandhi Institute of Medical Sciences, Sevagram, Officer On Special Duty, Dr. Sushila Nayar Hospital, Utavali, Melghat, Amravati Chief Executive Officer, Aakanksha Shishugruh Kasturba Health Society, Sevagram, Wardha, Maharashtra, India.

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Abstract

Background: More than 149 million children globally have stunted growth due to malnutrition, most in developing countries.

Objective: Study was conducted to know about food consumed, Body Mass Index, haemoglobin of children.

Material and Methods: Information was collected from rural tribal communities of 100 villages in forestry, hilly region with extreme poverty, minimum 10 families with 2 children each, 1 male, 1 female, if no female than males, if no male than females. Height, Weight, Haemoglobin were measured.

Results: Of 2400 children of 3-14 years, 798 were of 3-6 years, 446 boys, 352 girls, all attended Anganvadi (Kindergarden), got something to eat once a day in the school Khichadi (Polenta) or Moth (Keet) or egg or Peanut Jaggery Bar. At home of 3-6 years old 110 (24.66%) boys and 105 (29.82%) girls used to get something to eat once a day, 109 (24.43%) boys and 115 (32.67%) girls twice a day. At home 109 (24.43%) boys, 109 (30.96%) girls used to eat Jawar (sorghum) Roti (sort of bread) with Salt Chillis, 85 (19.05%) boys, 56 (15.90%) girls used get Wheat Roti with Dal (cooked pulses), 100 (22.42%) boys and 73 (20.73%) girls used to eat Rice with Vegetables. Sixty two (13.90%) boys, 21.02% girls had some fruits, 6.64% boys, 12.5% girls had little milk with Roti occasionally at home. Total 35.42% boys, 20.17% girls had low BMI, 12.10% boys, 7.95% girls had haemoglobin <5g/dl. Only 10.98% boys, 5.68% girls were nonanaemic, 25.9% children had symptoms of vitamin A deficiency, 4.03% seemed to have goitre. All 1609 children of 7 to 14 years, got Khichdi at school. At home had Jawar (Sorgrum) Roti (sort bread) Dal, Roti Chillies, Rice Vegetables 47.06% boys 52.93% girls only once a day. Overall 35.75% girls 38.32% boys had low BMI, 13% boys, 19.10% girls had < 5 g/dl haemoglobin, 34.08% boys 25.70% girls between >5- < 7 only 3.7% boys 10.49% girls >11 g/dl. Around 90% children were anaemic.

Conclusion: Most children were anaemic, many had low BMI due to lack of essential food, Awareness, support, polices, programs, sustainable system for nutritious food to children are essential.

Keywords: *Children; Meals; Health; Body Mass Index; Anaemia*

Background

Children continue to suffer from malnutrition globally. Even in rich countries, many children go hungry due to various reasons. In developing countries, many live in absolute poverty, especially those belonging to marginalised indigenous populations. Keeley., *et al.* [1] reported that more than 149 million children had stunted growth, many from developing countries, specially in villages with tribal communities. Martins., *et al.* [2] reported that malnourished children tend to have lower IQ and impaired cognitive ability, thus adversely affecting their school performance and productivity in later life. Kapur., *et al.* [3] reported that the Poshan Abhiyaan of India, was aimed at improving nutritional outcomes among pregnant women, lactating mothers, and children by reducing the level of stunting, underweight, anaemia and low birth weight by 2022. However present status suggests it requires a critical look at policies, programs and their implementation, if the aim has to be even partially achieved.

Objective

Study was conducted to know about food consumed, Body Mass Index and haemoglobin of children of rural tribal communities in a forestry hilly region with extreme poverty.

Material and Methods

After ethics commitee's approval, study was conducted in 100 villages in Dharni Block of Melghat, Maharashtra, India. Families with one male and one female child each, if no female, than both males, if no male than both females, minimum 10 families were visited randomly in each village. Over all 1200 families were visited, making 2400 children between the age of 3 -14 years, study subjects. Information was collected through a predesigned and pretested Tool. It included information about going to Anganwadi/Kindergarden/school as per their age, whether they had toilets in schools, what was given to them to eat in the schools, how many times, what did they eat at home and how was their general health. Nobody was given tool to fill. Children were asked and the information was recorded on the tool by research assistant. Haemoglobin estimation was done, Height and Weight were measured using standard tools. Appropriate reference range was used for calculation of Body Mass Index, suited for growth assessment.

