DoI: https://doi.org/10.58537/jorangrau.2026.54.1.10

J. Res. ANGRAU 54 (1) 85-90, 2026

NUTRITIONAL STATUS AND DIETARY ADEQUACY OF PM POSHAN (MID-DAY MEAL) SCHEME BENEFICIARIES IN GUNTUR DISTRICT

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Date of Receipt : 10-02-2025 Date of Acceptance : 05-03-2026

ABSTRACT

The present study was carried out in 2024 to assess the nutritional status of school children enrolled under the PM POSHAN (Mid-Day Meal) scheme in Guntur district of Andhra Pradesh in 2024. The scheme was renamed as PM-POSHAN (Pradhan Mantri Poshan Shakthi Nirman) in 2021. A total sample of 200 upper primary school students was selected. Anthropometric assessment revealed that nearly half of the students had normal BMI, while 40 percent were undernourished and 10 percent were overweight or obese. Height-for-age analysis showed that 45 percent of the children had normal height, 35 percent were mildly stunted, and 18.5 percent were moderately stunted, indicating the coexistence of undernutrition and overnutrition. Clinical examination revealed the presence of pale nails, discoloured enamel, dental cavities, swollen gums, smooth tongue, and transverse nail lines, suggesting micronutrient deficiencies—primarily iron and calcium. Although the Mid-Day Meal (MDM) provides one-third of the daily nutrient requirement, fifty percent of the respondents suffered from some form of malnutrition. This calls for planned nutritional interventions to complement the MDM scheme.

Key words: Anthropometric assessment, Clinical assessment, Mid-Day Meal scheme, Stunted, Underweight.

INTRODUCTION

India has one of the largest and fastest-growing adolescent populations in the world, with individuals aged 10–19 years accounting for nearly 19.5 percent of the total population. This period of life is marked by rapid physical growth, hormonal changes, and increased nutrient requirements, making adolescents particularly vulnerable to nutritional deficiencies. Ensuring adequate nutrition during these formative years is essential for optimal physical development, cognitive performance, immunity, and future productivity.

The PM POSHAN scheme is one of India's flagship nutritional programmes aimed at improving school enrolment, attendance, and learning outcomes while simultaneously addressing malnutrition among school-aged children. However, despite the scale and reach of the programme, malnutrition continues to be a significant public health challenge.The 11th Joint Review Mission (JRM) of the Ministry of Human Resource Development (2018), conducted in Andhra Pradesh, reported that approximately 42 percent of school-going children aged 5–15 years exhibited some form

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of malnutrition. The review noted below-normal height, weight, and BMI, along with clinical symptoms such as angular stomatitis, cheilosis, and pale conjunctiva, reflecting deficiencies in vitamin B-complex, iron, and folic acid. These findings highlighted the persistence of both macronutrient and micronutrient deficiencies despite the nutritional support offered through the PM POSHAN(MDM) scheme.

As per MDM norms, the meal provides 470 k.cal and 12 g protein for primary school children and 700 k.cal and 20 g protein for upper primary school children. However, the persistence of malnutrition suggests that these meals alone may not be adequate to meet the complete nutritional needs of growing children, especially when home diets are insufficient or imbalanced.

Further, evidence from the National Family Health Survey (NFHS-5, 2019–'20) reinforces the seriousness of the situation, reporting 31.2 percent stunting, 16.1 percent wasting, and 29.6 percent underweight among Indian children. Persistent undernutrition can impair cognitive development, increase susceptibility to infections, and negatively impact educational outcomes and future earning potential.

Given this background, periodic assessment of the nutritional status of MDM beneficiaries is essential to identify existing gaps, evaluate programme effectiveness and introduce targeted interventions to improve child health and nutrition.

MATERIAL AND METHODS

Stratified Random Sampling Method was used to select the study area. The mandals of Guntur district were divided into urban and rural mandals. Ten mandals- five urban and five rural mandals were then randomly selected. One school from each mandal was selected randomly.

