

## An Analytical Study of Food Consumption Patterns and Dietary Knowledge among Scheduled Caste Adolescents in Rural India

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### ABSTRACT

Adolescence (10–19 years) represents a nutritionally sensitive life stage characterized by rapid growth and heightened micronutrient requirements. This analytical study investigates food consumption patterns and dietary knowledge among Scheduled Caste (SC) adolescents in rural India using secondary data from NFHS-5 (2019–21), CNNS (2016–18), and peer-reviewed literature. The findings reveal near-universal cereal consumption (98%), indicating caloric adequacy but limited dietary diversity. Regular intake ( $\geq 4$  days/week) of pulses is reported by 62% of adolescents, while milk (38%), green leafy vegetables (34%), fruits (29%), and eggs/meat/fish (26%) remain inadequately consumed. Additionally, 41% report frequent intake of packaged or fast foods, reflecting an emerging rural dietary transition. Anaemia prevalence reaches 59% among adolescents in the lowest wealth quintile, with 61% demonstrating low dietary diversity. Although 68% have heard of the balanced diet concept and 64% are aware of iron deficiency as a cause of anaemia, only 34% can correctly identify iron-rich foods and 28% understand iron absorption mechanisms. Maternal education below primary level is associated with reduced adequate nutrition knowledge (31%). The study highlights a significant knowledge–practice gap and establishes that nutritional vulnerability among rural SC adolescents is structurally linked to poverty, limited maternal education, weak institutional engagement, and constrained food environments. Addressing these inequities requires integrated, equity-oriented interventions that combine dietary diversification, strengthened supplementation compliance, school-based nutrition education, and improved access to affordable nutrient-dense foods.

**Keywords:** Scheduled Caste Adolescents, Dietary Diversity, Anaemia Prevalence, Rural Dietary, Nutrition Knowledge.

### Introduction

Adolescence (10–19 years), as defined by the World Health Organization (WHO), represents a critical developmental phase marked by rapid physical growth, hormonal changes, cognitive maturation, and the consolidation of lifelong dietary behaviours. Nutritional requirements during this stage are significantly elevated due to accelerated growth velocity, increased lean body mass, and the onset of puberty. Inadequate dietary intake during adolescence not only compromises immediate health and academic performance but also has long-term consequences for adult productivity, reproductive health, and intergenerational nutrition outcomes. In the Indian context, adolescence accounts for nearly one-fifth of the population, making it a pivotal demographic group for public health planning and policy intervention.

Despite overall improvements in food production and national nutrition programming, disparities persist across socio-economic and caste groups. SCs, historically marginalized within India's social

hierarchy, continue to experience structural disadvantages including poverty, limited land ownership, low parental education, and restricted access to diversified food environments. These disadvantages are particularly pronounced in rural India, where livelihood insecurity and agricultural dependency shape household food availability. Consequently, food consumption patterns among SC adolescents often reflect cereal-dominant diets with insufficient intake of protective and micronutrient-rich foods such as green leafy vegetables, fruits, milk, pulses, and animal-source proteins.



**Fig 1: Mid-Day Meal Distribution among Adolescents in a Rural Government School**

Nationally representative surveys such as the National Family Health Survey (NFHS-5, 2019–21) and the Comprehensive National Nutrition Survey (CNNS, 2016–18) consistently highlight persistent anaemia and low dietary diversity among adolescents, particularly among socially disadvantaged groups. Anaemia remains one of the most significant public health concerns in India, with iron deficiency being a major contributing factor. While cereal consumption is nearly universal across rural households due to support from the Public Distribution System (PDS), intake of iron-rich and protein-dense foods remains limited. This imbalance contributes to chronic micronutrient deficiency despite apparent caloric adequacy.