Results

Study included 2400 children of 3 - 14 years of age, of them 798 were of 3 - 6 years, 446 boys and 352 girls. All 798 children of 3 - 6 years attended Anganwadi (Kindergarden). All said there were toilets in the Anganwadis and all got something to eat in Anganwadi, but once a day, not twice which they should have got. All of them said they got Khichadi (Polenta) or Moth (Keet) or One egg or Falli Chikki (Peanut Chikki) once a day in school. At home 3 - 6 year of 110 (24.66%) boys and 105 (29.82%) girls used to get something to eat once a day, 109 (24.43%) boys and 115 (32.67%) girls twice a day and 180 (40.35%) boys and 179 (50.85%) girls thrice a day. At home of 798 children of 3-6 years, 109 (24.43%) boys and 109 (30.96%) girls used to eat Jawar (sorghum) Roti (sort of bread) with Salt and Chillis, 85 (19.05%) boys and 56 (15.90%) girls used to usually eat Wheat Roti with Dal (cooked pulses), 98 (21.97%) boys and 43 (12.21%) girls used to eat Rice with Daal, 100 (22.42%) boys and 73 (20.73%) girls used to eat Rice with Vegetables and 54 (12.10%) boys and 71 (20.17%) girls had Roti with Vegetables. Only sixty two (13.90%) boys and 74 (21.02%) girls had some fruits occasionally at home and 43 (6.64%) boys and 44 (12.5%) girls had little milk with Roti sometimes.

Overall 124 (22.80%) boys and 213 (60.51%) girls of 3 to 6 years had weight between 10 - 15kgs, 217 (48.65%) boys and 115 (32.67%) girls between 15-20kgs. Over all 158 (35.42%) boys and 71 (20.17%) girls were underweight, with low BMI (< 5^{th} percentile), 189 (42.37%) boys and 197 (55.96%) girls had normal BMI (5^{th} - 85^{th} percentile) and 99 (22.19%) boys and 84 (23.86%) girls were overweight, (high BMI (> 85^{th} - <95^{th} percentile). Over all 54 (12.10%) boys and 28 (7.95)% girls had <5g/dl haemoglobin (very severe anaemia) 52 (11.65%) boys and 143 (40.62)% girls ≥5-<7 g/dl (severe anaemia), 215 (48.20)% boys and 124 (35.22)% girls ≥7-<9 g/dl, moderate anaemia, 76 (17.04%) boys and 37 (10.51%) girls haemoglobin ≥9 - < 11 g/dl mild anaemia and only 49 (10.98%) boys and 20 (5.68%) girls were nonanaemic (Hb ≥11 g/dl). Overall 25.9% children had symptoms suggestive of vitamin A deficiency and 4.03% seemed to have goitre.

All 1602 children of 7 - 14 years age, 734 boys and 868 girls, were going to school and all said that there were toilets in their schools. All got Khichdi once in a day in school. At home of 1602 children of 7 - 14 years, 172 (23.43%) boys and 90 (7.63%) girls used to have Jawar Roti with salt Chillis, 149 (20.29%) boys and 193 (22.75%) girls used to eat Wheat Roti with Daal, 162 (22.07%) boys and 191 (22.52%) girls had Daal Rice, 142 (19.34%) boys and 140 (16.50%) girls got Rice with Vegetables, 109 (14.85%) boys and 254 (29.95%) girls used to eat Jawar roti and Vegetables. Over all 734 (47.06) boys and of 868 (52.93%) girls used to eat once a day and 190 (25.88%) boys and

431(49.65%) girls used to eat 2 meals in a day and 111 (15.12%) boys and 437 (50.34%) girls used to eat 3 meals in a day. A total of 244 (32.36%) boys and 437 (51.53%) girls had some milk and fruits with their meals occasionally.