The boys and girls studying in Upper Primary School- VI, VII and VIII standards were considered for the study.The total size of the sample was 200 which included 100 girls and 100 boys i.e 10 boys and 10 girls from each selected school. Consent of the students was taken for participation in the study by explaining the aim of the study. The research study was presented to the Institutional Human Ethics Committee (IHEC) of the university before taking up the study at the field level, and the approval was taken.

Assessment of nutritional status

The nutritional status of school children was assessed using Physical Clinical and Anthropometric data. Standard measurement procedures were followed for measuring/ calculating weight, height, age and BMI. The data was compared with the WHO standards, 2007.

Statistical analysis

Frequency and percentages were utilized to determine the respondents distribution based on the factors that were chosen.

Table 1. Distribution of students based on 'BMI for age' (n=200)

Standards	Category	Girls	Boys	Girls and Boys
-3SD to -2SD	Moderately under nourished	16	25	41(20.5)
-2SD to -1SD	Mildly under nourished	27	21	48(24)
Median	Normal	49	42	91(45.5)
+1SD to +2SD	Mildly over nourished	6	8	14(7)
+2SD to +3SD	Moderately over nourished	2	4	6(3)

*****The numbers in parenthesis indicate percentages

RESULTS AND DISCUSSION

Anthropometric assessment of children

Data on anthropometric measurements of children was analysed and tabulated based on WHO standards (2007) and distinguished according to (z-scores of BMI for age and z-scores of height for age. Distribution of children based on 'BMI for age' is given in Table 1.

The results in Table 1 indicate that 8 percent of girls and 12.5 percent of boys were moderately undernourished and 13.5 percent of girls and 10.5 percent of boys were mildly undernourished. These findings align with Bhargava *et al.* (2017), who reported high prevalence of underweight among school-aged children. Mall (2017) also observed similar BMI distributions among younger school children.In the present study, 3 percent of girls and 4 percent of boys were mildly overnourished, while 1 percent of girls and 2 percent of boys were moderately overnourished. Kamath *et al.* (2015), similarly reported substantial rates of overweight and obesity in their assessment of school children.Recent studies also support these observations. Kaur *et al.* (2024), reported persistent undernutrition among upper primary school children covered under MDM, despite regular meal provision. Pal *et al*. (2024), found improvements in BMI categories but still documented significant proportions of underweight children. Koushik *et al.* (2025), highlighted similar patterns of inadequate BMI values among MDM beneficiaries.

Distribution of children based on 'Height for Age'

Table 2 indicates that 8.5 percent of girls and 10 percent of boys were moderately stunted, while 14.5 percent of girls and 20 percent of boys were mildly stunted. These results closely match those reported by Patel *et al.* (2016), who found substantial stunting among MDM beneficiaries. Bhargava *et al.* (2017), also noted high rates of stunting in their assessment. Upadhyaya and Bisla (2019), further observed that most children exhibited stunted growth compared with WHO standards.

Recent literature strengthens these observations. Gharge *et al*. (2024) demonstrated that long-term MDM participation reduced the risk of underweight but had limited effect on height attainment due to chronic nutritional gaps. PK *et al*. (2023), also noted that protein and calorie deficits in home diets may restrict height gain even with regular school meal intake.

Physical Clinical assessment of children

Malnutrition can present with various physical signs and symptoms, serving as important indicators of nutritional deficiencies. These include delayed growth and development, assessed against standard growth charts, and pallor of the skin, mucous membranes, nail beds,

Table 2. Distribution of students based on 'Height for Age' (n=200)

Standards	Girls	Boys	Girls and Boys
-3SD to -2SD(Moderately stunted)	17	20	37 (18.5)
-2SD to -1SD(Mildly stunted)	29	40	69 (34.5)
Median(Normal)	51	38	89 (44.5)
+1SD to +2SD	3	2	5 (2.5)
+2SD to +3SD	0	0	0 (0)

