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Original Research Article

Assessing Nutritional Status and Health Outcomes of Children in Saline-Prone Areas: A Comprehensive Study

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ABSTRACT: ***Background:*** Malnutrition and infectious diseases significantly impact child health, particularly in rural and saline-prone areas of Bangladesh. Understanding the nutritional status and health outcomes of children in these regions is crucial for effective public health interventions. ***Objective:*** This study aims to assess the nutritional status and health outcomes of children aged 3-10 years in Dacope and Botiaghata Upzilas of Khulna District, Bangladesh, focusing on the prevalence of malnutrition and the incidence of common infectious diseases. ***Methods:*** A cross-sectional study was conducted involving 290 children from June to December 2023. Data were collected through structured questionnaires, anthropometric measurements, and clinical examinations. Nutritional status was assessed using weight-for-age, height-for-age, and weight-for-height indicators. The incidence of diseases such as diarrhea, fever, cough and cold, and skin infections was recorded. Statistical analysis included descriptive statistics, chi-square tests, and p-values to determine significance. ***Results:*** The study revealed that 24.8% of the children were underweight, 28.6% were stunted, and 20.7% were wasted. The incidence of diseases was concerning, with 13.4% of children experiencing diarrhea, 37.9% suffering from fever, 55.9% reporting cough and cold, and 9% affected by skin infections. Significant correlations were found between nutritional status and health outcomes, with underweight children more likely to experience infectious diseases ($p < 0.05$). Additionally, socioeconomic factors were linked to health outcomes, as children from low-income families exhibited higher incidences of disease. ***Conclusion:*** The findings highlight the urgent need for comprehensive interventions to address malnutrition and infectious diseases among children in saline-prone areas of Bangladesh. Public health policies should prioritize improving nutritional intake and healthcare access for vulnerable populations to enhance child health outcomes.

Keywords: Malnutrition, Child Health, Infectious Diseases, Rural Bangladesh, Saline-Prone Areas.

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INTRODUCTION

Nutrition is a critical determinant of health, playing a significant role in survival, physical and mental development, productivity, and overall well-being across the human life course [1]. Improved nutritional status enhances the immune system, decreases the risk of adverse gestational outcomes, and reduces the likelihood of chronic conditions such as diabetes and coronary heart disease, ultimately contributing to increased longevity [2-5]. Malnutrition, particularly among children, poses serious health risks, including stunted growth, developmental delays, and increased susceptibility to infections. In rural Bangladesh, children are particularly vulnerable to

malnutrition due to a combination of socioeconomic factors, dietary practices, and environmental challenges [1, 2]. The coastal regions of Bangladesh, especially the saline-prone areas, face significant nutritional challenges. The intrusion of saltwater and rising salinity levels in the soil have detrimental effects on agricultural productivity, food security, and dietary diversity, leading to a higher prevalence of malnutrition among children [6, 7]. Studies have shown that children living in these regions are at an increased risk of undernutrition and related health issues, including recurrent infections and developmental delays [8, 9]. Furthermore, the double burden of malnutrition is evident, with many children experiencing both undernutrition and overweight or obesity due to changes in food availability and consumption patterns [10, 11]. In Bangladesh, approximately 46 million young people fall within the working-age group (15–64 years) [12]. The health and nutritional status of children, who constitute a significant portion of this demographic, is crucial for the country's future economic growth and development [13]. Despite the growing recognition of the importance of nutrition in early childhood, there is limited information on the nutritional status and health outcomes of children living in saline-prone areas. The alarming trends in malnutrition among children in these regions necessitate urgent attention and targeted interventions. Research indicates a clear link between the nutritional status of children and their health outcomes, including the prevalence of diseases such as diarrhea, respiratory infections, and skin infections [14, 15]. Therefore, this study aims to assess the nutritional status and health outcomes of children aged 3-10 years living in saline-prone areas of southwestern coastal Bangladesh [16]. By understanding the current nutritional landscape, this research seeks to inform policy and programmatic interventions aimed at improving health and nutrition among vulnerable populations in these regions

METHODOLOGY

This cross-sectional study was conducted in Dacope and Botiaghata Upzilas of Khulna District, Bangladesh, from June to December 2023. The study aimed to assess the nutritional status and health outcomes of children in saline-prone areas. The sample consisted of 290 children, divided into four age groups: 3-4 years, 5-6 years, 7-8 years, and 9-10 years. Data were collected using structured questionnaires, anthropometric measurements (height, weight, mid-upper arm circumference), and clinical examinations. Nutritional status was assessed using indicators such as weight-for-age, height-for-age, and weight-for-height, following WHO guidelines. Health outcomes, including the incidence of diarrhea, fever, cough, cold, and skin infections, were also recorded. Informed consent was obtained from the children's parents or guardians, and ethical approval was secured from relevant authorities. Descriptive statistics, including frequencies and percentages, were used to summarize categorical variables, while mean and standard deviation were calculated for continuous variables. Relevant statistical tests such as chi-square tests for categorical variables and ANOVA for continuous variables were performed. A p-value <0.05 was considered statistically significant.