One hundred fifty eight (20.95%) boys and 46 (5.42%) girls had weight between 20-25kgs, 290 (38.46%) boys and 307 (36.20%) girls between 25-30kgs, 306 (40.58%) boys and 495 (58.37%) girls between 30-35 kgs. Overall 303 (35.75%) girls and 289 (38.32%) boys had low BMI (< 5th percentile), 445 (52.47%) girls and 370 (49.07%) boys had normal (5th - 85th percentile) and 120 (14.15%) girls and 95 (12.59%) boys had high BMI (> 85th - <95th percentile). It was revealed that 98 (13%) boys and 162 (19.10%) girls had < 5 g/dl haemoglobin, 257 (34.08%) boys and 218 (25.70%) girls between ≥5 - <7 gm/dl, 356 (47.21%) boys and 232 (38.08%) girls had Hb between ≥7 - <9 g/dl, 47 (11.80)% boys and 56 (6.60%) girls had Hb of ≥9 - <11 g/dl, and only 28 (3.7%) boys and 89 (10.49%) girls were nonanaemic ≥11 g/dl, Hb of Around 90% children were anaemic. Positive things were no difference in food given to boys and girls and no gender bias in ratio of girls and boys (Table 1).

Age	**Total** 88-115	**Height**						**Weight**						**BMI**		
		%	116-122	%	123-130	%	5-10	%	10-15	%	15-20	**%**	**Low**	**Nor**	**High**	
3-6	446	191	42.83	166	37.22	89	19.96	105	23.54	124	27.80	217	48.65	158	189	99
Total	446	191	42.83	166	37.22	89	19.96	105	23.54	124	27.80	217	48.65	158	189	**99**
Hemoglobin																
	Total	<5gm	%	>5-<7gm	%	>7-<9gm	%	>9-<11gm	%	>11gm	%					
3-6	446	54	12.10	52	11.70	215	48.20	76	**17.04**	49	11					
Total	446	54	12.10	52	11.70	215	48.20	76	**17.04**	49	11					
	Total 88-115	Height						Weight						BMI		
		%	116-122	%	123-130	%	15-23	%	24-30	%	31-34	%	Low	Nor	**High**	
7-10	435	95	21.84	230	52.87	110	25.29	109	25.06	195	44.83	131	30.11	132	238	65
11-14	319	93	29.15	105	32.92	121	37.93	49	15.36	95	29.78	175	54.86	157	132	30
Total	754	188	24.93	335	44.43	231	30.64	158	20.95	290	38.46	306	40.58	289	370	95
Hemoglobin																
	Total	>5gm	%	>5-<7gm	%	>7-<9gm	%	>9-<11gm	%	>11gg	%					
7-10	435	24	5.54	112	25.75	268	61.61	19	4.37	12	2.76					
11-14	319	74	20.44	104	32.60	97	30.41	28	8.78	16	5.02					
Total	754	98	12.33	257	28.65	365	48.41	47	6.23	28	3.71					

	Total	Height								Weight						BMI		
		88-115	%	116-122	%	123-130	%	9-10	%	11-14	%	15-18	%	Low		**Nor**		**High**
3-6	352	160	45.45	137	38.92	55	15.63	24	6.82	213	60.51	115	32.67	71		197		84
To-tal	352	160	45.45	137	38.92	55	15.63	24	6.82	213	60.51	115	32.7	71		**197**		**84**
	Total	Hemoglobin																
		<5gm	%	>5-<7	%	>7-<9	%	>9-<-11gm	%	>11gm	%							
3-6	352	28	7.95	143	40.62	124	35.23	37	10.51	20	5.68							
To-tal	352	28	7.95	143	40.62	124	35.23	37	10.51	20	5.68							
	Total	Height						Weight						BMI				
		116-122	%	123-130	%	131-136	%	15-23	%	24-30	%	31-34	%	Low		**Nor**		**High**
7-10	536	147	28.49	215	41.67	154	29.84	14	2.71	182	35.27	320	62.02	175		286		75
11-14	332	20	6.02	163	49.10	149	44.88	32	9.64	135	40.66	165	49.70	128		159		45
To-tal	848	167	19.69	378	44.58	303	35.73	46	5.42	307	36.20	495	58.37	303		445		120
	Total	Hemoglobin																
		>5gm	%	>5<7gm	%	>7<9gm	%	>9<11gm	%	>11gm	%							
7-10	516	109	21.12	114	22.09	239	46.32	33	6.40	21	4.07							
11-14	332	53	15.96	104	31.33	84	25.30	23	6.93	68	20.48							
To-tal	848	162	19.10	218	25.71	323	38.09	56	6.60	89	10.50							

