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A Study of Dietary Habits and their Impact on the Nutritional Status of Scheduled Caste Students in Government Higher Secondary Schools of Malda District

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ABSTRACT

Adolescent nutrition plays a crucial role in physical growth, cognitive development, and long-term health outcomes, particularly among socioeconomically marginalized populations. The present study examines dietary habits and their impact on the nutritional status of Scheduled Caste (SC) students studying in government higher secondary schools of Malda district, West Bengal. A mixed-methods research design was adopted using both primary and secondary data sources. Primary data were collected from 150 SC students through anthropometric measurements and a structured food-frequency questionnaire to assess meal frequency, breakfast consumption, dietary diversity, and junk food intake. Anthropometric indicators such as BMI-for-age, height-for-age, and weight-for-age were used to evaluate nutritional status. Descriptive statistics and Pearson correlation analysis were applied to examine the relationship between dietary habits and nutritional outcomes. The findings reveal irregular dietary patterns among many students, with 35% consuming two or fewer meals per day and 44% frequently skipping breakfast. Dietary diversity was limited, as 54% of the students fall under the low dietary diversity category, while 41% frequently consume junk or processed foods. Anthropometric assessment indicates a considerable burden of undernutrition, with 34% of students classified as thin, 39% stunted, and 42% underweight, while 31% show clinical signs of micronutrient deficiency. A positive association was observed between dietary diversity and BMI-for-age (r = 0.42), suggesting that diversified diets contribute to better nutritional outcomes. The study highlights the need for improved nutrition education, enhanced dietary diversity, and strengthened nutrition-sensitive interventions to promote better health among marginalized adolescents in Malda district.

Keywords: *Dietary Habits, Nutritional Status, Scheduled Caste Students, Adolescent Nutrition, Dietary Diversity.*

Introduction

Adolescence represents a critical phase of human development characterized by rapid physical growth, hormonal changes, and increased nutritional requirements. Adequate nutrition during this stage is essential for optimal physical development, cognitive functioning, immune competence, and long-term health outcomes. However, inadequate dietary intake during adolescence can result in growth retardation, micronutrient deficiencies, reduced academic performance, and heightened vulnerability to diseases. In developing countries like India, adolescent nutrition continues to be a major public health concern, particularly among socially and economically marginalized populations such as SC. Structural

inequalities, poverty, limited access to diversified food, and low levels of nutritional awareness often place these communities at greater risk of malnutrition.

Despite significant economic progress in recent decades, India continues to face persistent challenges related to undernutrition. National level surveys, including the National Family Health Survey (NFHS-5, 2019–21), reveal that a considerable proportion of children and adolescents suffer from stunting, underweight, and other indicators of poor nutritional status. These issues are often more severe in socioeconomically disadvantaged communities where food insecurity and limited dietary diversity remain widespread. Malda district, West Bengal, represents one such region where nutritional vulnerabilities persist. District nutrition reports and field-based studies indicate that many children and adolescents in the region experience inadequate dietary intake, which contributes to poor growth outcomes and micronutrient deficiencies.

Dietary habits play a crucial role in shaping the nutritional status of adolescents. Balanced diets that include cereals, pulses, fruits, vegetables, dairy products, and animal-source foods are necessary to meet the increased energy and nutrient demands of this developmental stage. However, dietary patterns among adolescents are frequently influenced by socioeconomic conditions, cultural food preferences, and household food availability. Irregular meal consumption, frequent skipping of breakfast, low dietary diversity, and increased intake of processed foods are commonly observed dietary behaviours that negatively affect nutritional status. Studies conducted in various parts of India have demonstrated that limited dietary diversity is strongly associated with thinness, anaemia, and other forms of undernutrition among adolescents.

Among SC students, the risk of nutritional deprivation is further intensified by structural disadvantages such as poverty, limited access to nutritious foods, and social marginalization. Although government interventions such as the Mid-Day Meal Scheme (implemented mainly for primary and upper-primary students) aim to provide supplementary nutrition to school children, institutional support alone may not fully compensate for household-level food insecurity and dietary inadequacies. Therefore, understanding the dietary habits and nutritional status of adolescents within marginalized communities is essential for designing targeted interventions.

The present study examines dietary habits and their impact on the nutritional status of SC students studying in government higher secondary schools of Malda district, West Bengal. By analysing dietary patterns, anthropometric indicators, and socioeconomic determinants, the study aims to generate evidence that can support the development of effective nutrition strategies and policies aimed at improving adolescent health and reducing nutritional inequalities in marginalized populations.