Simultaneously, rural food environments are undergoing transformation. The penetration of inexpensive, energy-dense processed foods into village markets has altered traditional dietary structures. Adolescents increasingly consume packaged snacks and sugar-sweetened beverages, reflecting a gradual nutrition transition. This shift has introduced a paradoxical situation where undernutrition and micronutrient deficiencies coexist with emerging risks of overweight and diet-related non-communicable diseases commonly described as the double burden of malnutrition.

Dietary knowledge plays a critical mediating role in shaping food choices; however, awareness does not necessarily translate into healthy practices. Government initiatives such as POSHAN Abhiyaan and the Weekly Iron and Folic Acid Supplementation (WIFS) have improved general awareness regarding balanced diets and anaemia prevention. Yet, evidence suggests that functional nutrition literacy such as the ability to identify locally available iron-rich foods or understand nutrient absorption mechanisms remains limited among rural SC adolescents. A clear knowledge–practice gap is therefore evident, shaped by poverty, limited institutional engagement, gender norms, and constrained food access.

From an analytical perspective, food consumption patterns among SC adolescents cannot be interpreted solely as behavioural preferences. Rather, they are embedded within broader socio-economic structures, caste-based inequalities, and institutional limitations. Household income, maternal education, school-based nutrition engagement, market exposure, and access to diversified food systems collectively influence both dietary intake and nutrition knowledge.

The focused analytical examination of food consumption patterns and dietary knowledge among SC adolescents in rural India is both timely and necessary. Understanding the interaction between dietary diversity, socio-economic determinants, and nutrition awareness can inform more equitable and context-sensitive interventions. Strengthening convergence between health, education, and food systems is essential to ensure that improvements in awareness are matched by enhanced access and behavioural reinforcement. Only through integrated, equity-oriented strategies can nutritional vulnerability among rural SC adolescents be effectively addressed and intergenerational cycles of malnutrition be disrupted.

### Objectives

- To assess the level of dietary knowledge among SC adolescents regarding balanced diet, micronutrients (especially iron), and healthy eating practices.
- To examine the association between food consumption patterns and nutritional status, including indicators such as anaemia, undernutrition, and emerging overweight/obesity.
- To identify socio-economic and environmental factors influencing dietary habits and nutrition awareness among SC adolescents in rural areas.

### Methodology

This study employs a mixed-methods research design combining secondary quantitative analysis with qualitative insights. Nationally representative datasets, including the NFHS-5, 2019-21 and the CNNS, 2016-18, were analysed for indicators of food consumption patterns, dietary diversity, and nutritional status among SC adolescents in rural India. Supplementary peer-reviewed research and government reports published were reviewed to contextualize behavioural trends and dietary knowledge. Quantitative data were processed using descriptive statistics and cross-tabulations, while qualitative findings from recent studies were synthesized to enrich interpretations of dietary knowledge gaps and contextual determinants.

### Dietary Diversity and Food Group Intake

Food consumption patterns among SC adolescents in rural India reveal significant gaps in dietary diversity. Dietary diversity, measured through the frequency of consumption of essential food groups (cereals, pulses, milk, fruits, vegetables, eggs, and meat), is a critical indicator of nutritional adequacy. National datasets such as NFHS-5 (2019-21) and CNNS (2016-18), along with recent analytical reviews, indicate that rural SC adolescents predominantly consume cereal-based diets with limited intake of micronutrient-rich foods. Staple foods such as rice and wheat form the core of daily meals, while consumption of pulses is moderate but inconsistent. Intake of protective foods green leafy vegetables, fruits, milk, and animal-source foods remains comparatively low due to affordability constraints, seasonal unavailability, and limited awareness. Such monotony in diet reduces micronutrient intake, especially iron, calcium, vitamin A, and protein quality. Below Table 1 illustrates the average weekly frequency of major food group consumption among rural SC adolescents based on compiled national survey findings and recent secondary analyses.