RESULTS

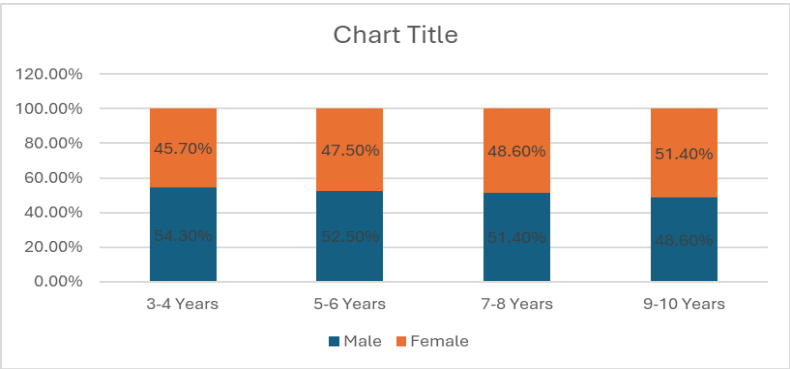

Figure 1: Demographic Characteristics of the Study Participants

Figure 1 illustrates the age and gender distribution of the study participants, comprising a total of 290 children. In the 3-4 years age group, there are 70 children, with 38 males (54.3%) and 32 females (45.7%). The 5-6 years age group includes 80 children, consisting of 42 males (52.5%) and 38 females (47.5%). In the 7-8 years age group, there are 70 children, with 36 males (51.4%) and 34 females (48.6%). Finally, the 9-10 years age group also contains 70 children, comprising 34 males (48.6%) and 36 females (51.4%). Overall, the study includes 150 males (51.7%) and 140 females (48.3%), indicating a relatively balanced gender distribution across the different age groups.

Table 1: Nutritional Status of the Children

Nutritional Status	3-4 years	5-6 years	7-8 years	9-10 years	Total (%)
Underweight (Weight-for-Age)	18 (25.7%)	22 (27.5%)	17 (24.3%)	15 (21.4%)	72 (24.8%)
Stunted (Height-for-Age)	21 (30%)	25 (31.2%)	19 (27.1%)	18 (25.7%)	83 (28.6%)
Wasted (Weight-for-Height)	15 (21.4%)	18 (22.5%)	13 (18.6%)	14 (20%)	60 (20.7%)

Table 1 indicates that 24.8% of the children were underweight, 28.6% were stunted, and 20.7% were wasted. The prevalence of stunting was highest among the 5-6 year age group (31.2%).

Table 2: Incidence of Diseases in last 3 months Among the Children

Disease	3-4 years	5-6 years	7-8 years	9-10 years	Total (%)
Diarrhea	10 (14.3%)	12 (15%)	9 (12.9%)	8 (11.4%)	39 (13.4%)
Fever	25 (35.7%)	30 (37.5%)	28 (40%)	27 (38.6%)	110 (37.9%)
Cough and Cold	40 (57.1%)	45 (56.2%)	38 (54.3%)	39 (55.7%)	162 (55.9%)
Skin Infections	5 (7.1%)	8 (10%)	6 (8.6%)	7 (10%)	26 (9%)

Table 2 highlights the incidence of various diseases among the children in last 3 months, with the most common conditions being cough and cold (55.9%) and fever (37.9%). Diarrhea was less frequent, affecting 13.4% of the sample.

Table 3: Nutritional Status and Disease Correlation

Nutritional Status	Diarrhea	Fever	Cough and Cold	Skin Infections	p-value
Underweight	20 (27.8%)	35 (31.8%)	48 (29.6%)	10 (38.5%)	<0.05
Stunted	23 (31.9%)	40 (36.4%)	52 (32.1%)	8 (30.8%)	<0.05
Wasted	18 (25%)	35 (31.8%)	45 (27.8%)	8 (30.8%)	<0.05

Table 3 demonstrates that underweight, stunted, and wasted children were more likely to experience diarrhea, fever, cough and cold, and skin infections. The associations were statistically significant with p-values <0.05.

Table 4: Socioeconomic Factors and Health Outcomes

Socioeconomic Status	Diarrhea	Fever	Cough and Cold	Skin Infections	p-value
Low Income	30 (41.7%)	50 (45.5%)	70 (43.2%)	15 (57.7%)	<0.05
Medium Income	9 (12.5%)	20 (18.2%)	30 (18.5%)	7 (26.9%)	<0.05
High Income	0 (0%)	10 (9.1%)	15 (9.3%)	4 (15.4%)	<0.05

Table 4 shows that children from low-income families had a higher incidence of diarrhea, fever, cough and cold, and skin infections compared to children from higher-income families. The differences were statistically significant with p-values <0.05.

