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Prevalence of Stunting and its Impact on Academic Performance among Secondary Schools in Noakhali Coastal Area

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Abstract

Childhood stunting remains a significant public health concern in Bangladesh, particularly among school-aged children. Despite notable progress in various child health indicators, the persistently high prevalence of stunting in this population continues to pose serious challenges to overall development and well-being. This research investigates the prevalence of stunting and its association with academic performance among secondary school students in the Noakhali coastal region of Bangladesh. Utilizing primary data from 154 Class Six students, the research employs descriptive statistical methods to analyze anthropometric, socioeconomic, and educational indicators. The results reveal that approximately 13% of the respondents are stunted, including 11.7% moderately and 1.3% severely. Academic performance was categorized into four proficiency levels, and a clear disparity was observed between stunted and non-stunted students. While 44% of non-stunted students achieved proficiency and 4.5% reached advanced proficiency, only 5% of stunted students attained proficiency, and none demonstrated advanced academic capability. The findings suggest a strong inverse relationship between stunting and school performance, likely driven by the cognitive and physical impairments associated with chronic malnutrition. Additional analysis highlights the influence of parental education, family income, and household size on both nutritional status and academic outcomes. The study underscores the need for integrated policy interventions combining school-based nutrition programs, parental awareness campaigns, and targeted support for vulnerable families to mitigate the long-term educational and health consequences of stunting in coastal regions.

Keywords: Stunting, Academic Performance, Coastal Bangladesh, Cognitive Developmen

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1. Introduction

Despite having million people, Bangladesh remains one of the poorest countries in the world (Ahmed, 2002). It is the eighth most populated country worldwide. Still, it has accomplished a lot in terms of social and economic growth, particularly in the areas of health and education (Islam and Biswas, 2014). Many international organizations, including the UN, the World Bank, and the WHO, have praised its health sector performance (Desjarlais,1996). The fact that these advancements have transpired in spite of little funding for healthcare, a vulnerable health system, pervasive poverty, and economic inequality is intriguing. This progress on a macro level is not enough to alleviate Bangladesh's persistent difficulties, such as extreme poverty and starvation, which appear to be worsened by a new set of problems that have emerged in the 21st century (Asthana and Shukla, 2004).

Currently, there are 148.1 million stunted children in the world, meaning that 22.3% of children are classed as such (UNICEF et al., 2022). It is estimated that stunting kills 1.2 million children under the age of 5 worldwide (Black et al., 2013; UNICEF et al., 2022). Based on data, Bangladesh has one of the highest rates of child stunting prevalence worldwide, with a rate of 36.1%. When nations are ranked from lowest to highest for the prevalence of stunting, Bangladesh comes in at number 107 out of 132 (UNICEF et al., 2022). Bangladesh, one of the top-performing nations in terms of the Millennium Development Goals (MDGs), is especially eager to accept the new SDG targets. However, stunting makes it more difficult to attain the Sustainable Development Goals (SDGs) since it lowers individual productivity, which in turn makes future economic growth less likely (T. R. Chowdhury et al., 2022).

Childhood stunting is still a serious public health issue in Bangladesh, especially for kids in school. Even though there has been improvement in several child health metrics, the high rate of stunting in this population group still presents obstacles to general development and well-being (Chowdhury et al., 2023; Chowdhury et al., 2022). According to the survey of Akram et al., (2018), 25% of schoolchildren in urban areas and over 36% of kids in rural regions were stunted. This gap between rural and urban areas highlights the ongoing socioeconomic disparities that exist throughout the nation. There are regional differences in the prevalence of the condition, with a greater incidence seen in the northern and coastal regions, and boys are frequently more affected than females (Adhikari et al., 2019).