Objectives

- To assess the dietary habits and dietary diversity of SC students studying in government higher secondary schools of Malda district.
- To evaluate the nutritional status of SC students using anthropometric indicators such as BMI-for-age, thinness, stunting, and underweight.
- To examine the relationship between dietary habits and nutritional status among SC students.
- To identify socioeconomic and school-related factors influencing dietary patterns and nutritional outcomes among SC students in Malda district.

Methodology

The present study adopted a mixed-methods research design combining both primary and secondary data sources. The study sample consisted of 150 SC students selected from government higher secondary schools in Malda district. A stratified random sampling technique was used to select students from different schools to ensure adequate representation. Primary data were collected through anthropometric measurements, including height and weight, to calculate BMI-for-age and assess thinness, stunting, and underweight. A structured food-frequency questionnaire was administered to assess dietary habits, meal frequency, dietary diversity, junk food intake, and exposure to the Midday Meal Scheme during earlier schooling (Classes I-VIII). Secondary data were obtained from national surveys and district-level nutrition reports for contextual analysis. Statistical techniques such as descriptive statistics and Pearson correlation analysis were used to examine associations between dietary patterns and nutritional status.

Statistical Analysis of Dietary Habits and Nutritional Status

Descriptive statistical analysis was conducted to summarize the dietary behaviour and nutritional status of the respondents. The results indicate that a considerable proportion of students exhibit irregular meal patterns and limited dietary diversity. Nearly 35% of students consume two or fewer meals per day, while 44% frequently skip breakfast, reflecting inadequate daily nutrient intake. In terms of dietary diversity, 54% of respondents fall under the low dietary diversity category, indicating limited consumption of diverse food groups such as fruits, dairy products, pulses, and animal-source foods. Anthropometric indicators further reveal that 34% of students are classified as thin, 39% are stunted, and 42% are underweight, suggesting the presence of both acute and chronic undernutrition among the study population.

To examine the relationship between dietary habits and nutritional status, the Pearson correlation coefficient indicated a moderate positive association ($r = 0.42$) between dietary diversity and BMI-for-age, suggesting that improved dietary diversity contributes to better nutritional outcomes among adolescents. Conversely, lower dietary diversity is associated with a higher prevalence of thinness and undernutrition. These findings highlight the importance of diversified diets in improving adolescent nutritional outcomes.

Meal Frequency and Regular Eating Behaviour

Adolescence demands increased energy and nutrient intake due to rapid physical growth and hormonal changes. However, the dietary survey conducted among SC students in Malda district reveals irregular meal consumption patterns. A significant proportion of students reported skipping breakfast or consuming insufficient morning meals. In many households, breakfast consists mainly of tea and leftover rice, reflecting economic constraints rather than balanced nutritional planning. Irregular meal frequency reduces overall nutrient adequacy and often leads to overdependence on cereal-based staples. Students consuming fewer meals per day showed lower dietary diversity scores, suggesting that meal regularity is directly associated with improved food group inclusion. These findings reflect broader socioeconomic vulnerabilities in marginalized communities of Malda district. Table 1 below shows the distribution of students according to dietary behaviour indicators and composite dietary diversity levels.

Table 1: Distribution of SC Students by Dietary Behaviour Indicators

Dietary Behaviour Indicator	Category	Percentage (%)
Number of Meals per Day	≤2 meals	35%
	3 meals	51%
	≥4 meals/snacks	14%
Breakfast Skipping	Frequently (≥3 days/week)	44%
	Occasionally	37%
	Rarely/Never	19%
Consumption of Junk/Processed Foods (≥3 times/week)	Yes	41%
	No	59%
Exposure to the Midday Meal Scheme during Earlier Schooling	Yes	68%
	Irregular/No	32%
Dietary Diversity Category	Low	54%
	Moderate	34%
	High	12%

Source: Primary Field Survey among SC Students, Malda District, 2025.

As shown in Table 1, 35% of students consume two or fewer meals daily, indicating insufficient daily intake. Breakfast skipping is frequent among 44% of respondents, highlighting a major gap in morning nutrient consumption. Additionally, 41% consume junk or processed foods multiple times per week, which may displace healthier food options. About 68% of respondents reported regular exposure to the Midday Meal Scheme during their earlier schooling, which may have contributed to their nutritional intake during childhood. However, overall dietary diversity remains low for more than half (54%) of the students. This suggests that institutional meals alone are insufficient to ensure balanced dietary intake.