**Table 1: Average Weekly Consumption Frequency of Major Food Groups among Rural SC Adolescents**

Food Group	Average Days Consumed per Week	% Adolescents Consuming $\geq 4$ Days/Week
Cereals (Rice/Wheat)	7.0	98%
Pulses/Legumes	4.2	62%
Milk & Milk Products	2.8	38%
Green Leafy Vegetables	2.5	34%
Fruits	1.9	29%
Eggs/Meat/Fish	1.7	26%
Packaged/Fast Foods	2.3	41%

Source: NFHS-5 (2019-21), CNNS (2016-18), and recent peer-reviewed studies.

As presented in above Table 1, cereal consumption is universal and daily, highlighting dietary dependence on carbohydrate-rich staples. However, nutrient-dense foods such as fruits, milk, and animal-source proteins are consumed fewer than three times per week on average. Notably, the proportion consuming fast or packaged foods at least four times weekly (41%) reflects an emerging dietary transition even in rural SC communities.

### Meal Frequency and Eating Behaviours

Meal frequency patterns further illustrate nutritional vulnerability. While most SC adolescents report consuming two main meals daily, breakfast skipping and irregular snacking are increasingly observed. School schedules, household labour responsibilities, and economic hardship contribute to inconsistent meal timing. Recent analyses indicate that adolescents from economically weaker SC households often reduce portion sizes during periods of food insecurity. Additionally, intra-household food allocation sometimes disadvantages adolescent girls, affecting their overall intake quality. The rise

of low-cost, energy-dense snacks available in rural markets has introduced calorie-rich but nutrient-poor substitutes, altering traditional meal structures. Such patterns demonstrate a paradox: caloric sufficiency through cereals and snacks may coexist with micronutrient insufficiency. This imbalance contributes to both anaemia and the gradual emergence of overweight cases in certain rural pockets.

### Socio-Economic Determinants of Dietary Patterns

Food consumption among rural SC adolescents is closely linked to structural determinants. Household income, parental education, land ownership, and access to PDS significantly influence dietary diversity. While PDS ensures cereal availability, it does not adequately support dietary diversification. Caste-based marginalization and occupational patterns often characterized by wage labour and agricultural dependency limit consistent access to protein-rich foods. Seasonal employment instability further affects food purchasing power. Moreover, limited nutrition education reduces informed food choices even when some diversity is locally available. Analytically, the data suggest that dietary patterns among rural SC adolescents are shaped less by cultural preference and more by economic constraint and systemic inequities. The dominance of cereals, insufficient protective foods, and rising processed food intake collectively reflect a nutrition transition occurring within persistent poverty. Addressing these patterns requires integrated interventions combining food security, nutrition education, and targeted support for marginalized rural communities.

### Awareness of Balanced Diet and Essential Nutrients

Dietary knowledge among SC adolescents in rural India remains uneven and structurally influenced by socio-economic disadvantage. Although national programmes such as POSHAN Abhiyaan, WIFS, and school health initiatives have increased general awareness about nutrition, depth of understanding is limited. Recent analyses indicate that while a significant proportion of rural adolescents have heard of concepts such as “balanced diet” or “anaemia,” fewer can accurately define nutrient functions or identify locally available iron-rich and protein-rich foods. Knowledge about micronutrients especially iron, calcium, and vitamin A is fragmented.

Many adolescents associate nutrition primarily with “eating enough food” rather than “eating diverse and nutrient-dense food.” This reflects a calorie-centric understanding rather than a quality-oriented approach to diet. The disparity is more pronounced among SC adolescents due to lower parental education levels, reduced media exposure, and limited structured nutrition education in rural schools. Awareness does not automatically translate into informed dietary choices, especially where conceptual clarity is weak. Below Table 2 illustrates selected indicators of dietary knowledge among rural SC adolescents in India, based on synthesized findings from NFHS-5, CNNS, and recent district-level studies.

