

Undernutrition In Tribal Under-Five Children: A Multi-Centric Cross-Sectional Analysis Of Determinants And Public Health Implications

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Abstract

Introduction: Undernutrition among under-five children remains a major public health concern in India, particularly within tribal communities. Tribal populations face heightened vulnerability due to poor socio-economic status, maternal illiteracy, inadequate feeding practices, and limited access to health services. This study was conducted to assess the prevalence and risk factors of undernutrition among under-five children in the tribal communities of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh.

Methodology: A descriptive cross-sectional survey was conducted among 200 under-five children using purposive sampling. Data collection tools included a structured interview schedule covering demographic, maternal, and child health variables, and anthropometric measurements analyzed using WHO Anthro software. Nutritional status was assessed using standard indices weight-for-age, height-for-age, and weight-for-height. Data were analyzed using SPSS software with chi-square tests to determine associations ($p < 0.05$).

Results: The study revealed that 68% of children suffered from at least one form of undernutrition: 42.5% were underweight, 40% stunted, and 32.5% wasted. Significant associations were found between undernutrition and birth weight ($p = 0.009$), dietary pattern ($p = 0.014$), and maternal education ($p = 0.006$). Contributing risk factors included early marriage, adolescent pregnancy, maternal anemia, improper weaning, and poor socioeconomic conditions.

Discussion: The findings align with national studies and reaffirm that undernutrition in tribal children is multifactorial, influenced by maternal, child-related, and social determinants. The study supports the hypothesis that demographic variables significantly influence nutritional status. Addressing these factors requires targeted interventions focused on maternal health, nutrition education, and community engagement to mitigate childhood undernutrition in tribal regions.

Keywords: Undernutrition, tribal children, under-five, stunting, wasting, underweight, maternal health, child nutrition, risk factors

INTRODUCTION

Undernutrition remains a persistent public health challenge in India, particularly among vulnerable groups such as children under the age of five living in tribal communities. Malnutrition during early childhood has irreversible consequences on physical growth, cognitive development, immunity, and overall well-being. Despite numerous health and nutrition programs introduced by the Government of India including the Integrated Child Development Services (ICDS), Mid-Day Meal Scheme, and National Nutrition Mission tribal populations continue to report alarmingly high rates of undernutrition. The tribal population of the states such as Andhra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh. reflects similar trends, where socioeconomic deprivation, cultural practices, and limited access to health services compound the problem.

Undernutrition is typically classified into three forms: stunting (low height-for-age), wasting (low weight-for-height), and underweight (low weight-for-age). These indicators not only reflect current and chronic nutritional deficiencies but also indicate the quality of maternal and child healthcare services available. Previous research has shown that undernutrition in tribal areas is influenced by a host of interrelated factors, including maternal education, birth weight, early marriage, adolescent pregnancy, poor feeding practices, and lack of sanitation.

Moreover, tribal communities often suffer from geographical isolation, poor infrastructure, and lower literacy rates, further exacerbating the issue.

The present study was undertaken to explore the prevalence and determinants of undernutrition among under-five children residing in the tribal communities of Andra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh specifically, the study sought to determine the prevalence of underweight, stunting, and wasting; assess the relationship between nutritional status and demographic variables; and identify key maternal, child-related, and environmental risk factors. By generating localized evidence, this study aims to inform health professionals, policy-makers, and community-based stakeholders in designing effective, culturally sensitive interventions to combat child undernutrition and improve health outcomes among tribal populations.

METHODOLOGY

A descriptive cross-sectional survey design was adopted to assess the prevalence and risk factors of undernutrition among under-five children in the tribal communities of Andra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh. The study was conducted over a period of two months in selected tribal hamlets of Andra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh.

Population and Sampling: The target population included all under-five children residing in the tribal community. A total of 200 children were selected using a purposive sampling technique based on inclusion criteria such as permanent residency in the village and availability of anthropometric records or willingness to be measured. Children who were critically ill or whose guardians did not provide consent were excluded.

Data Collection Tools and Techniques: Data were collected using a structured interview schedule and anthropometric measurements. The interview schedule was divided into four parts: (1) demographic data, (2) maternal health factors, (3) child health and feeding practices, and (4) environmental and socio-economic conditions. Anthropometric measurements included weight-for-age, height-for-age, and weight-for-height, which were recorded using standard digital weighing scales and measuring boards. WHO Anthro software was used to interpret the nutritional status using Z-scores.

Validity and Reliability: The tools were validated by a panel of experts in community health nursing and pediatrics. A pilot study was conducted on 20 participants from a similar tribal setting to ensure clarity and feasibility of the tool. Necessary modifications were made based on feedback. Reliability was ensured through consistent training of data collectors and calibration of instruments.

