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ASSESSING THE MEAN HEIGHT OF SCHOOL GOING CHILDREN IN REASI DISTRICT, JAMMU & KASHMIR: A COMPARISON WITH WHO AND ICMR STANDARDS

Ashraf Nawaz[1], Rajni Saluja[2]

[1] Research Scholar, Department of Business Management and Commerce, Desh Bhagat University, Mandi Gobindgarh, Punjab, India
[2] Professor, Department of Business Management and Commerce, Desh Bhagat University, Mandi Gobindgarh, Punjab, India

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ABSTRACT

This study assesses the mean height of school-going children in the Reasi district of Jammu & Kashmir, comparing the findings with WHO and ICMR reference standards. A total of 400 children (219 boys and 181 girls) aged 6 to 10 years were included in the analysis. The results revealed that the mean heights of both boys and girls were consistently lower than the reference standards, with girls exhibiting larger deviations than boys. The largest differences from WHO standards were observed at age 10 for boys and at age 7 for girls. In comparison, the deviations from ICMR standards were slightly smaller but still significant. The study highlights the challenges faced by children in this region, where malnutrition, socio-economic disparities, and limited access to healthcare contribute to stunted growth. The findings underscore the need for targeted interventions to address these issues and promote optimal growth among children in rural areas.

Keywords: Reasi District, Height, WHO Standards, ICMR Standards, Malnutrition, Public Health Interventions

1. INTRODUCTION

Growth and development are fundamental indicators of the health and well-being of children, reflecting the quality of nutrition, healthcare, and socio-economic conditions in a population (Habicht et al., 1974; Katoch, 2022). Among the various anthropometric measures, height serves as a critical parameter for assessing growth patterns and identifying potential deviations from expected norms (UNICEF et al., 2012). Monitoring the growth of school-going children is particularly important, as this age group is highly susceptible to the long-term impacts of nutritional and health interventions (Katoch & Sharma, 2016). Variations in growth trends often highlight disparities in regional healthcare access, nutritional practices, and socio-economic development, making such studies essential for targeted public health planning (Katoch & Nawaz, 2018).

The World Health Organization (WHO) and the Indian Council of Medical Research (ICMR) have established growth reference standards that serve as benchmarks for assessing child development (Hakeem et al., 2004). WHO standards provide a global reference for optimal growth under ideal conditions, while ICMR standards are tailored to the Indian population, accounting for regional genetic and environmental variations. These standards are widely used to assess nutritional status, identify growth faltering, and guide interventions aimed at improving child health (Apodaca, 2008; O. Katoch, 2023). Comparing regional data to these reference standards provides valuable insights into whether children

are achieving their full growth potential and highlights areas where public health interventions are most needed (Black et al., 2008).

This study focuses on the Reasi district of Jammu & Kashmir, a region characterized by diverse geography and socio-economic challenges. The area's unique demographic and environmental context makes it an important case for examining growth patterns in school-going children. By assessing the mean height of children in this district and comparing the data with WHO and ICMR reference standards, this study aims to shed light on the nutritional and health status of the population.

The significance of this study lies in its potential to inform public health policies and targeted interventions. Identifying deviations from growth standards can help prioritize resource allocation and design region-specific programs to address malnutrition and other health concerns. Additionally, this research contributes to the growing body of literature on child growth patterns in India, providing a valuable regional perspective.

The subsequent sections of this paper present a review of the relevant literature, describe the study's methodology, discuss the findings, and interpret them in the context of existing standards. The paper concludes with recommendations for policy and future research to address identified gaps and challenges.

2. LITERATURE REVIEW

Child growth and development are widely recognized as critical indicators of public health, reflecting the nutritional, environmental, and socio-economic conditions of a population (Striessnig & Bora, 2020). Globally, several studies have explored growth trends among children, emphasizing the role of nutritional intake, healthcare access, and living conditions (Acosta et al., 2003; Alderman et al., 2006; Butte et al., 2007; Das et al., 2022). For instance, research in low- and middle-income countries has consistently highlighted the prevalence of stunted growth, a key indicator of chronic malnutrition, with regional variations linked to socio-economic disparities and cultural practices (Kjelsrud & Somanathan, 2017). Similarly, studies in high-income countries often focus on the impacts of overnutrition and sedentary lifestyles on child growth and obesity trends (Luzi, 2012). These studies collectively underline the importance of standardized benchmarks for assessing child growth and identifying deviations.