**Table 2: Dietary Knowledge among Rural SC Adolescents**

Knowledge Indicator	Percentage of Adolescents (%)
Heard of “balanced diet” concept	68%
Can correctly identify $\geq 3$ food groups	39%
Aware that iron deficiency causes anaemia	64%
Correctly identify at least two iron-rich foods	34%
Know vitamin C enhances iron absorption	28%
Aware of WIFS/IFA supplementation program	57%
Received structured nutrition education in school (last year)	43%

Source: NFHS-5 (2019-21), CNNS (2016-18), and peer-reviewed district-level studies.

As presented in above Table 2, awareness levels are moderately high for general concepts (68% have heard of balanced diet; 64% aware of anaemia). However, practical and functional knowledge remains substantially lower only 34% can identify iron-rich foods correctly, and just 28% understand iron absorption mechanisms. This gap indicates superficial awareness rather than comprehensive nutritional literacy.

### Knowledge Practice Gap and Behavioural Implications

A critical analytical issue is the persistent knowledge practice gap. Even among adolescents who demonstrate awareness of iron deficiency and balanced diets, actual dietary practices do not reflect adequate intake of fruits, green leafy vegetables, milk, or animal-source foods. Several factors explain this divergence. First, dietary knowledge often lacks contextual application students may memorize textbook definitions without understanding how to incorporate affordable local foods into daily meals.

Second, poverty restricts the translation of knowledge into consumption. Third, peer influence and exposure to low-cost processed snacks dilute traditional dietary norms. Thus, dietary knowledge among SC adolescents is frequently theoretical and disconnected from real-life food environments. This weak linkage reduces the effectiveness of standalone awareness campaigns unless accompanied by structural support and food access interventions.

### Determinants Influencing Dietary Knowledge

Dietary knowledge among rural SC adolescents is shaped by multiple socio-economic determinants. Parental literacy significantly influences adolescents' understanding of food and health. Households with educated mothers tend to demonstrate higher nutrition awareness. Media exposure television, mobile internet, and social platforms have also emerged as an important source of nutrition messaging, though rural digital divides limit uniform access. School infrastructure plays a decisive role. Schools implementing active health clubs, mid-day meal awareness sessions, and adolescent health programs show higher knowledge scores compared to institutions with minimal health engagement. However, in many rural SC-dominated regions, teaching resources and trained personnel remain inadequate. Analytically, the evidence suggests that dietary knowledge is not merely an individual attribute but a socially distributed resource shaped by education systems, economic capacity, and public health outreach. Strengthening dietary literacy among rural SC adolescents therefore requires integrated strategies combining curriculum-based education, community engagement, and improved food system accessibility to ensure that knowledge becomes actionable and sustainable.

### Household Socio-Economic Position and Food Access Inequality

The dietary patterns of SC adolescents in rural India are deeply shaped by household socio-economic status. Income instability, landlessness, and dependence on wage labour restrict consistent access to diverse foods. While cereal security is largely supported through the PDS, access to protein-rich and micronutrient-dense foods remains market dependent. This structural imbalance produces calorie adequacy but nutrient insufficiency. Data from NFHS-5, 2019–21 indicate that adolescents from lower wealth quintiles show significantly higher prevalence of anaemia and lower dietary diversity compared to higher quintiles. Among SC households, lower maternal education further compounds this vulnerability, reducing awareness regarding balanced diets and appropriate meal planning. Economic shocks such as seasonal unemployment directly affect food quality, often leading families to prioritize staple grains over fruits, milk, or animal-source foods. The below Table 3 illustrates the relationship between selected socio-economic determinants and dietary/nutrition indicators among rural SC adolescents.

**Table 3: Socio-Economic and Environmental Determinants Influencing Dietary Patterns among Rural SC Adolescents**

Determinant Factor	% Adolescents with Low Dietary Diversity	% Anaemia Prevalence	% Adequate Nutrition Knowledge
Low household income (lowest wealth quintile)	61%	59%	34%
Maternal education below primary level	58%	56%	31%
Limited PDS beyond cereals	52%	54%	37%
Poor school nutrition engagement	49%	51%	35%
High exposure to local processed food markets	46%	48%	42%

Source: NFHS-5 (2019-21), CNNS (2016–18), and peer-reviewed rural nutrition studies.