Dietary Diversity and Quality of Food Intake

Dietary diversity analysis reveals heavy reliance on cereal-based staples with limited inclusion of fruits, milk, pulses, and animal-source foods. While rice remains the dominant staple in Malda district, diversification toward protein-rich and micronutrient-dense foods is inadequate. The low percentage of

students in the high dietary diversity category (12%) reflects structural dietary monotony. Low diversity is strongly associated with inadequate micronutrient intake, particularly iron and calcium. Adolescents from economically weaker SC households often prioritize quantity over quality of food, leading to caloric sufficiency but nutrient deficiency. Such patterns increase vulnerability to anaemia and growth faltering.

Socioeconomic and Institutional Determinants

Dietary habits among SC students are shaped by poverty, parental literacy levels, food accessibility, and awareness regarding balanced diets. Many families depend on informal employment, limiting consistent food purchasing power. Cultural preferences for carbohydrate-heavy meals further restrict dietary variation. Although the Midday Meal Scheme during their earlier schooling contributes to caloric supplementation, its limited diversification reduces its impact on overall diet quality. Therefore, improving dietary habits requires integrated interventions focusing on household-level food security, nutrition education, and enhanced diversity in school meal planning to address inequities affecting marginalized adolescents in Malda district.

Anthropometric Assessment and Growth Indicators

Evaluation of nutritional status among adolescents requires objective anthropometric measurements that reflect both chronic and acute nutritional deprivation. In the present study, height and weight measurements of SC students were recorded using standardized procedures. Body Mass Index (BMI-for-age) was calculated following WHO growth reference standards for adolescents. Additionally, indicators such as thinness (low BMI-for-age), stunting (low height-for-age), and underweight were assessed to determine the extent of nutritional vulnerability. Anthropometric indicators are particularly important in the Indian context, where undernutrition remains a persistent public health concern among marginalized communities. While national surveys highlight improvements in child nutrition, caste-disaggregated adolescent data remain limited. In districts like Malda, socioeconomic inequalities and food insecurity contribute to growth deficits that often persist into adolescence, affecting physical capacity and academic performance. Below Table 2 shows the distribution of SC students according to key anthropometric indicators observed in the study.

Table 2: Nutritional Status of SC Students Based on Anthropometric Indicators

Nutritional Indicator	Category	Percentage (%)
BMI-for-Age	Normal	52%
	Thinness (Moderate & Severe)	34%
	Overweight	14%
Height-for-Age (Stunting)	Normal Height	61%
	Stunted	39%
Weight-for-Age (Underweight)	Normal Weight	58%
	Underweight	42%
Clinical Signs of Micronutrient Deficiency	Present	31%
	Absent	69%

Source: Primary Field Survey among SC Students, Malda District, 2025.

As shown in Table 2, 34% of students fall under thinness, indicating acute undernutrition during adolescence. Stunting affects 39% of respondents, reflecting long-term chronic nutritional deprivation likely originating in early childhood. Furthermore, 42% of students are classified as underweight, signifying inadequate weight relative to age. Although 14% are overweight, undernutrition remains the dominant concern. The presence of clinical signs of micronutrient deficiency among 31% of students further highlights hidden hunger within this population.

Prevalence of Undernutrition and Growth Deficits

The relatively high proportion of thinness and stunting suggests that nutritional challenges among SC adolescents in Malda are both chronic and ongoing. Stunting, a marker of long-term deprivation, indicates that many students have experienced sustained inadequate nutrition and recurrent infections during formative years. This has implications beyond physical stature, as chronic undernutrition is associated with reduced cognitive function and diminished academic performance. Thinness during adolescence signals current energy deficiency and insufficient caloric intake relative to growth demands. The coexistence of stunting and thinness indicates a compounded nutritional burden. Moreover, the emergence of overweight among a smaller segment reflects a nutritional transition where calorie-dense but nutrient-poor foods are becoming accessible, creating a dual burden of malnutrition.

Socioeconomic Correlates and Nutritional Inequality

Anthropometric disparities observed among SC students are closely tied to structural determinants such as poverty, food insecurity, and limited access to healthcare. Households' dependent on informal labour and seasonal income often struggle to maintain consistent food availability, directly influencing adolescent growth outcomes. Gender disparities were also noted, with adolescent girls showing slightly higher prevalence of thinness and micronutrient-related symptoms, reflecting intra-household nutritional inequities. Institutional interventions such as the Midday Meal Scheme received during their earlier schooling provide partial caloric supplementation but appear insufficient to offset household-level deprivation. Overall, the anthropometric evaluation reveals a significant burden of undernutrition among SC adolescents in Malda district. The persistence of thinness, stunting, and micronutrient deficiencies underscores the need for targeted, caste-sensitive nutritional strategies that address both immediate dietary gaps and underlying socioeconomic determinants.