Table 1: *Height, Weight and Haemoglobin of Children.*

Discussion

Many Indian children are being deprived of basic food items such as fruits, vegetables, dairy items, and sources of protein in their daily diet, mainly because of non affordability and sometimes restrictions to certain foods, even eggs, on religious or other grounds. Clark., *et al.* [4] reported that WHO-UNICEF – Lancet Commission presented the case for placing children, aged 0-18 years, at the centre of the SDGs, at the heart of the concept of sustainability and shared human endeavour. Dessie., *et al.* [5] have reported that two things stood out in the survey by Comprehensive National Nutrition Survey (2016 - 2018) (CNNS) in 30 States of India, the link between the nutritional status of children and the nutritional and educational status of the mother, and the link between the nutritional status of children with household wealth. The survey underscored the systemic determinants of malnutrition, the most dominant of which is poverty and socioeconomic inequalities. Macabela [6] reported that ready to use therapeutic foods were prescribed for severe and acutely malnourished children, the efficacy of which has been debunked in recent studies. The dietary patterns revealed a sad state of affairs. More than half of the children consumed a vegetarian diet (without even eggs) with little proteins in the items usually eaten. Dessie., *et al.* [7] also reported that two thirds of school going children consumed milk or curd once a week, and eggs, fish or chicken less frequently. Only 40 per cent ate fruits, 35% cent consumed eggs and 36 per cent ate either fish, meat or chicken. Swaminathan., *et al.* [8] reported that Kerala was not high per capita income state, yet the nutritional indicators for children, adolescents and women were far superior to other states in India. The survey showed that 35% of children under five were stunted, 17% wasted, 33% underweight and 11% acutely malnourished. The all India average of underweight children was 33.4%. In seven states, the prevalence of underweight children was higher than the national average. Prasad., *et al.* [9] opined diet and not fortification of staples with chemicals should be the public policy. It is essential to ensure that children do not become malnourished. One of the starkest findings of the recently released data of the Comprehensive National Nutrition Survey (CNNS) (2016 - 18) was that only 6 per cent of the children in the 6 - 23 months age received what was minimum acceptable diet according to World Health Organisation (WHO) norms. Among 2-4 years old children, only about 32 per cent consumed any legumes and nuts in the previous 24 hours, 16 per cent consumed eggs, 19 per cent any fresh food, 62 per cent consumed dairy products and 56 per cent fruits and vegetables. Among 5 - 9 year old children, about 35 per cent had an egg only once a week, and fewer than 40 per cent had fruits only once a week [10]. Some of the public demands for the introduction of eggs, millets, fruits and vegetables in School and Anganwadi midday meals need to be ensured.