Causes of Stunting in Bangladesh

Additionally, a variety of factors that contribute to stunting in Bangladeshi school children. An attempt by Adhikari et al., 2019 demonstrated that low nutritional intake, unhygienic living conditions, and restricted access to medical treatment, considerably raise the prevalence of stunting. Also, maternal education and work status have become a significant predictor of child stunting in Bangladesh, in addition to socioeconomic considerations (Win et al., 2022). Theoretically, children of mothers with lower levels of education are more likely to suffer from stunting, emphasizing the need to educate and empower mothers in the fight against this problem. One of the main causes of stunting among Bangladeshi school children is malnutrition, namely an inadequate diet (Jarin et al., 2023). Research shows

that poverty, food insecurity, and restricted availability of nutrient-dense foods cause a significant fraction of school-age children to not acquire the nutrients needed for growth and development (Hasan et al., 2020). Furthermore, children from underprivileged groups are more susceptible to stunting as a result of differences in wealth distribution and regional development (Chowdhury et al., 2023; Chowdhury et al., 2022).

Stunting and Educational Performance

Children who are stunted frequently have cognitive impairments, such as poor memory, attention, and executive functioning, which can impede learning and academic success. According to Rahman et al., (2021) stunting at crucial stages of brain development may also have long-term effects on academic performance, higher dropout rates, and decreased school enrolment. According to research, children who are stunted may have trouble focusing, solving problems, and processing information, which might lower their interest and involvement in the classroom (M. H. Chowdhury et al., 2023; Sarma et al., 2017).

1.1 Statement of the Problem

Bangladesh's coastal regions are prone to natural calamities like floods and cyclones, have poor access to healthcare, and have high rates of poverty (Uddin et al., 2020). Due to soil salinity, which is made worse by tidal surges and rising sea levels, a large portion of agricultural land cannot be farmed, which reduces food production and exacerbates starvation (Biswas et al., 2019). Recent surveys carried out by the Bangladesh Bureau of Statistics (BBS) have yielded important insights regarding the frequency of stunting among schoolchildren in various regions of the nation. These surveys show that economically poor areas, especially those in Bangladesh's north and southwest, have a larger concentration of stunted children. The risk of stunting prevalence is higher in coastal areas and needs more focus and actions to solve it (Wilianarti et al., 2022).

As a result, stunting at crucial stages of brain development may have long-term effects on academic performance, higher dropout rates, and decreased school enrolment (Rahman et al., 2021). A variety of behavioral and cognitive issues that impact learning outcomes and academic achievement are linked to stunting. Children who are stunted may have trouble focusing, solving problems, and processing information, which might lower their interest and involvement in the classroom (M. H. Chowdhury et al., 2023; Sarma et al., 2017).

Mass media also shows various criticism and concern of the children's health condition and their academic performance in the coastal area. On this backdrop, there is a necessity to find the effects of children's stunting problems on educational performance in the Coastal region. Ultimately, the goal is to inform evidence-based strategies for enhancing the health and educational quality by giving appropriate policy suggestions.

1.2 Rationale of the Study

Fundamental human rights include the right to appropriate sustenance and care for one's health. Bangladesh claims that one of its main jobs is to improve sanitation, diet, and the health of its people. The chronic stunting rate among children is still relatively high in Bangladesh, despite the fact that the country has achieved considerable gains in certain nutrition and health metrics over the last several decades. Tragically, stunted growth affects 2 out of 5 children in Bangladesh who are less than five years old.

In response to the widespread issue of malnutrition in the nation, the government of Bangladesh published the Bangladesh National Nutrition Policy in 2013. The unacceptably high malnutrition rate in Bangladesh remains when contrasted with the developed world, despite efforts to decrease it that have persisted for over ten years. Yet, it is clear that this policy's execution requires additional coordination and reinforcement if Bangladesh is to accomplish the MDG targets and move forward with the post-MDG social development goals.

Firstly, understanding the current stunting behavior in the Noakhali Coastal area that has a number of negative effects on a child's survival and long-term wellbeing. Additionally, it has far-reaching effects on the nation's general development, economic output, and human capital. Secondly, determining the risk factors for stunting in children is crucial in order for stakeholders to develop evidence-based policy to enhance nutrition status. One of the primary issues facing economists and public health specialists is figuring out these variables and offering useful recommendations to enhance nutrition.

