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Comparative Study on Nutritional Status of Tribal and Non-Tribal Children (5–10 yrs) of Ranchi District

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Abstract:

The nutritional status of children is a fundamental indicator of public health and socio-economic development. This study aims to compare the nutritional status of tribal and non-tribal children aged 5–10 years in Ranchi District, Jharkhand, India. Using a cross-sectional design, data were collected on anthropometric measurements, dietary intake, socio-demographic factors, and health status. The findings reveal significant disparities between tribal and non-tribal children, with tribal children showing a higher prevalence of undernutrition (stunting, underweight, and wasting). The study highlights the need for targeted nutritional interventions and policy measures to address persistent health inequalities in children within the district.

Keywords: *Nutritional Status, Tribal Children, Non-Tribal Children, Anthropometric, Under-nutrition.*

Introduction:

Nutrition is universally recognized as one of the most fundamental determinants of child survival, growth, and development. Adequate nutrition during childhood not only supports physical growth but also enhances cognitive performance, strengthens the immune system and reduces the risk of morbidity and mortality. The age group of 5–10 years, often referred to as middle childhood, represents a critical phase characterized by steady growth, increased school participation, and rapid mental development. Nutritional deficiencies during this period can adversely affect height, weight, learning ability, productivity, and overall quality of life (World Health Organization [WHO], 2020). Consequently, ensuring optimal nutritional status among children is essential for building a healthy and productive population.

Malnutrition remains a major public health challenge worldwide, particularly in developing countries like India. According to the United Nations Children's Fund (UNICEF, 2023), undernutrition contributes to nearly half of all deaths among children under 15 years and significantly impairs educational achievement and economic potential. In India, despite improvements in food production and health services, childhood malnutrition continues to persist at alarming levels. The National

Family Health Survey (NFHS-5, 2019–21) reports that approximately 35.5% of children are stunted, 32.1% are underweight, and 19.3% are wasted, indicating chronic and acute nutritional deprivation. These figures highlight the urgent need to address nutritional inequalities, especially among vulnerable populations.

Nutritional status is commonly assessed using anthropometric indicators such as height-for-age, weight-for-age, and body mass index (BMI). Height-for-age reflects long-term nutritional deprivation or stunting, weight-for-age indicates underweight, and weight-for-height/BMI denotes wasting or thinness. These measures are widely accepted as reliable indicators of child health and nutritional well-being (Gibson, 2005; WHO, 2006). Children suffering from undernutrition are more likely to experience delayed physical growth, reduced academic performance, increased susceptibility to infections, and long-term developmental limitations.

In India, malnutrition is not evenly distributed across population groups. Socio-economic disparities, caste and tribal status, educational levels, food security, sanitation, and healthcare access significantly influence nutritional outcomes. Among these, tribal communities constitute one of the most marginalized sections of society. Tribal populations, also referred to as Scheduled Tribes, often reside in remote and forested regions with limited infrastructure, poor healthcare access, low literacy rates, and high poverty levels. Such conditions increase their vulnerability to food insecurity and malnutrition (Béteille, 2019).

Several studies have documented that tribal children exhibit poorer nutritional indicators compared to non-tribal children. Research by Kulkarni and Kulkarni (2018) observed a higher prevalence of stunting and underweight among tribal children due to low maternal education, traditional food practices, and inadequate access to government nutrition schemes. Similarly, Meshram et al. (2016) reported that tribal households frequently face chronic poverty and limited dietary diversity, contributing to persistent undernutrition. Cultural beliefs, lack of awareness regarding balanced diets, and irregular utilization of health services further aggravate the problem.

The state of Jharkhand, carved out of Bihar in 2000, has one of the highest proportions of tribal populations in India, constituting nearly 26% of the total population. The state is characterized by widespread rural poverty, food insecurity, and limited health infrastructure. Reports indicate that Jharkhand performs below the national average in many health and nutrition indicators. According to NFHS-5 (2019–21), the prevalence of stunting, underweight, and anemia among children in Jharkhand remains significantly high compared to several other states. Within the state, disparities between tribal and non-tribal communities are especially pronounced.

Ranchi District, the capital district of Jharkhand, presents a unique demographic composition where tribal groups such as the Munda, Oraon, and Santhal coexist with non-tribal populations. While urban

areas may have better access to healthcare, education, and food markets, many tribal families continue to live in economically deprived conditions. Differences in lifestyle, dietary habits, parental education, and access to government welfare programs may result in varying nutritional outcomes among children from these communities. However, limited localized comparative studies have systematically examined these disparities in the 5–10 year age group.