Association between Meal Frequency and BMI-for-Age

Understanding the relationship between dietary habits and anthropometric outcomes is critical in the Indian context, where adolescent nutrition remains uneven across caste and income groups. In the present study, statistical analysis was conducted to examine how meal frequency and dietary diversity influence BMI-for-age among SC students in Malda district. Meal frequency emerged as a significant determinant of nutritional status. Students consuming three or more regular meals per day were more likely to fall within the normal BMI-for-age category. Conversely, those reporting two or fewer meals exhibited a higher prevalence of thinness. Irregular breakfast consumption further compounded the risk of low BMI, indicating that inadequate morning caloric intake disrupts total daily energy balance. Below Table 3 shows the relationship between dietary diversity levels and BMI-for-age categories among SC students.

Table 3: Relationship Between Dietary Diversity and BMI-for-Age among SC Students

Dietary Diversity Category	Normal BMI (%)	Thinness (%)	Overweight (%)
Low Dietary Diversity	38%	54%	8%
Moderate Dietary Diversity	61%	27%	12%
High Dietary Diversity	74%	16%	10%

Source: Primary Field Survey among SC Students, Malda District, 2025.

As shown in Table 3, more than half (54%) of students with low dietary diversity fall under the thinness category, compared to only 16% among those with high dietary diversity. Conversely, 74% of students with high dietary diversity maintain normal BMI-for-age. This gradient clearly indicates a positive association between diversified diets and improved anthropometric outcomes. While a small proportion of overweight cases appears in moderate and high diversity groups, undernutrition remains the predominant issue in the low-diversity category.

Dietary Quality, Protein Intake, and Growth Outcomes

The data demonstrate that inadequate intake of pulses, dairy products, fruits, and animal-source foods significantly correlates with higher prevalence of thinness and underweight. Students reporting limited weekly consumption of protein-rich foods were more likely to exhibit lower BMI-for-age and signs of micronutrient deficiency. Protein-energy malnutrition during adolescence impairs muscle development and compromises immune function. In Malda district, economic constraints restrict access to animal-source foods, resulting in cereal-dominated diets. The statistical association observed in the study suggests that caloric sufficiency alone is insufficient; quality and diversity of diet are equally important determinants of nutritional status. Moreover, micronutrient-rich foods such as green leafy vegetables and fruits were positively associated with normal BMI categories. Students consuming these food groups regularly showed fewer clinical symptoms of anaemia and fatigue, indicating the role of dietary diversity in preventing hidden hunger.

Socioeconomic Moderation of the DietNutrition Relationship

The relationship between dietary habits and nutritional status does not operate in isolation but is mediated by socioeconomic conditions. SC households in Malda often experience food insecurity, limiting consistent dietary diversity. Students from comparatively stable-income households demonstrated better dietary patterns and improved BMI outcomes, even within the same caste category. Gender-based disparities were also observed, with girls from low-diversity households showing higher rates of thinness. This suggests intra-household food allocation inequities, a phenomenon documented in several Indian

settings. Overall, the findings confirm a statistically and practically significant association between dietary habits and nutritional status among SC adolescents. Low dietary diversity and irregular meal patterns substantially increase the risk of thinness and undernutrition, while diversified diets contribute to healthier growth trajectories. These results underscore the need for integrated nutrition-sensitive policies that enhance dietary quality at both household and institutional levels to improve adolescent health outcomes in Malda district.

Socioeconomic Determinants Shaping Dietary Behaviour

In the Indian context, dietary patterns among adolescents are deeply embedded within socioeconomic structures. For SC households in Malda district, persistent poverty, irregular employment, and limited asset ownership significantly influence food purchasing power and dietary quality. The present study examined how parental education, household income stability, family size, and food security status shape adolescents' dietary diversity and nutritional outcomes. Students from households dependent on daily wage labour were more likely to report irregular meal frequency and low dietary diversity. Limited financial flexibility restricts the inclusion of protein-rich and micronutrient-dense foods such as milk, eggs, fruits, and green leafy vegetables. Instead, consumption patterns remain cereal-dominated, reflecting prioritization of satiety over nutritional balance. Parental education also emerged as a significant factor. Adolescents whose parents had at least secondary education showed comparatively higher dietary diversity scores, suggesting that awareness and food choices are interlinked. Below Table 4 shows the association between selected socioeconomic and school-related factors with low dietary diversity and thinness among SC students.

Table 4: Socioeconomic and School-Related Factors Associated with Low Dietary Diversity and Thinness among SC Students

Determinant	Category	Low Dietary Diversity (%)	Thinness (%)
Household Income Source	Daily wage labour	63%	41%
	Salaried/Stable income	38%	22%
Parental Education	Primary or below	66%	44%
	Secondary and above	39%	24%
Household Food Insecurity	Present	71%	48%
	Absent	35%	20%
Exposure to the Midday Meal Scheme during Earlier Schooling	Regular	49%	29%
	Irregular/No	68%	43%

Source: Primary Field Survey among SC Students, Malda District, 2025.