In India, child growth studies have shown significant variability across states and regions, driven by factors such as dietary diversity, maternal health, sanitation, and healthcare infrastructure (R. Radhakrishna & C. Ravi, 2004). Research in urban areas often reveals better growth outcomes compared to rural regions, reflecting disparities in access to resources (Katoch, 2024; Kotecha, 2008). Studies conducted in northern states, including Jammu & Kashmir, have highlighted challenges such as undernutrition, anemia, and delayed growth milestones, particularly in rural and economically disadvantaged populations (Khan Y, 2012; Ministry of Health and Family Welfare (GoI), 2021; Sharma & Katoch, 2018). Despite these findings, limited data exists on specific districts like Reasi, leaving a gap in understanding localized growth patterns.

The World Health Organization (WHO) and the Indian Council of Medical Research (ICMR) provide reference standards that serve as essential tools for assessing child growth. WHO standards offer a universal benchmark, representing optimal growth under ideal conditions, while ICMR standards account for population-specific factors, such as genetic predispositions and environmental influences, making them particularly relevant for Indian children (WHO, 2020). These standards are widely used to identify growth deviations, inform public health interventions, and guide nutritional and healthcare policies (WHO, 2021). However, the application of these standards in district-level studies remains limited, especially in diverse and underserved regions like Reasi.

Despite the extensive research on child growth, gaps persist in the literature. Many studies focus on state or national averages, often overlooking the district-level variations that are crucial for targeted interventions Katoch, 2023; Oninla et al., 2007). Moreover, limited attention has been given to the comparative analysis of WHO and ICMR standards in specific Indian contexts, leaving uncertainties about which benchmark is more appropriate for certain populations. Additionally, gender-specific analyses of growth trends remain underexplored, despite evidence suggesting that socio-cultural factors can significantly influence growth outcomes for boys and girls.

This study addresses these gaps by focusing on the Reasi district of Jammu & Kashmir, a region with unique socio-economic and geographical characteristics. By comparing the mean height of school-going children to both WHO and ICMR standards, this research provides a comprehensive assessment of growth patterns in the district. The gender-specific analysis further highlights disparities and provides insights into the underlying factors affecting growth. This localized approach not only contributes to the existing body of knowledge but also offers practical recommendations for public health interventions tailored to the needs of the Reasi district.

3. METHODOLOGY

This study employed a cross-sectional design to assess the mean height of school-going children in the Reasi district of Jammu & Kashmir and compare it to WHO and ICMR reference standards. The target population consisted of children aged 6 to 10 years enrolled in government and private schools across urban and rural areas of the district. A total of 400 participants (219 boys and 181 girls) were selected using stratified random sampling to ensure adequate representation of different age groups, genders, and geographical areas.

Height measurements were conducted using a standardized stadiometer, ensuring accuracy and consistency. The equipment was calibrated daily to minimize measurement errors. Participants were measured without shoes, standing upright with their backs against the stadiometer, eyes level, and arms relaxed at their sides. Each measurement was recorded to the nearest 0.1 cm. Data collection was conducted by trained field investigators under the supervision of a senior researcher to ensure reliability.

The reference standards used for comparison were the WHO growth standards 2005, which provide a global benchmark for optimal child growth, and the ICMR standards, tailored specifically for Indian children (Nandy et al., 2005). Data analysis included calculating the mean height for each age and gender group in the sample and determining the differences between the observed mean heights and the reference values. Statistical techniques, such as Z-scores and paired t-tests, were applied to evaluate the significance of deviations.

Ethical approval for the study was obtained from the institutional ethics committee. Written informed consent was secured from the parents or guardians of all participants, and children were included only with their assent. Confidentiality of personal data was maintained throughout the study.