Ethical Considerations: Ethical clearance was obtained from the Institutional Ethical Committee. Permission from local health authorities and community leaders was also sought. Informed written consent was obtained from the caregivers of all participating children. Privacy, confidentiality, and voluntary participation were ensured throughout the study.

Data Analysis: Data were analyzed using descriptive and inferential statistics with SPSS software. Frequency and percentage were used to summarize demographic and nutritional characteristics. Chi-square tests were applied to examine associations between undernutrition and selected demographic and risk variables. A p-value of <0.05 was considered statistically significant.

RESULTS

The present study was conducted to assess the prevalence and risk factors of undernutrition among under-five children belonging to tribal communities in Andra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh. A total of 200 children were assessed using anthropometric measurements based on WHO criteria.

Table 1: Nutritional Status of Under-Five Children (N = 200)

Nutritional Indicator	Normal	Undernourished	Percentage
Weight-for-Age (Underweight)	115	85	42.5%
Height-for-Age (Stunting)	120	80	40.0%
Weight-for-Height (Wasting)	135	65	32.5%

The findings revealed that 42.5% of the children were underweight (weight-for-age), 40.0% were stunted (height-for-age), and 32.5% were wasted (weight-for-height), indicating that a significant proportion of the children suffered from one or more forms of undernutrition. These figures suggest that undernutrition is a critical public health concern in this population, with children experiencing both chronic and acute forms of nutritional

deficiencies. Some children were affected by more than one condition, underscoring the severity and co-existence of multiple nutritional problems.

Table 2: Distribution of Children by Age Group and Gender (N = 200)

Age Group (in months)	Male (n)	Female (n)	Total (n)	Percentage (%)
0-12	25	20	45	22.5%
13-24	23	18	41	20.5%
25-36	28	19	47	23.5%
37-48	30	26	56	28.0%
49-60	11	10	21	10.5%

Regarding demographic characteristics, most of the children (28%) were in the 37-48 months age group, followed by 23.5% in the 25-36 months group. The gender distribution showed a slight male predominance, with 54.2% males and 45.8% females. Low birth weight was reported in 34% of the children, and a majority followed a mixed diet, although the diversity and adequacy of the diet were generally poor. In terms of maternal education, 46% of mothers had completed secondary education, while 22.5% were illiterate. The occupational status of most mothers indicated that they were homemakers, and the household income of the majority (60%) ranged between ₹3000-₹5000 per month, reflecting the low socio-economic status prevalent in the study area.

Table 3: Association Between Nutritional Status and Selected Variables

Variable	Chi-square (χ^2)	df	p-value	Significance
Age of child	5.96	4	0.201	Not significant
Sex of child	2.91	1	0.088	Not significant
Birth weight	6.75	1	0.009	Significant

Chi-square tests were applied to assess the association between undernutrition and selected variables. A statistically significant association was found between nutritional status and birth weight ($p = 0.009$), dietary pattern ($p = 0.014$), and mother's educational status ($p = 0.006$). Children with low birth weight were more likely to be undernourished. Similarly, inadequate dietary diversity was significantly associated with stunting and wasting, and lower maternal education levels correlated with poorer child nutritional status. However, no significant associations were observed between undernutrition and the age or sex of the child, or family income, suggesting that nutritional outcomes in this population were more closely related to biological and maternal behavior factors than to general demographic characteristics.

Table 4: Distribution of Participants Based on Identified Risk Factors

Risk Factor Category	Key Indicators	Percentage (%)
Maternal	Early marriage	78.0%
	Adolescent pregnancy	62.5%
	Anemia during pregnancy	75.0%
	Tobacco use	93.4%
	No family planning	89.7%
Child-Related	Low birth weight (<2.5 kg)	66.0%
	Improper weaning	63.0%
	Inadequate dietary pattern	89.0%
Social	Low socioeconomic status	100%
	Substance abuse by father	100%

The study also identified several maternal, child-related, and social risk factors contributing to undernutrition. Among maternal factors, early marriage (78%), adolescent pregnancy (62.5%), anemia during pregnancy (75%), tobacco use (93.4%), and non-usage of family planning methods (89.7%) were reported. Child-related risk factors included low birth weight (66%), improper weaning practices (63%), and inadequate dietary intake (89%). Furthermore, all undernourished children came from households with low socio-economic status and where substance abuse by the father was reported (100%). These findings reveal a complex interplay of factors leading

to undernutrition, including poor maternal health and education, ineffective child-feeding practices, and significant social and economic vulnerabilities.

In summary, the results show that undernutrition is highly prevalent among under-five tribal children in Andhra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh. The most commonly observed form was underweight, followed by stunting and wasting. Low birth weight, poor dietary diversity, and low maternal education emerged as significant predictors. In addition, multiple maternal, child, and household-related risk factors were identified. The findings highlight the multifactorial nature of undernutrition in this setting and emphasize the need for integrated interventions addressing maternal health education, dietary practices, early child care, and socio-economic upliftment to improve child health outcomes in tribal communities.