But it is anticipated that the outcomes of this research will aid health and education authorities in making necessary preparations for the growing enrollment of children in schools along coastal areas and the escalating prevalence of health and nutrition issues among this demographic. Since these issues can impede the government's objective of creating a highly educated nation, this study also urges that we prioritize actions to eradicate them.

1.3 Research Objectives

The research team in this study set out to look at the correlation between stunting and academic performance in secondary school students in the Noakhali Coastal area of Bangladesh. The family, the child, and their academic performance will be the subjects of our gathering. The research inquiries are given as below:

RO 1: How are the stunting condition among secondary school students in the Noakhali Coastal area?

RO 2: Does educational performance differ by stunting status?

Along with this this study also aims to answer the following question as its sub objective (i) Does nutritional status vary based on family, child, and school factors? (ii) Does educational attainment vary based on family, child, and school factors? (iii) Does home socioeconomic situation mislead the association between educational success and nutritional status? (iv) What factors influence educational attainment in the Coastal Area?

The study yields several key outputs that will contribute to the understanding of nutrition status of children's and their academic progression in primary schools in Bangladesh. Moreover, this study will identify the challenges and remedy of the stunting problems.

1.4 Scopes and Limitations of the Study

The scope of this study is this study focus on primary schools in the Noakhali Coastal area, encompassing various Upazila across the district. The participants are high school students who are actively involved in the classroom instruction and formative assessment practices. The study will explore the challenges faced by the students and figure out the policy to overcome the problems. Apart from the scopes, a few limitations may exist in this study. The study will cover a limited part of the population considering their number and diverse settings they exist in. Thus, some significant inquiries may remain unexplored. Furthermore, the study will be conducted within a limited timeframe, which may restrict the depth of data collection and analysis.

2. Review of the Literature

According to estimates by the United Nations, approximately one-third of preschool-aged children in less developed countries, equivalent to around 180 million children under the age of five, exhibit stunted growth when measured against international standards (United Nations, 2000). Several studies in developing countries found that height-for-age, which is an indicator of stunting, is related to educational achievement (Yeasmin and Islam, 2016; Prangthip et al., 2019; Shree and Murthy, 2021). The high prevalence of underweight among children is a serious health concern in Bangladesh, and nutritional status influences students' academic performance directly or indirectly.

Bangladesh, one of the top-performing nations in terms of the Millennium Development Goals (MDGs), is especially eager to accept the new SDG targets. However, stunting makes it more difficult to attain the Sustainable Development Goals (SDGs) since it lowers individual productivity, which in turn makes future economic growth less likely (T. R. Chowdhury et al., 2022). Childhood stunting is still a serious public health issue in Bangladesh, especially for kids in school. Even though there has been improvement in several child health metrics, the high rate of stunting in this population group still presents obstacles to general development and well-being (M. H. Chowdhury et al., 2023; T. R. Chowdhury et al., 2022). A study by (Akram et al., 2018) found that stunting is still very common among school-age children in Bangladesh, with a disproportionate amount of the population living in rural regions. According to the survey, 25% of schoolchildren in urban areas and over 36% of kids in rural regions were stunted. This gap between rural and urban areas highlights the ongoing socioeconomic disparities that exist throughout the nation. There are regional differences in the prevalence of the condition, with a greater incidence seen in the northern and coastal regions, and boys are frequently more affected than females (Adhikari et al., 2019).