As presented in above Table 3, adolescents from the lowest income households demonstrate the highest proportion of low dietary diversity (61%) and anaemia (59%). Maternal education emerges as a decisive factor, with knowledge levels dropping to 31% among adolescents whose mothers have minimal schooling. These findings confirm that dietary inadequacy is structurally embedded within poverty and educational disadvantage rather than merely behavioural preference.

### **Educational and Institutional Influences**

Institutional environments significantly influence nutrition awareness. Although national initiatives such as POSHAN Abhiyaan and Weekly Iron and Folic Acid Supplementation aim to improve adolescent nutrition, implementation quality varies across rural SC-dominated regions. Schools lacking active health clubs, structured nutrition modules, or trained educators show weaker nutrition literacy outcomes. Evidence suggests that adolescents exposed to structured school-based nutrition sessions demonstrate moderately higher knowledge scores; however, this does not automatically translate into improved dietary behaviour. The gap between awareness and practice reflects the limitations of knowledge without economic enabling conditions. Moreover, irregular monitoring of iron-folic acid supplementation reduces compliance and weakens anaemia-control efforts. Thus, educational institutions serve as critical mediating spaces, but their impact is constrained by infrastructural gaps and resource inequities in marginalized rural communities.

### **Rural Food Environment and Emerging Dietary Transition**

The rural food environment is undergoing transformation. Increased penetration of low-cost packaged snacks and sugary beverages has altered adolescent food preferences. Exposure to local markets selling energy-dense processed foods is associated with higher snack frequency and reduced traditional meal quality. Analytically, Table 3 shows that adolescents with high exposure to processed food markets exhibit lower dietary diversity (46%) and moderately high anaemia prevalence (48%), despite relatively higher general awareness (42%). This indicates that environmental exposure can override knowledge, especially when processed foods are cheaper and socially appealing. Additionally, infrastructural factors such as distance to fresh produce markets, seasonal variability in vegetable supply, and limited cold storage facilities reduce regular access to protective foods. Therefore, dietary behaviour among SC adolescents reflects a complex interaction between structural poverty, institutional support systems, and evolving rural food markets.

### **Strengthening Structural and Programmatic Interventions**

Addressing nutritional inequities among SC adolescents in rural India requires moving beyond isolated awareness campaigns toward integrated structural reform. National datasets such as the NFHS-5, 2019–21 and the Comprehensive National Nutrition Survey demonstrate that anaemia and low dietary diversity remain disproportionately high among socially disadvantaged groups. This indicates that program coverage alone is insufficient; delivery must be equity-focused and context-sensitive.

Existing initiatives including POSHAN Abhiyaan and Weekly Iron and Folic Acid Supplementation provide institutional platforms for intervention, but their effectiveness depends on behavioural reinforcement and supply-side support. Strengthening convergence between health, education, and food systems is essential.

For example, iron supplementation must be paired with dietary diversification strategies that improve access to locally available iron-rich foods such as green leafy vegetables, pulses, and millets. Economic empowerment mechanisms such as strengthening rural livelihoods, expanding access to diversified foods through farmer-producer collectives, and enhancing the PDS beyond cereals can directly influence food environments. Without addressing affordability and access, knowledge-based interventions risk limited impact.

### **Behavioural Change, Food Environment Reform, and Community Engagement**

The sustainable improvement in adolescent nutrition cannot rely solely on awareness generation. With 61% of rural SC adolescents exhibiting low dietary diversity, 59% experiencing anaemia in the poorest households, and only 34% able to identify iron-rich foods correctly, behavioural change must be supported by enabling structural conditions.

School-based interventions require transformation from theoretical nutrition messaging to experiential and context-specific learning. Given that only 43% of adolescents reported receiving structured nutrition education in the previous year, practical strategies such as meal planning exercises, food group demonstrations using locally available iron-rich foods (pulses, green leafy vegetables, millets), and reinforcement of iron-folic acid supplementation are essential to bridge the knowledge-practice gap.

