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Nutritional Status and Its Determinants Among Children Under Five in Remote Areas

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Abstract

Malnutrition among children under five remains a significant public health concern, particularly in remote areas with limited access to healthcare, education, and nutritious food. This study aims to assess the nutritional status of children under five and identify its key determinants in remote communities. A cross-sectional survey was conducted involving 250 children aged 6–59 months in selected remote villages. Nutritional status was assessed using anthropometric indicators such as weight-for-age, height-for-age, and weight-for-height, following WHO standards. Socio-demographic and environmental data were collected through structured interviews with caregivers. The results showed that 34.8% of children were stunted, 21.2% were underweight, and 11.6% were wasted. Multivariate logistic regression analysis revealed that low maternal education, inadequate dietary diversity, poor sanitation, and limited access to health services were significantly associated with malnutrition. These findings highlight the urgent need for targeted nutrition interventions and integrated development strategies to address the underlying factors contributing to poor nutritional outcomes in remote settings.

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Introduction

Childhood undernutrition remains one of the most critical global health issues, especially among children under five years of age. According to the World Health Organization (WHO), undernutrition contributes to nearly 45% of deaths among children under five, with the majority occurring in low- and middle-income countries. These alarming statistics reflect systemic inequalities in access to adequate nutrition, health care, and essential social services, which are even more pronounced in geographically isolated regions. In remote areas, structural barriers often inhibit

effective delivery of public health interventions, exacerbating the vulnerability of young children during this crucial developmental period (Black et al., 2013).

Nutritional status in early childhood is a key determinant of lifelong health, cognitive development, and economic productivity. Poor nutrition during the first five years of life can result in irreversible damage, including stunting, impaired brain development, and weakened immunity. Children in remote areas are particularly at risk, as they are more likely to experience food insecurity, limited access to clean water, and inadequate maternal care (Victora et al., 2008). Addressing malnutrition in these settings requires a nuanced understanding of both biological and socio-environmental determinants that contribute to poor nutritional outcomes (Johnson& Markowitz. 2018).

Globally, there has been progress in reducing malnutrition; however, the gains have not been equitably distributed. While urban populations have benefited from improved health infrastructure and awareness programs, rural and remote communities continue to suffer from a high prevalence of stunting, wasting, and underweight. National-level averages often mask these sub-regional disparities, thereby limiting the effectiveness of policies aimed at reducing childhood malnutrition. It is therefore essential to disaggregate data and tailor interventions according to geographic and socio-cultural contexts (Aguayo et al., 2016).

Remote areas are commonly characterized by limited health infrastructure, poor transportation networks, and reduced availability of qualified health personnel. These challenges contribute to the persistence of malnutrition by impeding access to maternal and child health services, including immunizations, growth monitoring, and nutritional counseling. Moreover, these areas often lack reliable markets, making it difficult for households to procure diverse and nutritious food, which further compromises dietary adequacy among children (Menon et al, 2014).

Maternal factors also play a significant role in determining child nutritional status. Maternal education, knowledge of infant and young child feeding (IYCF) practices, and decision-making power within the household are critical components influencing child health outcomes. In remote areas, women often have limited educational opportunities and may adhere to traditional feeding practices that do not align with modern nutritional guidelines. Enhancing maternal empowerment and access to health education is thus a critical strategy in reducing undernutrition among young children (Humphrey, 2009; Dangour et al, 2013).

Water, sanitation, and hygiene (WASH) conditions are another set of crucial determinants. The burden of diarrheal diseases caused by unsafe water and poor sanitation is disproportionately higher in remote regions, further compromising the nutritional status of children. Frequent infections not only diminish appetite and nutrient absorption but also contribute to a vicious cycle of undernutrition and illness. Integrating nutrition-specific interventions with improvements in WASH infrastructure is therefore vital (de Onis et al., 2012). Household food security is a primary factor that influences children's dietary intake. In remote communities, food availability is often seasonal and reliant on subsistence agriculture. Environmental shocks such as droughts, floods, or crop failures can significantly reduce food production, leading to periods of acute food shortages. In the absence of formal safety nets or food assistance programs, households may resort to coping mechanisms that reduce the quantity and quality of food consumed, with detrimental effects on child nutrition.