Research shows that poverty, food insecurity, and restricted availability of nutrient-dense foods cause a significant fraction of school-age children to not acquire the nutrients needed for growth and development (Hasan et al., 2020). Additionally, diet quality and diversity

are important factors; diets deficient in iron, zinc, or vitamin A, for example, increase the risk of stunting (Islam et al., 2017). Bangladeshi schoolchildren's prevalence of stunting is significantly impacted by socioeconomic circumstances. The issue is largely exacerbated by parental lack of education, household poverty, and restricted access to healthcare services (M. H. Chowdhury et al., 2023; Rabbani et al., 2016). Furthermore, children from underprivileged groups are more susceptible to stunting as a result of differences in wealth distribution and regional development (M. H. Chowdhury et al., 2023; T. R. Chowdhury et al., 2022).

According to the findings of Sri et al. (2013), there is a statistically significant relationship between stunting and educational performance. Stunting and underweighted student's educational performance is significantly lower than normal healthy students. Moreover Zalilah Mohd Shariff et al., 2000) also found that student's performance in exams is significantly different from being stunted or not, and the build-up of dietary deprivation over time is reflected in height-for-age, which may have an impact on cognitive growth of children. The effect of malnutrition in the first thousand days of life is stunting, which results in an irreversible disruption of the child's physical development, lowering the child's capacity for success and performance at work (Nurdin et al., 2023). A study in Ethiopia by Woldehanna et al. (2017) showed that children's cognitive functioning is substantially harmed by early childhood stunting. After accounting for potentially confounding factors like duration of breastfeeding, birth weight, health issues during early childhood like acute respiratory illness and malaria, baseline household wealth, child gender, household size, and parental education, estimates from PSM indicate that stunted children performed 16.1% worse on the Peabody Picture Vocabulary Test and 48.8% worse on the Quantitative Assessment test at eight years old. These differences are statistically significant at $P<0.01$. On the other hand, Chi-square was used by Nurdin et al. (2023) in Indonesia to examine the connection between stunting and student accomplishment. According to the test results, there was no correlation between student success and stunting ($0.451 > 0.05$). Another study by Grantham-Mcgregor et al., (2007) regarding child development showed that the percentage of kids who finish primary school falls by 8% for every 10% rise in stunting.

Research also shows differences in stunting and academic performance between rural and urban children. For instance, Mosharraf and his colleagues (2020) found a significant difference in mean height, weight, and body mass index (BMI) between rural and urban students. They also found a significant relationship ($p<0.01$) between the nutritional status and the academic results of the high school students from rural and urban areas. Poor health and inadequate nutrition among children can hinder their educational performance. Therefore, enhancing children's health and nutritional status is likely to lead to improved educational outcomes (Mosharraf et al., 2020; Biswas, 2020; The knowledge, attitude, and practice scores among coastal Bangladeshi mothers were inadequate for household cleanliness and hygiene management, which resulted in children's stunted growth (Mamun et al., 2024). Almost half of the primary school-going children were stunted in Island (Sandwip) and Hill-Tract (Bandarban) areas of Bangladesh (Rahman, 2022). Socioeconomic status among people in coastal and hill-tract areas is vulnerable compared to other rural and urban areas in the country.

Many researchers (Alam et al., 2020; Arafin, 2024; Seyoum et al., 2019; Fontanilla et al., 2023) have shown interest in the link between nutrition, health, and the educational achievement of school-age children in less-developed countries, largely due to the recurring observation that a significant number of these children either fail to complete primary education or, if they do, tend to perform worse academically compared to their peers in developed countries. In Bangladesh, acute malnutrition is most likely common in every region, more or less. Study found acute malnutrition among school children in Rajshahi is around 24% (Karim, 2024), half of the children in Island and Hill-tract are stunted due to malnutrition (Rahman, 2022), more than one third of the students had abnormal BMI.

However, although the majority of households (90.33%) were food secure in Coastal area of Noakhali, having poor nutritional knowledge (OR=1.604, 95% CI=1.1,87.4) and lower-income level (OR= 7.636, 95% CI=1.14-51.18) have significantly increased the risk of food insecurity among people (Alam et al., 2020). This food insecurity poses a significant public health challenge in coastal areas of Bangladesh, largely fueled by poverty, inadequate maternal health, food insecurity, and environmental hardships (Morshed et al., 2025; Mamun et al., 2024; Alam et al., 2020). In these regions, addressing this growing issue requires immediate nutrition-specific interventions, and effective food safety and hygiene-based education is essential to enhance awareness and promote healthier nutrition practices within households (Rahman, 2022; Mamun et al., 2024; Morshed et al., 2025; Arafin, 2024).