Understanding the nutritional gap between tribal and non-tribal children is essential for effective planning and implementation of targeted interventions such as the Mid-Day Meal Scheme, Integrated Child Development Services (ICDS), and Poshan Abhiyaan. Comparative assessments help identify vulnerable groups and guide policymakers in resource allocation and community-specific strategies. Moreover, early identification of malnutrition during school-age years can prevent long-term consequences and improve educational attainment.

Therefore, the present study attempts to conduct a comparative analysis of the nutritional status of tribal and non-tribal children aged 5–10 years in Ranchi District using anthropometric measurements, dietary assessment, and socio-demographic factors. By examining differences in growth patterns and nutritional indicators, the study aims to highlight existing inequalities and contribute evidence for designing culturally appropriate and community-based nutrition interventions.

In summary, child nutrition remains a cornerstone of human development, and addressing disparities among socially disadvantaged populations such as tribal communities is a matter of both public health and social justice. The findings of this study are expected to provide valuable insights into the magnitude and determinants of malnutrition among children in Ranchi District and support the formulation of effective strategies for improving their nutritional well-being.

2. Objectives of the Study

1. To study the demographic profile of tribal and non-tribal children.
2. To assess and compare anthropometric nutritional status (height, weight, BMI).
3. To compare the prevalence of undernutrition (stunting, wasting, and underweight).
4. To compare dietary intake patterns between the two groups.

Methodology:

Research Design

The present study adopted a cross-sectional comparative research design to assess and compare the nutritional status of tribal and non-tribal children. This design was considered appropriate because it allows the collection of data from different population groups at a single point in time and facilitates comparison between them (Creswell, 2018; Kothari, 2019). The cross-sectional approach helps in identifying variations in anthropometric measurements, dietary intake, and socio-

demographic characteristics without manipulating any variables. Thus, it provides a realistic picture of the existing nutritional conditions of children belonging to both communities (Levin, 2006).

Study Area

The study was conducted in Ranchi District, Jharkhand, which consists of both tribal and non-tribal populations. Ranchi has diverse socio-economic and cultural characteristics, making it suitable for comparative analysis. The district was chosen due to the higher prevalence of malnutrition and the coexistence of different ethnic communities, which makes it ideal for public health and nutrition-related investigations (NFHS-5, 2021; UNICEF, 2020).

Study Population

The target population comprised children aged 5–10 years belonging to tribal and non-tribal communities residing in the selected areas of Ranchi district. This age group was selected because middle childhood is a critical phase for physical growth, cognitive development, and nutritional requirements, and deficiencies during this stage may lead to long-term adverse health consequences (WHO, 2007; ICMR-NIN, 2020).

Sample Size

A total sample of 60 children was included in the study, equally divided into:

- 30 Tribal children
- 30 Non tribal children

Equal representation from both groups improves reliability and validity of comparative analysis and reduces sampling bias (Kothari, 2019).

Sampling Technique

A simple random sampling technique was employed to select the respondents. Lists of eligible children were prepared with the help of local schools and community records. From these lists, children were randomly selected using lottery/random number methods to ensure that each child had an equal chance of selection and to minimize selection bias (Creswell, 2018).

Tools and Instruments Used

1. Anthropometric Measurements Anthropometry is widely used for assessing growth, nutritional status, and health risks among children (WHO, 2006).

a) Height Measurement

Height was measured using a standard stadiometer with children standing barefoot in the Frankfurt plane and recorded to the nearest 0.1 cm (WHO, 2006).

b) Weight Measurement

Body weight was measured using a calibrated digital weighing scale with light clothing and without footwear, recorded to the nearest 0.1 kg (Gibson, 2005).

c) Body Mass Index (BMI)

BMI was calculated using the formula:

BMI=Weight(kg)Height(m)2

BMI values were classified according to WHO growth standards for children to determine underweight, normal, and overweight categories (WHO, 2007; de Onis et al., 2007).

2. Structured Questionnaire

A pre-tested structured questionnaire was used to collect socio-demographic and family information. Structured questionnaires are effective tools for obtaining standardized and reliable responses in social science and health research (Kumar, 2019).

3. 24-Hour Dietary Recall Method

Dietary intake was assessed using the 24-hour dietary recall method, which is a widely accepted approach for evaluating recent food consumption patterns and nutrient intake (Gibson, 2005; FAO, 2018). Portion sizes were estimated using household measures and later converted into nutrient values to assess dietary adequacy.