Food environment reform is equally critical. While cereal intake is universal (98%), access to protective foods remains limited and 41% of adolescents frequently consume processed snacks. Strengthening the nutritional quality of mid-day meals, diversifying PDS provisions beyond cereals, improving rural market access to fruits and vegetables, and supporting local food production systems can enhance dietary diversity.

Community engagement must complement institutional strategies. Maternal education strongly influences adolescent nutrition literacy, with adequate knowledge declining to 31% when mothers have minimal schooling. Therefore, mothers' groups, adolescent health forums, and village-level awareness platforms should promote practical, culturally relevant nutrition education. Intergenerational engagement can improve household food allocation practices and reinforce healthy dietary behaviours.

Thus, behavioural change must operate within reformed food environments and empowered communities to ensure that knowledge becomes actionable and sustainable.

### Findings and Analysis

- **Food Consumption Patterns and Dietary Diversity:** Analysis of NFHS-5 (2019–21) and CNNS (2016–18) data shows that cereal consumption among rural SC adolescents is nearly universal (98%), indicating caloric adequacy. However, dietary diversity is low: only 62% consume pulses  $\geq 4$  days/week, milk (38%), green leafy vegetables (34%), fruits (29%), and eggs/meat/fish (26%). Frequent intake of packaged/fast foods (41%) suggests an emerging rural nutrition transition. Overall, 61% of adolescents from the lowest wealth quintile exhibit low dietary diversity, reflecting economic constraints.
- **Nutritional Status and Anaemia:** Anaemia prevalence is high (59%) among adolescents in the poorest households and strongly associated with low dietary diversity. Limited intake of iron-rich foods and inconsistent supplementation contribute to this burden. Although 64% are aware that iron deficiency causes anaemia, only 34% can correctly identify iron-rich foods, highlighting inadequate functional knowledge.
- **Dietary Knowledge and Knowledge–Practice Gap:** While 68% have heard of the “balanced diet” concept, only 39% can identify major food groups. Knowledge of iron absorption is low (28%). Maternal education significantly influences awareness; adequate nutrition knowledge drops to 31% when mothers have below-primary education. School-based nutrition engagement remains limited (43%).
- **Socio-Economic and Environmental Determinants:** Low income, limited food access beyond cereals, and exposure to processed food markets shape dietary behaviour. Adolescents exposed to processed food environments show lower dietary diversity (46%) despite moderate awareness.

Overall, findings indicate that cereal-dominant diets, high anaemia prevalence, and limited actionable nutrition literacy among rural SC adolescents are structurally linked to poverty, maternal education, and constrained food environments.

### Conclusion

This analytical study confirms that food consumption patterns and dietary knowledge among SC adolescents in rural India are profoundly influenced by structural socio-economic inequalities. Although cereal consumption is nearly universal (98%), dietary diversity remains inadequate, with limited regular intake of milk (38%), green leafy vegetables (34%), fruits (29%), and animal-source foods (26%). A high prevalence of anaemia (59%) among adolescents in the lowest wealth quintile, alongside 61% low dietary diversity, highlights persistent micronutrient deficiencies despite apparent caloric sufficiency. While awareness of balanced diets (68%) and iron deficiency (64%) is moderately high, functional nutrition literacy remains weak, as only 34% can correctly identify iron-rich foods and 28% understand iron absorption. Maternal education, household income, school engagement, and exposure to processed food markets significantly shape dietary behaviour. The findings underscore that nutritional vulnerability among rural SC adolescents is not merely behavioural but structurally embedded. Therefore, sustainable improvement requires integrated, equity-driven strategies that combine dietary diversification, strengthened supplementation compliance, enhanced school-based nutrition education, and improved access to affordable, nutrient-dense foods to break intergenerational cycles of malnutrition.

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