3. Methodology of the Study

3.1 Sampling

In the Noakhali coastal area, this study surveyed 3 schools. The age range of the children will 11 to 14 years. The study randomly selects 154 respondents of class six-grade.

The three Upazila is:

- Subarnachor Upazila
- Companiganj Upazila
- atiya Upazila

3.2 Source of data and methods of data collection

The data for this study were obtained through primary sources, collected directly from students in three secondary schools. The selection of participants was not based on purposive or random sampling techniques; rather, we visited three schools and included all students enrolled in Class 6 who were present on the day of the survey. This approach ensured a natural and unbiased representation of students within that grade level in the selected schools.

Data collection was carried out in two stages. First, students were asked to fill out a structured questionnaire, which gathered information on their age, family background, parental occupation, educational attainment of parents, and household characteristics. The questionnaire was designed to be simple, age-appropriate, and administered in a supervised classroom setting to maintain consistency and clarity.

Second, a standardized subject-based test was administered to assess students' academic performance. The test included questions covering key subject areas aligned with the national curriculum, such as mathematics, language, and science. The assessment aimed to evaluate students' basic competencies through a combination of multiple-choice and short-answer questions. This standardized test allowed for objective measurement of student performance across the three schools.

All responses were collected under controlled conditions, with the presence of both school teachers and the research team to ensure discipline and accuracy. Data were then compiled and cleaned for analysis, maintaining confidentiality and anonymity throughout the process.

3.3 Tools of data collection

Family and Child background: Household income, Income per capita (Taka), Household size, Number of children, Parents literacy

Nutritional status: Stunting, height-for-age measures linear growth. A child who is more than two standard deviations (-2 SD) below the median of the WHO reference population in terms of height for-age is considered short for his or her age, or'stunted'. This condition reflects the cumulative effect of chronic malnutrition.

Academic Performance: The study employs Learning Assessment of Secondary Institutions (LASI) framework.

To Assess the Bangla and English proficiency:

- Focusing Domains: Comprehension, Vocabulary, and Grammar.
- Cognitive level: Locate, Interpret, and Reflect.

To identify the Mathematical performance:

- Focusing Domains: Algebra, Data and Measurement, Number Properties and Operations, and Space and Geometry.
- Cognitive levels: Formulate, Employ, Interpret, and Review.

To measure academic performance this study, employ subject based standardized test proposed by Learning Assessment of Secondary Institutions (LASI) framework. Standardized subject-based tests are uniform assessments used to evaluate students' knowledge and skills in core subjects like math, science, language, and social studies. These tests ensure comparability across schools by using the same content, administration, and scoring procedures. They serve diagnostic, formative, summative, and accountability purposes, guiding instruction, identifying learning gaps, and informing policy. Aligned with national curricula, they use valid and reliable questions to assess learning outcomes objectively.

To assess proficiency in the mother language, Bangla, and the foreign language, English, this study divides student capacity into two domains: focusing domains, which include comprehension, vocabulary, and grammar, and cognitive level domains, which include locate, interpret, and reflect. Locate, interpret, and reflect are key cognitive processes used in assessments to evaluate student performance. Locate involves finding specific information; interpret requires understanding and explaining meaning; and reflect assesses critical thinking and applying knowledge. Together, they measure both basic comprehension and higher-order thinking. These skills help identify students' strengths and weaknesses, guide teachers in targeted instruction, and support curriculum development. By evaluating how well students perform across these areas, educators can make informed decisions to improve learning outcomes. To assess mathematical performance similarly, this study divides students' mathematical capability into two domains: focusing domains, which include algebra, data and measurement, number properties and operations, and space and geometry, and cognitive levels, which include formulate, employ, interpret, and review.