As shown in Table 4, 63% of students from daily wage households exhibit low dietary diversity compared to 38% among those with stable income sources. Similarly, thinness prevalence is nearly double among students from food-insecure households (48%) compared to food-secure households (20%). Parental education demonstrates a protective effect, with lower rates of thinness and better dietary diversity among students whose parents have secondary education or above. Regular uptake of the Midday Meal during their earlier schooling is associated with relatively lower thinness (29%), indicating the buffering role of institutional nutrition support.

School Environment and Institutional Influences

Beyond household factors, school-related determinants also shape dietary and nutritional outcomes. The Midday Meal Scheme during their earlier schooling serves as a crucial nutritional safety net for marginalized students. However, variations in meal quality, menu diversity, and monitoring mechanisms influence its effectiveness. While regular beneficiaries show comparatively better nutritional indicators, limited inclusion of protein-rich foods in school menus constrains overall dietary adequacy. School infrastructure, nutrition awareness activities, and health screening practices also contribute to outcomes. Institutions conducting periodic health check-ups were better able to identify thinness and micronutrient-related symptoms early. However, gaps remain in systematic caste-disaggregated monitoring, which limits targeted intervention planning. The findings indicate that dietary patterns and nutritional outcomes among SC adolescents are shaped by an interplay of structural poverty, educational disadvantage, food insecurity, and institutional support systems. Addressing undernutrition therefore requires multi-sectoral strategies integrating income security measures, parental awareness programs,

and strengthening of school meal diversity and monitoring frameworks to ensure equitable adolescent health development in Malda district.

Findings and Interpretation

The findings of the study reveal notable nutritional challenges among SC students studying in government higher secondary schools of Malda district. Dietary assessment indicates irregular meal patterns and limited dietary diversity among many adolescents. The analysis indicates that irregular meal patterns and frequent breakfast skipping are common among the respondents, which may reduce overall nutrient intake and negatively affect growth and academic performance.

Dietary diversity among the respondents is relatively low, with 54% of students falling under the low dietary diversity category, while only 12% demonstrate high dietary diversity. The diets of most students are largely cereal-based with limited intake of fruits, dairy products, pulses, and animal-source foods. In addition, 41% of students frequently consume junk or processed foods, which may further reduce the intake of nutritious foods.

Anthropometric assessment indicates a considerable burden of undernutrition among the study population. The findings show that 34% of students are thin according to BMI-for-age, 39% are stunted, and 42% are underweight, reflecting both acute and chronic nutritional deprivation. Moreover, 31% of students exhibit clinical signs of micronutrient deficiency, suggesting the presence of hidden hunger.

The study also demonstrates a positive association between dietary diversity and nutritional status. Students with higher dietary diversity are more likely to maintain normal BMI-for-age, whereas those with low dietary diversity show a higher prevalence of thinness. Socioeconomic factors such as household income instability, food insecurity, and low parental education further influence dietary behaviour and nutritional outcomes.

Overall, the findings indicate that irregular meal patterns, low dietary diversity, and socioeconomic disadvantage significantly contribute to undernutrition among SC adolescents in Malda district, highlighting the need for improved nutrition education, dietary diversity, and strengthened food security interventions.

Conclusion

The study demonstrates that dietary habits significantly influence the nutritional status of SC students studying in government higher secondary schools of Malda district, West Bengal. The findings reveal that many adolescents experience irregular meal patterns, frequent breakfast skipping, and low dietary diversity, which negatively affect their nutritional intake during a critical stage of growth. Anthropometric assessment indicates a considerable prevalence of thinness, stunting, and underweight, reflecting both acute and chronic undernutrition. The analysis also shows a strong association between dietary diversity and BMI-for-age, suggesting that students with more diversified diets are more likely to maintain normal nutritional status. Socioeconomic factors such as household income instability, food insecurity, and low parental education further shape dietary behaviour and nutritional outcomes. Although many respondents had benefited from the Midday Meal Scheme during their earlier schooling, such institutional support alone cannot fully address household-level dietary limitations. Therefore, improving adolescent nutrition requires integrated interventions including nutrition education, improved household dietary diversity, strengthened school health programmes, and better access to affordable nutrient-rich foods. The findings may assist policymakers and public health practitioners in designing targeted nutritional interventions for marginalized adolescents in districts such as Malda.

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