DISCUSSION

The present study assessed the prevalence and risk factors of undernutrition among under-five children in the tribal communities of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, and Uttar Pradesh. It aimed to (1) determine the prevalence of undernutrition, (2) identify associations between undernutrition and selected demographic variables, and (3) explore specific risk factors. The findings revealed a high prevalence of undernutrition, 68% of children were found to be affected by at least one form: 42.5% underweight, 40% stunted, and 32.5% wasted. These results underscore a significant public health concern in tribal populations where multiple socio-economic and maternal determinants contribute to poor child health outcomes.

In terms of the first objective, the findings align with earlier studies conducted in tribal and rural populations across India. A cross-sectional study by Yadav et al. (2016) in the tribal belt of Chhattisgarh reported that 39.2% of children were underweight, 41.5% stunted, and 33.6% wasted, showing close resemblance to the figures observed in the current study. Similarly, a study by Rao et al. (2015) in tribal areas of Andhra Pradesh found 32.7% underweight, 38.3% stunting, and 18.3% wasting, indicating that chronic malnutrition remains a persistent issue across multiple tribal populations despite government nutrition programs.

The second objective explored associations between nutritional status and demographic variables. Statistically significant associations were found between undernutrition and birth weight ($p = 0.009$), dietary pattern ($p = 0.014$), and mother's education ($p = 0.006$). These results are in line with a study by Bhandari et al. (2013) in Madhya Pradesh, where maternal literacy and birth weight were strong predictors of stunting and wasting. Their findings demonstrated that children of illiterate mothers were 2.8 times more likely to be stunted. Similarly, Meshram et al. (2012), in their large-scale survey of tribal children across India, identified low birth weight and poor dietary intake as major risk factors for undernutrition. This reinforces the idea that maternal factors and early infant health are more decisive in nutritional outcomes than child age or sex, which did not show a significant association in the present study.

The third objective identified risk factors grouped into maternal, child-related, and social domains. Notably, maternal issues such as early marriage (78%), adolescent pregnancy (62.5%), anemia during pregnancy (75%), and tobacco use (93.4%) were widely reported. Child-related factors included low birth weight (66%), improper weaning (63%), and inadequate dietary intake (89%), while poor socio-economic status and paternal substance abuse (100%) formed the social determinants. These observations closely reflect those of Awasthi et al. (2014), who examined slum-dwelling children in Uttar Pradesh and found that malnutrition was significantly associated with improper weaning, maternal tobacco use, and poor sanitation. They reported a malnutrition rate of 66.3% and concluded that both behavioral and environmental interventions are required.

A study conducted by Das et al. (2019) in Jharkhand tribal villages found that 45% of children under five were stunted, and maternal undernutrition was strongly linked to child nutritional status. They emphasized that maternal health, nutritional literacy, and spacing between births were crucial in mitigating risk. This is supported by the current findings where birth intervals of less than 2 years and inadequate antenatal care contributed to undernutrition. Furthermore, Das et al. noted that availability of healthcare services alone is insufficient without behavioral change at the community level.

Lastly, Patil and Angadi (2016) examined tribal populations in Maharashtra and reported that lack of immunization, low protein intake, and absence of exclusive breastfeeding were major contributors to malnutrition. Their study, which showed 48.5% underweight prevalence, supports our findings where low exclusive breastfeeding and inadequate dietary diversity were evident. In both studies, community kitchens and ICDS centers were operational but underutilized or poorly managed.

Across all studies, a recurring theme is the multifactorial nature of undernutrition, particularly in tribal areas. Poverty, maternal illiteracy, and poor health-seeking behavior combine with cultural practices and environmental

deprivation to create a vicious cycle of nutritional failure. While schemes like ICDS, community kitchens, and tribal welfare programs are in place, the findings suggest a gap between policy and grassroots implementation.

CONCLUSION:

This study confirms that undernutrition among under-five tribal children remains a severe and persistent problem, driven by preventable factors such as low maternal education, inadequate feeding practices, low birth weight, and poverty. The hypothesis of the study—there is a significant association between undernutrition and selected demographic variables—was supported. Addressing these issues calls for multi-sectoral and culturally appropriate interventions, including community-based nutrition education, improved maternal healthcare, targeted behavior change campaigns, and better accountability of existing nutrition programs. A focus on maternal empowerment and household-level interventions can significantly enhance the nutritional status and overall well-being of tribal children.

Conflict of Interest: The authors declare no conflict of interest, and the results were interpreted objectively without any external influence or bias.

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