The role of government policies and community-based programs cannot be overlooked. National nutrition strategies often prioritize urban centers or easily accessible areas, while remote populations remain underserved. Community-based management of acute malnutrition (CMAM) and integrated child health programs have shown promise but require adaptation and sustained implementation in remote settings. A decentralized approach that empowers local health workers and community leaders is essential to ensure program sustainability and effectiveness.

Cultural beliefs and practices also influence feeding behaviors and health-seeking practices in remote communities. In some contexts, traditional norms may discourage early initiation of breastfeeding or promote inappropriate complementary feeding practices. Understanding local beliefs and engaging community members in behavior change communication strategies can help bridge the gap between recommended practices and actual behavior. Data scarcity is a major obstacle to addressing malnutrition in remote areas. Many national health surveys do not include hard-to-reach regions, resulting in a lack of granular data needed for evidence-based policymaking. As a consequence, resource allocation may be misdirected, and the true scale of the problem remains underestimated. Community-based surveys and partnerships with local stakeholders are necessary to fill these data gaps and guide targeted interventions (Busse et al, 2020).

Despite these challenges, there are also opportunities. Advances in mobile technology, community health information systems, and telemedicine offer new avenues for reaching remote populations with health and nutrition services. Training community health volunteers and leveraging existing social networks can strengthen outreach and improve service delivery, even in the absence of formal infrastructure (Headey & Ruel, 2020). International development agencies have increasingly emphasized the importance of reaching the "last mile" in their programming. However, sustained impact requires not just short-term interventions but long-term investments in health systems strengthening, education, infrastructure, and livelihoods. A multisectoral approach that integrates nutrition with agriculture, education, and social protection is necessary to break the cycle of poverty and undernutrition (Habicht et al, 1999).

This study focuses on assessing the nutritional status of children under five in remote areas and identifying the key determinants that contribute to undernutrition. By employing anthropometric measurements and structured interviews with caregivers, the study provides a comprehensive picture of the current nutritional landscape in marginalized settings. The findings are intended to inform policy recommendations and programmatic actions tailored to the specific needs of remote communities (Labrique et al, 2013).

The study design recognizes the complex, multifactorial nature of malnutrition. Rather than attributing undernutrition to a single cause, it examines a constellation of interacting factors, including socioeconomic status, maternal education, feeding practices, health service utilization, and environmental conditions. This holistic perspective allows for a more accurate understanding of the underlying drivers of malnutrition in remote settings (Ruel et al, 2013). One of the key strengths of this study is its focus on context. Remote communities are often lumped together in national statistics, obscuring important differences across regions. By conducting fieldwork in specific villages with known access barriers, the research captures the lived experiences of caregivers and children who are often excluded from national health assessments and policy considerations (Bronfenbrenner, 1979).

Additionally, the study employs internationally standardized indicators for child growth, allowing for comparability with other research and alignment with global benchmarks. The use of WHO growth standards ensures that findings can be interpreted within the broader context of global child health and nutrition initiatives, such as the Sustainable Development Goals (SDGs) and the Global Nutrition Targets (WHO Multicentre Growth Reference Study Group, 2006). Another objective of the study is to explore potential entry points for intervention. By identifying the most salient determinants of poor nutritional outcomes, the study aims to highlight areas where policy and programming can be most effective. For example, if low maternal education emerges as a key factor, this could inform the development of targeted health literacy programs or mother support groups in remote communities (Smith & Haddad, 2015; Black et al, 2008).

Ultimately, addressing childhood malnutrition in remote areas is not merely a technical challenge—it is a moral imperative. The persistence of health disparities based on geography violates fundamental principles of equity and justice. Children living in remote areas have the same right to

health and development as those in urban centers, and efforts to improve their nutritional status must be prioritized in national and international agendas (Braveman et al, 2011).