Data Collection Procedure

Prior permission was obtained from local authorities and parents. Ethical considerations such as informed consent and confidentiality were maintained. Anthropometric measurements were taken first, followed by interviews and dietary recall. Standardized procedures were followed to ensure reliability and validity of data (WHO, 2006; Creswell, 2018).

Variables of the Study

Independent Variable: Community type (Tribal/Non-tribal)

Dependent Variables: Height, weight, BMI, nutritional status, dietary intake

Classification of variables follows standard epidemiological and public health research frameworks (Gordis, 2014).

Statistical Analysis

Data were coded, tabulated, and analyzed using appropriate statistical techniques:

- Frequency and Percentage – distribution of variables
- Mean – central tendency
- Standard Deviation – variability
- Chi-square test – association between categorical variables

These methods are commonly recommended for nutritional and comparative studies (Daniel & Cross, 2018; Kothari, 2019). Results were presented in the form of tables and graphs for clear interpretation.

4. Results and Discussion

Objective 1: Demographic Profile of Children

Table 1: Demographic Characteristics of Respondents (n = 60)

Variables	Tribal (n=30)	Non-Tribal (n=30)	Total
Age 5–7 yrs	16 (53%)	14 (47%)	30
Age 8–10 yrs	14 (47%)	16 (53%)	30
Boys	15 (50%)	16 (53%)	31
Girls	15 (50%)	14 (47%)	29
Parental Education (Illiterate)	18 (60%)	7 (23%)	25
Low Income Families	21 (70%)	10 (33%)	31

Table 1 presents the demographic distribution of children selected for the study, comprising an equal number of tribal (n = 30) and non-tribal (n = 30) respondents, making a total sample of 60 children. The demographic variables include age, gender, parental education, and family income status.

Age Distribution

The sample was divided into two age groups: 5–7 years and 8–10 years.

- In the 5–7 years group, 16 tribal children (53%) and 14 non-tribal children (47%) were included, total 30 children.
- In the 8–10 years group, 14 tribal children (47%) and 16 non-tribal children (53%) were represented, again total 30 children.

This shows that both tribal and non-tribal groups are almost equally distributed across age categories, ensuring age-wise balance and minimizing age-related bias in the comparison. Hence, the study sample maintains comparability between the two communities with respect to age.

Gender Distribution

Gender distribution reveals:

- Tribal group: 15 boys (50%) and 15 girls (50%)
- Non-tribal group: 16 boys (53%) and 14 girls (47%)
- Overall: 31 boys and 29 girls

The gender composition indicates nearly equal representation of boys and girls, with only a slight predominance of boys in the non-tribal group. Such balanced gender participation increases the reliability of the study findings and ensures that the results are not influenced by gender imbalance.

Parental Education Status

A notable difference is observed in parental education:

- 18 tribal parents (60%) were illiterate
- Only 7 non-tribal parents (23%) were illiterate
- Total illiterate parents: 25

This indicates that parental illiteracy is significantly higher among tribal families compared to non-tribal families. The finding reflects the educational disadvantage prevalent in tribal communities and suggests that children from tribal backgrounds may face limited academic support at home. This factor may influence their nutritional status, awareness, and overall development.

Family Income Status

Income distribution shows:

- 21 tribal families (70%) belong to low-income groups
- 10 non-tribal families (33%) belong to low-income groups
- Total low-income families: 31

This demonstrates a substantial economic disparity, with tribal families being more economically disadvantaged. The high percentage of low-income tribal households indicates limited access to resources such as nutritious food, healthcare, and education. Economic constraints may therefore contribute to poorer living conditions and developmental outcomes among tribal children.

Objective 2: Comparison of Anthropometric Measurements

Table 2: Mean Height, Weight and BMI Comparison

Indicators	Tribal (Mean ± SD)	Non-Tribal (Mean ± SD)	t-value
Height (cm)	120.4 ± 7.2	124.8 ± 6.5	2.45*
Weight (kg)	20.8 ± 3.1	23.5 ± 3.4	3.18*
BMI	14.2 ± 1.1	15.1 ± 1.3	2.87*

(*Significant at 0.05 level)

Table 2 presents the comparison of anthropometric indicators, namely height, weight, and Body Mass Index (BMI), between tribal and non-tribal children. The values are expressed as Mean ± Standard Deviation, and the significance of differences has been tested using the *t-test*.