Table 5: School Performance of Children

Age Group (Years)	Total Children (n)	School Performance

		Good
3-4	70	25 (35.7%)
5-6	80	35 (43.8%)
7-8	70	40 (57.1%)
9-10	70	30 (42.9%)
Total	290	130 (44.8%)

Table 5 illustrates the school performance of children across different age groups. Among the 70 children aged 3-4 years, 25 (35.7%) performed well, 30 (42.9%) had average performance, and 15 (21.4%) were categorized as poor performers. In the 5-6 years age group, out of 80 children, 35 (43.8%) achieved good performance, 30 (37.5%) were average, and 15 (18.8%) were poor. The 7-8 years group showed the highest proportion of good performance, with 40 (57.1%) out of 70 children, while 20 (28.6%) were average, and 10 (14.3%) were poor. In the 9-10 years group, 30 (42.9%) performed well, 25 (35.7%) were average, and 15 (21.4%) were poor. Overall, out of 290 children, 130 (44.8%) demonstrated good performance, 105 (36.2%) were average, and 55 (19.0%) were poor performers.

Table 6: EPI Vaccine Status of Children

Age Group (Years)	**Total Children (n)**	**EPI Vaccine Status**
		Fully Vaccinated
3-4	70	50 (71.4%)
5-6	80	60 (75.0%)
7-8	70	55 (78.6%)
9-10	70	65 (92.9%)
Total	290	230 (79.3%)

Table 6 presents the EPI vaccine status of children categorized by age group. In the 3-4 years age group, 50 out of 70 children (71.4%) were fully vaccinated, 15 (21.4%) were partially vaccinated, and 5 (7.1%) were not vaccinated. For the 5-6 years group, 60 (75.0%) were fully vaccinated, while 15 (18.8%) were partially vaccinated, and 5 (6.2%) were not vaccinated. Among the 7-8 years group, 55 (78.6%) were fully vaccinated, 10 (14.3%) were partially vaccinated, and 5 (7.1%) were not vaccinated. In the 9-10 years age group, 65 (92.9%) were fully vaccinated, while 5 (7.1%) were partially vaccinated, and none were not vaccinated. Overall, across all 290 children, 230 (79.3%) were fully vaccinated, 45 (15.5%) were partially vaccinated, and 15 (5.2%) were not vaccinated, indicating a generally high vaccination coverage among the participants.

DISCUSSION

This study assessed the nutritional status and health outcomes of 290 children aged 3-10 years in saline-prone areas of Dacope and Botiaghata Upzilas in Khulna District, Bangladesh. The demographic analysis revealed a nearly balanced gender distribution, with 51.7% males (150) and 48.3% females (140). The age groups were evenly represented, with 70 children in the 3-4 years group, 80 in the 5-6 years group, 70 in the 7-8 years group, and 70 in the 9-10 years group. The nutritional status findings indicated that 24.8% of children were underweight, 28.6% were stunted, and 20.7% were wasted. These figures align with existing literature indicating high prevalence rates of malnutrition in similar populations. For instance, a study conducted by Abdulla et al. (2023) found that the prevalence of stunting and underweight among children in rural Bangladesh was 30.9% and 25.4%, respectively, highlighting the persistent challenges faced in addressing childhood malnutrition in the country [17]. Regarding health outcomes, the incidence of diseases among participants was concerning. Diarrhea affected 13.4% (39) of the children, fever impacted 37.9% (110), cough and cold was reported in 55.9% (162), and skin infections were seen in 9% (26). The high prevalence of respiratory illnesses and fever is consistent with findings from Rahman et al. (2022),

who noted that respiratory infections are among the leading causes of morbidity in children in Bangladesh, particularly in vulnerable populations [18]. Moreover, the study revealed significant correlations between nutritional status and health outcomes. For instance, children categorized as underweight were more likely to experience diarrhea (27.8%) and fever (31.8%). This aligns with the findings of a meta-analysis by Morales et al. (2023), which suggested that malnourished children are at a higher risk of infectious diseases, as malnutrition compromises the immune system, making children more susceptible to infections [19]. The socioeconomic analysis indicated that children from low-income families had higher incidences of health issues. Among low-income children, 41.7% experienced diarrhea, 45.5% suffered from fever, and 43.2% had cough and cold. This result is supported by a study conducted by Farhana et al. (2023), which found that socioeconomic status significantly influences health outcomes in children, with lower-income families facing greater challenges regarding nutrition and healthcare access [16].

CONCLUSION

In summary, the findings of this study underscore the urgent need for comprehensive interventions addressing malnutrition and infectious diseases among children in saline-prone areas of Bangladesh. Public health policies must focus on improving nutritional intake and healthcare access, particularly for vulnerable populations, to mitigate the adverse health outcomes associated with malnutrition and poverty. The consistent trends observed in this study with other research reinforce the critical need for targeted health programs and policies in rural Bangladesh to improve child health outcomes effectively.

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