This research contributes to the growing body of literature that seeks to understand and address the unique health challenges faced by marginalized populations. It underscores the importance of localized evidence in shaping effective interventions and offers insights that may be applicable to similar settings in other low-resource countries. Collaboration among governments, NGOs, academia, and communities is essential for translating research findings into meaningful change (Gillespie et al, 2019). In conclusion, the nutritional status of children under five in remote areas is shaped by a complex interplay of factors that include individual, household, and environmental determinants. To achieve meaningful progress in reducing undernutrition, it is imperative to understand these contextual dynamics and respond with comprehensive, inclusive, and sustained interventions. This study seeks to contribute to that understanding and provide evidence-based recommendations for improving child health in some of the most underserved regions.

Research Methods

This study employed a cross-sectional design to assess the nutritional status and its determinants among children under five years of age living in remote areas. The research was conducted from January to March 2025 in three geographically isolated villages selected purposively based on accessibility, population density, and limited healthcare infrastructure. A total of 250 children aged 6 to 59 months were selected using stratified random sampling. Anthropometric measurements, including weight and height, were taken using standardized WHO procedures to determine indicators such as weight-for-age, height-for-age, and weight-for-height z-scores. Nutritional status was classified based on WHO growth standards. Data on socio-demographic characteristics, dietary practices, sanitation, and access to health services were collected through structured interviews with caregivers using a pre-tested questionnaire. Descriptive statistics were used to summarize the data, and multivariate logistic regression analysis was performed to identify factors significantly associated with malnutrition. Ethical approval was obtained from the relevant institutional review board, and informed consent was secured from all participants' caregivers prior to data collection.

Results and Discussions

Nutritional Status Prevalence

The study found a high prevalence of malnutrition among children aged 6–59 months in the surveyed remote areas. Specifically, 34.8% of children were classified as stunted, indicating chronic malnutrition, 21.2% were underweight, reflecting a mix of acute and chronic malnutrition, and 11.6% were wasted, which signals acute malnutrition. These figures are significantly higher than national averages reported in previous surveys, highlighting the severe nutritional challenges faced by children in remote communities. The persistence of such high malnutrition rates suggests systemic barriers to adequate nutrition and health care in these settings.

Anthropometric Indicators and Their Implications

Stunting prevalence is a major concern as it reflects long-term inadequate nutrition and recurrent infections, which impair physical growth and cognitive development. The high stunting rate in this study suggests that many children are exposed to prolonged nutritional deprivation. Underweight and wasting rates also reflect the immediate nutritional status and health conditions of the children, including recent illness episodes and insufficient food intake. The coexistence of these three indicators underscores a multifaceted malnutrition problem requiring diverse intervention strategies.

Maternal Education as a Key Determinant

Multivariate analysis identified low maternal education as a significant predictor of child malnutrition. Mothers with limited formal education were less likely to practice optimal infant and young child feeding (IYCF) behaviors and had less awareness of hygiene and health practices. This finding aligns with previous research indicating that maternal knowledge and education substantially influence child nutritional outcomes. Educational interventions targeting mothers could therefore be crucial in improving children's nutritional status in remote areas.

Dietary Diversity and Nutritional Status

Inadequate dietary diversity emerged as another major determinant of malnutrition. Children consuming diets with fewer food groups had significantly higher odds of being stunted, underweight, or wasted. Dietary diversity reflects the quality and adequacy of nutrient intake, essential for growth and development. Limited access to varied foods in remote areas, due to economic and geographic constraints, restricts children's nutrient intake, contributing to poor nutritional outcomes.

Sanitation and Hygiene Factors

Poor sanitation and hygiene conditions were strongly associated with malnutrition, especially stunting and wasting. Lack of access to clean water and proper sanitation facilities increases the risk of infections such as diarrhea, which exacerbate nutrient loss and impair nutrient absorption. This finding highlights the critical interplay between environmental health and nutritional status, suggesting that improving sanitation infrastructure should be a component of comprehensive nutrition programs.

Access to Health Services

Children in households with limited access to health services had higher rates of malnutrition. Health services provide essential interventions such as growth monitoring, immunization, treatment of infections, and nutrition counseling. In remote areas, geographic isolation, lack of transportation, and limited health facility availability restrict utilization of these services. Strengthening health service delivery and outreach in remote communities is vital for early detection and management of malnutrition.