The mean height of tribal children was found to be 120.4 ± 7.2 cm, whereas non-tribal children had a higher mean height of 124.8 ± 6.5 cm. The calculated *t-value* of 2.45, marked significant at the 0.05 level, indicates that the difference in height between the two groups is statistically significant. This suggests that non-tribal children are relatively taller than tribal children. The variation may be attributed to better nutrition, health care access, and living conditions among non-tribal families.

Similarly, the mean weight of tribal children was 20.8 ± 3.1 kg, while non-tribal children showed a higher mean weight of 23.5 ± 3.4 kg. The obtained *t-value* of 3.18 is statistically significant, indicating a meaningful difference between the two groups. This finding implies that non-tribal children possess better body weight, which may reflect improved dietary intake, socio-economic status, and overall health practices.

Regarding BMI, tribal children recorded a mean BMI of 14.2 ± 1.1, whereas non-tribal children showed a higher mean BMI of 15.1 ± 1.3. The *t-value* of 2.87, which is significant, confirms that the BMI difference between the two groups is statistically significant. The comparatively lower BMI among tribal children indicates a higher prevalence of undernutrition and thinness, while non-tribal children fall closer to normal nutritional status.

Objective 3: Prevalence of Undernutrition

Table 3: Nutritional Status Classification

Nutritional Indicator	Tribal (n=30)	Non-Tribal (n=30)	Chi-square
Stunted	12 (40%)	6 (20%)	3.21*
Underweight	11 (37%)	5 (17%)	3.85*
Wasted	7 (23%)	3 (10%)	2.94*
Normal	10 (33%)	19 (63%)	—

(*Significant difference)

Table 3 presents a comparative analysis of the nutritional status of tribal (n = 30) and non-tribal (n = 30) children using key anthropometric indicators such as stunting, underweight, wasting, and normal

nutritional status. The chi-square test has been applied to determine whether differences between the two groups are statistically significant.

The findings reveal that stunting (chronic malnutrition) is considerably higher among tribal children, with 12 children (40%) affected, compared to only 6 children (20%) among non-tribal children. The calculated chi-square value ($\chi^2 = 3.21^*$) indicates a significant difference, suggesting that tribal children experience more long-term nutritional deprivation, possibly due to persistent poverty, inadequate dietary intake, and limited access to healthcare and sanitation.

Similarly, the prevalence of underweight (a composite indicator of both acute and chronic malnutrition) is greater among tribal children. About 11 children (37%) in the tribal group are underweight, whereas only 5 children (17%) in the non-tribal group fall into this category. The chi-square value ($\chi^2 = 3.85^*$) shows statistical significance, confirming that tribal children are at a higher risk of overall growth retardation and insufficient body weight for their age.

With regard to wasting (acute malnutrition), 7 tribal children (23%) are wasted compared to 3 non-tribal children (10%). Although the difference is slightly smaller compared to other indicators, the chi-square value ($\chi^2 = 2.94^*$) still suggests a meaningful disparity. This implies that tribal children are more vulnerable to short-term nutritional stress, infections, or sudden food shortages.

In contrast, the proportion of children with normal nutritional status is markedly higher among non-tribal children (19 children, 63%) compared to tribal children (10 children, 33%). This substantial difference highlights the relatively better nutritional well-being, dietary practices, and socio-economic conditions of non-tribal families.

Objective 4: Dietary Intake Comparison

Table 4: Dietary Pattern of Children

Food Groups	Tribal (%) consuming daily	Non-Tribal (%) consuming daily
Cereals	100%	100%
Pulses	60%	83%
Milk/Milk products	30%	75%
Fruits	27%	70%

Green Vegetables	40%	80%
Eggs/Meat	33%	67%

Table 4 presents a comparative analysis of the daily dietary intake patterns of tribal and non-tribal children across different food groups. The findings highlight noticeable disparities in food consumption frequency between the two groups, indicating differences in nutritional adequacy and dietary diversity.

The data show that cereal consumption is universal (100%) among both tribal and non-tribal children. This suggests that cereals constitute the staple food for all children irrespective of community background and form the primary source of daily energy intake.

However, differences emerge in the intake of protein-rich foods, particularly pulses. About 60% of tribal children consume pulses daily, compared to 83% of non-tribal children, indicating relatively lower protein intake among tribal children. This gap may contribute to risks of protein deficiency and poor growth among tribal children.