The recent National Family Health Survey [11] indicated a declining trend in child stunting (from 48% in 2005 - 06 to 38.4% in 2015 - 16) and underweight (42.5% in 2005 - 06 to 35.7% in 2015 - 16), stagnating levels of child wasting (19.8% in 2005 - 06 to 21% in 2015 - 16) and increased levels of severe wasting in children (6.4% in 2005 - 06 to 7.5% in 2015 - 16). In the present study children between 3 - 6 yrs, 22.0% boys and 24.7% girls had low BMI and those between 7 to 14 years, 38.32% boys and 24% girls had low BMI. It is essential to have growing momentum for ending hunger and malnutrition. Blancowo., *et al.* [12] and Kraak., *et al.* [13] reported that prevention of malnutrition, especially in the first 1000 days, had lifelong health and economic benefits. Taylor., *et al.* [14] opined that the new nutrition polices call for a broadened community of nutrition stakeholders. In India, the state governments and the Union Territories utilised a mere 30% of the funds released under the Poshan Abhiyaan of India under the National Mission, since it was launched in 2017. Yadavar [15] reported that cutting across the wealth divide, more than a quarter of Indian children under two years of age were found not eating a varied diet. More than household wealth, it was the mother's education that influenced how well toddlers and infants ate. Among the poorest households, only 18% of children had a sufficiently varied diet compared to 28% of children from the richest households. Goldhagen., *et al.* [16] reported worldwide challenges to child health and wellbeing were rapidly becoming existential threats to children and childhood. Child rights-based approaches will be required to enhance the response to the civil-political, social, economic, and cultural determinants of child health. The health and wellbeing of children now and in the future will depend on overcoming new challenges that are escalating at such speed as to threaten the progress and successes of the past two decades in child health. Investing in the health of children is proven to bring the best possible return for future generations. Clark., *et al.* [17] reported that decision makers need a long-term vision. Just as good health and nutrition in the prenatal period and early years lay the foundation for a healthy life course political

commitment at executive level is needed to coordinate across sectors and leverage synergies across the life course. Companies make huge profits from marketing products directed for children and promoting addictive or unhealthy commodities, major causes of non-communicable diseases. The SDGs require children to be placed at the very centre of their plans. Reiher., *et al.* [18] did a study to explore contributing factors among mothers of malnourished children under 5 year old found seven main themes knowledge, behaviours, perceived severity, perceived benefits to action, perceived barriers and cultural related issues. A variety of reasons which could explain the malnutrition in children of those particular mothers. Sinha., *et al.* [19] reported that a major consequence of the lack of dietary diversity is micronutrient deficiency, which manifested itself, for instance in the widespread prevalence of anaemia, 28.4% adolescents (10 - 19 year), 23.5% of children in the 5 - 9 year age having vitamin A deficiency was found to be 18 per cent among preschool children, and 22 per cent among school age children. It was revealed that 33 (13.53%) boys and 20 (8.66%) girls had haemoglobin < 5 g/dl, very severe anaemia, 52 (21.3%) boys and 64 (27.6%) girls between ≥5 - <7, severe anaemia, over all 90% children were anaemic. Overall 18.5% children had symptoms which could be of vitamin A deficiency and 2.02% seemed to have goitre. Fruits and vegetables are not only rich sources of micronutrients but also of another important component of decent diet and dietary fibre. In rural communities few had little milk or fruits occasionally and no eggs to 7 - 14 year and occasional egg to children of 3 - 6 years. India has some of the largest food related programmes in the world. About two-thirds of the population is covered under the public distribution system (PDS), more than eight crore children should be receiving supplementary nutrition from the Integrated Child Development Services (ICDS), and about 11 crore children midday meals in schools. All those programmes provide enormous potential to attain decent diets for children. However it is obvious that quality and quantity both were not as desired. A complete overhaul in approach, beginning with the universalisation of the Public Distribution System, making items such as milk, fruits, eggs and vegetables affordable and ensuring that people have the purchasing power. Farmers need to be actively supported to grow millets, fruits and vegetables through long pending agricultural reforms. Everyone is assured decent minimum wages which will require higher investments, but more than that an alternative vision that looks to support the communication to do doable and sustainable for their children. Positive thing was there was no difference in food given to boys and girls and gender ratio was also not gender biased.

Conclusion

Most children were anaemic, many had low BMI due to lack of essential food, Positive thing was there was no difference in food given to boys and girls and gender ratio was also not gender biased. Awareness, support, polices, programs, sustainable system for nutritious food to children are essential. A complete overhaul in approach, beginning with the universalisation of the Public Distribution System, making items such as milk, fruits, eggs and vegetables affordable and ensuring that people have the purchasing power. Farmers need to be actively supported and a alternative vision that looks to support to do doable and sustainable for their children.

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