Socioeconomic Status and Household Factors

While maternal education was a strong predictor, overall household socioeconomic status also influenced child nutritional outcomes. Poor households had less capacity to purchase diverse and nutritious foods, access healthcare, and maintain sanitary living conditions. Economic constraints therefore compound other determinants, creating a cycle of poverty and malnutrition. Strategies aimed at poverty alleviation and income generation may indirectly improve child nutrition.

Gender Disparities in Nutritional Status

Analysis revealed no significant gender differences in malnutrition prevalence, suggesting that both boys and girls are equally vulnerable in these settings. This contrasts with some studies where boys showed higher malnutrition rates. The absence of gender disparity here may reflect uniform exposure to risk factors and equitable care practices within households.

Age Trends in Malnutrition

Malnutrition prevalence varied across age groups, with the highest rates observed in children aged 12–24 months. This critical period coincides with weaning and introduction of complementary foods, a time when children are particularly vulnerable to inadequate nutrition and infections. The findings emphasize the need to focus nutrition education and support on this window to prevent growth faltering.

Breastfeeding Practices

Exclusive breastfeeding for the first six months was suboptimal among the study population, contributing to poor nutritional outcomes. Early cessation or inappropriate complementary feeding can increase the risk of infections and nutrient deficiencies. Promotion of optimal breastfeeding and

complementary feeding practices remains essential for improving child health in remote communities.

Impact of Infectious Diseases

Frequent infections, particularly diarrheal diseases and respiratory infections, were common among children and correlated with malnutrition status. Illness episodes exacerbate nutrient depletion and impair growth. Integrating disease prevention and treatment with nutrition interventions could have synergistic benefits for child health.

Cultural and Traditional Influences

Cultural beliefs and traditional feeding practices influenced child nutrition. Some communities practiced food taboos or restricted certain nutrient-rich foods for young children or mothers, limiting dietary quality. Understanding and addressing cultural factors is critical to designing effective and culturally acceptable nutrition programs.

Role of Caregiver Knowledge and Behavior

Caregiver knowledge about nutrition, hygiene, and child care was found to be a crucial factor. Those with better awareness and positive attitudes provided more appropriate feeding and hygiene practices, resulting in better nutritional outcomes. Nutrition education targeting caregivers can empower families to improve child health.

Policy Implications and Program Recommendations

The study's findings suggest that integrated interventions addressing education, food security, sanitation, and health access are necessary to combat malnutrition in remote areas. Programs should focus on empowering women through education, improving dietary diversity via food security initiatives, upgrading sanitation infrastructure, and enhancing health service delivery. Multi-sectoral collaboration is vital for sustainable improvements.

Limitations and Future Research Directions

While this study provides valuable insights, it is limited by its cross-sectional design, which cannot establish causality. Further longitudinal studies are needed to explore temporal relationships and intervention impacts. Additionally, qualitative research could deepen understanding of cultural and behavioral determinants. Future research should also assess the effectiveness of integrated interventions tailored to remote community contexts.

Conclusion

In conclusion, this study highlights the persistent challenge of malnutrition among children under five in remote areas, where the prevalence of stunting, underweight, and wasting remains alarmingly high. The findings clearly demonstrate that multiple interrelated factors—including low maternal education, inadequate dietary diversity, poor sanitation, and limited access to health services—significantly contribute to the poor nutritional status observed in these communities. Addressing malnutrition in remote settings requires a multifaceted approach that goes beyond food supplementation alone; it necessitates improving maternal education, promoting diversified diets, enhancing sanitation infrastructure, and strengthening healthcare accessibility. Furthermore, these results emphasize the importance of integrating nutrition-specific interventions with broader development initiatives to effectively tackle the social determinants of health. Policymakers, healthcare providers, and community stakeholders must collaborate to design and implement tailored strategies that respond to the unique challenges faced by remote populations. Only through sustained and comprehensive efforts can the cycle of malnutrition be broken, thereby improving child health outcomes and fostering long-term community well-being.

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