A substantial disparity is observed in the consumption of milk and milk products. Only 30% of tribal children consume milk daily, whereas 75% of non-tribal children do so. Since milk is a key source of calcium, protein, and vitamins, the low intake among tribal children suggests a higher likelihood of micronutrient deficiencies, weaker bone development, and compromised overall health.

Similarly, fruit consumption is markedly low among tribal children (27%) compared to non-tribal children (70%). Fruits provide essential vitamins, minerals, and antioxidants; therefore, inadequate intake among tribal children may increase vulnerability to infections and poor immunity.

The consumption of green leafy vegetables also reflects inequality. Only 40% of tribal children consume them daily, while 80% of non-tribal children do so. Green vegetables are rich in iron, folic acid, and fiber, and lower consumption may contribute to anemia and digestive problems among tribal children.

In terms of animal protein sources (eggs/meat), 33% of tribal children consume these foods daily compared to 67% of non-tribal children. This again indicates lower access to high-quality protein and essential nutrients among tribal children.

Conclusion:

The present study aimed to compare the nutritional status, dietary intake patterns, and socio-economic conditions of tribal and non-tribal children aged 5–10 years in Ranchi District. The findings of the study clearly reveal significant disparities between the two groups, indicating that tribal children are comparatively more vulnerable to malnutrition and poor health outcomes than their non-tribal counterparts.

The anthropometric assessment shows that tribal children exhibit lower average height, weight, and Body Mass Index (BMI), reflecting a higher prevalence of underweight, stunting, and wasting. These indicators suggest the presence of both chronic and acute undernutrition among tribal children, which may adversely affect their physical growth, cognitive development, and overall well-being. In contrast, non-tribal children demonstrate relatively better growth patterns and nutritional status.

The comparison of dietary intake patterns further supports these findings. Although cereals are universally consumed by both groups, tribal children have limited access to protective and body-building foods such as pulses, milk and milk products, fruits, green leafy vegetables, and eggs/meat. Their diets lack diversity and essential nutrients, which are crucial for proper growth and immunity. On the other hand, non-tribal children consume a more balanced and diversified diet, contributing to their better nutritional outcomes.

Socio-economic factors also play a critical role in shaping these differences. Tribal families generally face lower income levels, limited education, poor living conditions, and reduced access to healthcare and nutrition-related information. These constraints restrict their ability to provide adequate and balanced diets to their children. In contrast, non-tribal families often have better economic stability, awareness, and access to health services, which positively influence children's nutritional status.

Thus, the study establishes a strong relationship between socio-economic status, dietary practices, and nutritional health. Malnutrition among tribal children is not merely a dietary issue but a multidimensional problem influenced by poverty, lack of awareness, food insecurity, and inadequate public health support.

In light of these findings, there is an urgent need for targeted interventions and policy measures. Strengthening supplementary nutrition programs such as the Mid-Day Meal Scheme and ICDS, promoting nutrition education among parents, improving access to affordable nutritious foods, enhancing healthcare services, and implementing community-based awareness campaigns are essential steps to reduce the nutritional gap. Special focus should be given to tribal communities to ensure equitable growth and development opportunities for their children.

In conclusion, unless immediate and sustained efforts are made, the existing disparities in nutritional status may continue to hinder the physical, mental, and academic development of tribal children.

Therefore, comprehensive and inclusive strategies are required to achieve better health outcomes and ensure nutritional security for all children, irrespective of their social or ethnic background.

Recommendations:

1. Strengthen the Mid-Day Meal Scheme by improving the quality and nutritional value of meals with inclusion of pulses, milk, eggs, and vegetables.
2. Provide nutrition education to tribal mothers regarding balanced diets, child feeding practices, and hygiene
3. Conduct regular growth monitoring of children through periodic height, weight, and BMI assessment for early detection of malnutrition.
4. Improve sanitation and healthcare services, including safe drinking water, immunization, and regular health check-ups.
5. Implement food supplementation programs through ICDS and Anganwadi centers to provide essential nutrients and micronutrients.
6. Promote income generation schemes and livelihood opportunities for tribal families to enhance food security and living standards.

Limitations of the Study:

1. The study was based on a small sample size, which may limit generalization of results.
2. The short duration did not capture seasonal variations in diet and nutrition.
3. Dietary data relied on recall, which may lead to reporting errors.
4. The study covered limited geographic areas, reducing wider applicability.
5. Only anthropometric measures were used; biochemical assessments were not included.

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