4. RESULTS

The study analysed the height measurements of 400 school-going children, with 219 boys and 181 girls, aged 6 to 10 years, from the Reasi district. The findings, summarized in Table 1, show the comparison between the observed mean heights of the children and the reference standards provided by WHO and ICMR.

Overall, the results revealed that both boys and girls in the Reasi district had mean heights consistently lower than the WHO and ICMR reference standards across all age groups. For boys, the average deviation from WHO standards was -7.92 cm, with the largest difference observed at age 10, where boys were 11.5 cm shorter than the WHO standard. In comparison, girls showed a slightly greater average deviation of -7.36 cm from WHO standards, with the highest discrepancy observed at age 7, where the mean height of girls was 7.1 cm lower than the WHO standard. These findings are in line with the findings conducted in J&K (Katoch et al., 2022). This suggests a trend where children in the district are generally shorter than the global growth benchmarks, with girls exhibiting slightly more significant deviations compared to boys.

When comparing the results to the ICMR reference standards, the data indicated that the deviations were somewhat smaller for both boys and girls. For boys, the mean height deviation from ICMR standards was -7.74 cm, which is marginally closer to the reference value than the deviation from the WHO standards. Similarly, girls had an average deviation of -6.98 cm from ICMR standards, indicating a slightly better alignment with local growth benchmarks than with the WHO global standards. However, despite these smaller discrepancies, the height measurements still revealed significant deviations from both reference standards, suggesting that growth rates in the district are not aligned with the optimal standards set by either WHO or ICMR.

In terms of gender-based variations, boys generally showed smaller deviations from the reference standards compared to girls. This was particularly noticeable in the older age groups, where the difference in mean height between boys and the standards was smaller than that for girls. These gender-based differences may reflect a range of socio-economic, nutritional, and cultural factors, which could influence growth patterns differently for boys and girls in the region. Moreover, the discrepancies observed could point to underlying factors such as differences in diet, access to healthcare, and socio-economic conditions between male and female children in the district.

Overall, these results highlight that children in Reasi district are generally shorter than the reference standards, with girls showing slightly greater deviations from the norms compared to boys. The study underscores the importance of region-specific growth assessments, as well as the need for targeted health and nutrition interventions to address these deviations and promote optimal growth for all children in the area.

Table 1 Table 1 Comparison of Mean Height of Boys and Girls in the sample to WHO and ICMR

Age in Years	N=400		Mean Height in CM									
			Boys					Girls				
	Male	Female	Our Study	WHO*	ICMR**	Difference		Our Study	WHO*	ICMR**	Difference	
						Our Study vs WHO	Our Study vs ICMR				Our Study vs WHO	Our Study vs ICMR
6	16	9	112.5	116.0	116.1	-3.5	-3.6	111.0	116.0	116.1	-5	-5.1
7	30	21	119.7	121.7	121.7	-2	-2	114.6	121.7	121.7	-7.1	-7.1
8	59	39	120.7	127.3	127.3	-6.6	-6.6	121.2	127.3	127.0	-6.1	-5.8
9	46	52	121.6	132.6	132.6	-11	-11	124.2	132.6	132.2	-8.4	-8
10	128	43	126.3	137.8	137.8	-11.5	-11.5	127.6	137.8	137.5	-10.2	-9.9

Source: Survey data, 2023, WHO- World Health Organisation, ICMR-Indian Council of Medical Research

5. DISCUSSION

The results of this study indicate significant deviations in the mean height of school-going children in Reasi district from the WHO and ICMR reference standards. Overall, the findings suggest that both boys and girls in the region exhibit shorter stature compared to the global and national benchmarks. This trend aligns with the challenges faced by many regions in India, particularly in rural and underserved districts, where children often experience growth faltering due to inadequate nutrition, limited healthcare access, and socio-economic constraints. The mean height of boys and girls in the sample was consistently lower than both the WHO and ICMR standards, although the deviations were more pronounced for girls, especially in the younger age groups.