***The numbers in parenthesis indicate percentage

Table 3. Clinical assessment of the children **(n=200)**

S.No	Sites	Signs	Yes		No	
			Frequency	%	Frequency	%
1.	General Appearance	Loss of subconscious fat	0	0	200	100
		Sunken or hallow cheeks	0	0	200	100
		Underweight	90	45	110	55
		Easy fatigue	0	0	200	100
		Poor working capacity	0	0	200	100
		Insomnia	0	0	200	100
2.	Face	Moon face	0	0	200	100
		Diffuse depigmentation	0	0	200	100
3.	Hair	Easily pluck ability	0	0	200	100
		Dry, brittle hair	0	0	200	100
		Sparseness	0	0	200	100
		Thin and sparse	0	0	200	100
		Lustreless	18	9	182	91
4.	Nails	Spoon shaped	0	0	200	100
		Transverse lines	59	29.5	141	70.5
		Brittle	0	0	200	100
		Ridged	1	0.5	199	99.5
		Pale nails	33	16.5	167	83.5
5.	Skin	Dry and scaly	0	0	200	100
		Psoriasis from rashes	0	0	200	100
		Pallor	0	0	200	100
		Hyper pigmentation	0	0	200	100
		Easy bruising	0	0	200	100
		Follicular Hyperkeratosis	0	0	200	100
6.	Eyes	Night blindness	0	0	200	100
		Conjectural Xerosis	0	0	200	100
		Pale conjunctiva	0	0	200	100
		Corneal Xerosis	0	0	200	100
		Angular palpebritas	0	0	200	100
		Bitot's spots	0	0	200	100
7.	Mouth	Glossitis	0	0	200	100
		Cheilosis	0	0	200	100
		Lesions at the angle of mouth	0	0	200	100

S.No	Sites	Signs	Yes		No	
			Frequency	%	Frequency	%
8.	Neck	Goiter	0	0	200	100
		Parotid enlargement	0	0	200	100
9.	Teeth	Discoloured enamel	142	71	58	29
		Cavity	119	59.5	81	40.5
10.	Gums	Swollen	16	8	84	92
		Bleeding	0	0	200	100
11.	Tongue	Pale and smooth	2	1	198	99
		Magenta tongue	0	0	200	100
		Pigmented tongue	0	0	200	100

or palms, which may indicate iron-deficiency anaemia. Clinical evaluation of these signs aids in identifying potential micronutrient deficiencies. Clinical assessment of students is presented in the Table 3.

Table 3 shows that 45 percent of the students appeared underweight, 29.5 percent had transverse nail lines, and 16.5 percent had pale nails. A significant number 71 percent exhibited discoloured enamel, while 59.5 percent had dental cavities. Swollen gums were noted in 8 percent of the children, and 1 percent had a pale and smooth tongue.

These indicators point toward deficiencies in iron, calcium, B-complex vitamins, and protein. Similar clinical conditions were reported by Boriwal and Mittal (2019) among adolescent girls. Bose (2020) also found signs of protein-energy malnutrition such as lack of hair lustre and dental issues among school children.

Recent studies show comparable trends. Kaushik *et al*. (2025) identified widespread anaemia and poor oral health among MDM beneficiaries, correlating with indicators such as pale nails and enamel defects. Kaur *et al.* (2024) reported similar micronutrient deficiency signs among upper primary school children, while PK *et al.* (2023) also observed enamel discoloration and early clinical signs of deficiency linked to inadequacies in home diets.

CONCLUSION

The current research reveals the existence of malnutrition, encompassing micronutrient deficiencies, as well as underweight and overweight conditions in 50 percent of the children.Anthropometric measurements indicate that 40 percent were undernourished and 10 percent were obese. It can be said that apart from meeting one third of the daily requirement of nutrients through MDM, there is a need to consume balanced diet through other meals of the day (breakfast and dinner) too in order to meet the recommended daily intake of essential nutrients. This highlights the necessity of enhancing the nutritional well-being of the children with a specific focus on addressing deficiencies of essential micronutrients, aiming to provide a well-rounded and balanced nutritional support for the enrolled school students. It is important to take preventative action to address micronutrient deficiencies in the student body, since ignoring these indicators might have long-term health effects.

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