The observed deviations from the WHO standards, in particular, reflect the global growth benchmarks being slightly more stringent and potentially less applicable to the Indian context, which is characterized by diverse genetic, environmental, and socio-cultural factors. The ICMR standards, which are tailored specifically for the Indian population, showed smaller deviations, indicating that they might be more representative of the local growth patterns. However, despite the closer alignment with ICMR standards, both boys and girls in Reasi district still fell short of these benchmarks, suggesting that regional growth patterns are influenced by factors that go beyond genetic predispositions.

When comparing the findings of this study with those of other research conducted in India, similar trends in growth deviation are evident. For instance, studies conducted in northern Indian states such as have reported similar issues, where children in rural and economically disadvantaged areas show stunted growth and undernutrition (Katoch & Sharma, 2016). A study (Singh et al., 2020) conducted in rural Uttar Pradesh found that children's heights were consistently below the WHO standards, with girls facing greater stunting rates than boys. These findings are consistent with the gender-based differences observed in our study, where girls were found to have larger deviations from both WHO and ICMR standards.

One of the primary reasons for these deviations can be attributed to malnutrition, which remains a significant public health issue in many parts of India. In rural areas like Reasi, poor dietary intake, lack of diverse and micronutrient-rich foods, and insufficient breastfeeding practices may contribute to stunted growth. Malnutrition not only affects physical growth but also has long-term consequences for cognitive development, making it a critical area of concern. Other socio-economic factors such as poverty, lack of access to quality healthcare, and inadequate sanitation further exacerbate these growth deficits. Children in low-income families are often more vulnerable to illnesses, which can hinder their growth potential.

Additionally, the cultural practices in certain regions may contribute to gender-based growth disparities. In some parts of India, boys are given preferential access to food and resources, which could explain why boys, in general, show smaller deviations from the reference standards compared to girls. This socio-cultural bias may contribute to the observed gender differences in growth patterns, where girls, despite being equally or more in need of adequate nutrition, may face neglect or limited access to food and healthcare.

While this study provides valuable insights into the growth trends of children in Reasi district, it also carries significant implications for health, education, and policy. The results underscore the need for targeted public health interventions that address both nutritional deficiencies and broader socio-economic factors. Education campaigns aimed at promoting balanced diets, micronutrient supplementation, and better access to healthcare services should be prioritized, particularly in rural and underdeveloped regions. Furthermore, addressing gender disparities in food and resource

allocation should be a key focus to ensure that both boys and girls have an equal opportunity to reach their full growth potential.

The educational sector must also recognize the importance of physical development in children and integrate health-focused initiatives into school curricula. Schools can play a vital role in promoting healthy eating habits and providing nutritional support, such as midday meals that meet nutritional standards. Policymakers must focus on ensuring that healthcare services are accessible and equitable, particularly in rural areas, to prevent illnesses that may stunt growth and hinder overall development.

6. CONCLUSION AND POLICY IMPLICATIONS

This study examined the mean height of school-going children in the Reasi district of Jammu & Kashmir and compared these findings with WHO and ICMR reference standards. The results revealed that both boys and girls in the district had mean heights consistently below the reference standards, with girls showing slightly greater deviations compared to boys. The deviations from the WHO standards were larger than those from the ICMR standards, indicating that region-specific benchmarks may provide a more accurate representation of growth in this population. These findings underscore the challenges faced by children in this rural area, where factors such as malnutrition, limited access to healthcare, and socio-economic disparities contribute to stunted growth

The significance of these findings lies in their potential to inform public health policies and interventions. To address the growth deficits observed in the study, it is essential to prioritize nutrition-focused interventions, such as improving food security, promoting balanced diets, and enhancing micronutrient intake. Furthermore, addressing gender-based disparities in access to resources and healthcare will be crucial to achieving equitable growth outcomes for both boys and girls.

However, the study does have limitations, including its cross-sectional design, which limits the ability to infer causality, and the reliance on height as a sole indicator of growth. Future research should consider longitudinal studies to track growth over time and incorporate additional health indicators such as weight, nutrition status, and incidence of diseases. Interventions targeting nutrition, healthcare, and gender equality should be implemented to ensure healthier growth patterns for children in the region.

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CONFLICT OF INTEREST

None.

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