Students' performance was measured on a 54-point scale, where equal value (18 points) was given to each test. This study categorizes students' obtained marks into four ranges to differentiate students' performance. Students who obtain 0 to 15 marks are categorized as needing improvement; students who obtain 16 to 30 marks are categorized as developing proficiency; students who obtain 31 to 44 marks are categorized as proficient; and those who obtain 45 to 54 marks are categorized as advanced proficiency.

3.4 Methods of data analysis and presentation

For this study, a descriptive method was adopted to analyze the data collected from Class VI students. This approach allowed for a clear and systematic understanding of the students' demographic characteristics and academic performance. The data were primarily analyzed using basic statistical tools, including totals, averages, and percentages, which provided straightforward and interpretable insights into the patterns observed.

The percentage method was particularly useful in assessing the prevalence of stunting among students. By calculating the proportion of students falling into different categories—such as stunted versus non-stunted—we were able to quantify the extent of nutritional challenges within the sample. This also enabled comparisons between demographic factors and learning outcomes.

In addition, averages were computed for the standardized subject-based test scores to determine overall academic performance levels. These averages were compared across different groups (e.g., based on family background or nutritional status) to identify variations and trends. Total counts were used to categorize students by characteristics such as family income, parental education, and family size.

To enhance clarity and support interpretation, the results were presented visually through the use of tables, bar charts, and pie charts. These visual tools helped illustrate the distribution of demographic variables and educational outcomes, making the analysis more accessible and easier to understand for readers and stakeholders.

3.5 Conceptual Framework

[Household Income]
[Family Size] ↘
[Parental Education] → [Stunting Status] → [Academic Performance]
[Source of Income] ↗
[AGE, GENDER]

4. Data Analysis and Results

This section presents the key findings from the descriptive analysis of data collected from Class Six students in secondary schools of the Noakhali coastal region, Bangladesh. The discussion integrates empirical observations with theoretical perspectives and relevant literature to explore the relationship between stunting and academic performance.

Table 1: Gender and Age structure of Correspondents

Gender	Responses	Mean Age (Year)	Mean Height (Feet)
Male	67	12.15051	4.832139
Female	87	12.1025	4.913718
Total	154	12.12339	4.878225

Table 1 demonstrates the basic demographic attributes of the surveyed students. Among the 154 respondents, 67 (43.5%) were male, and 87 (56.5%) were female, indicating a gender distribution slightly skewed toward females. The average age for male students was 12.15 years, while female students had an average age of 12.10 years. Both figures 1 and 2 are consistent with the standard age for sixth-grade students in Bangladesh.

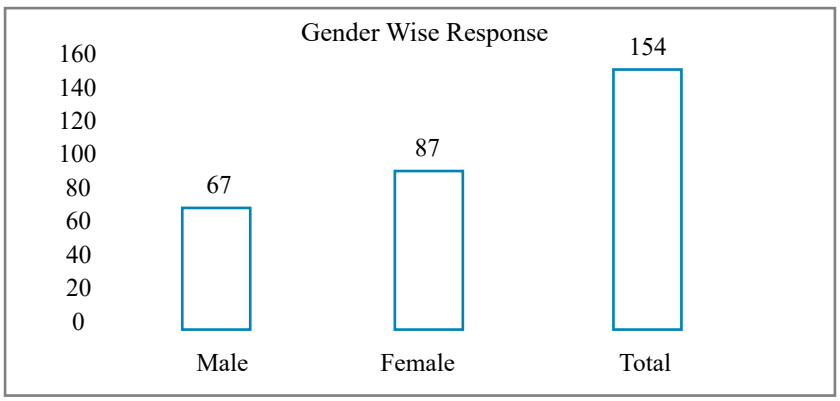

Figure 1: Gender wise response of the correspondents

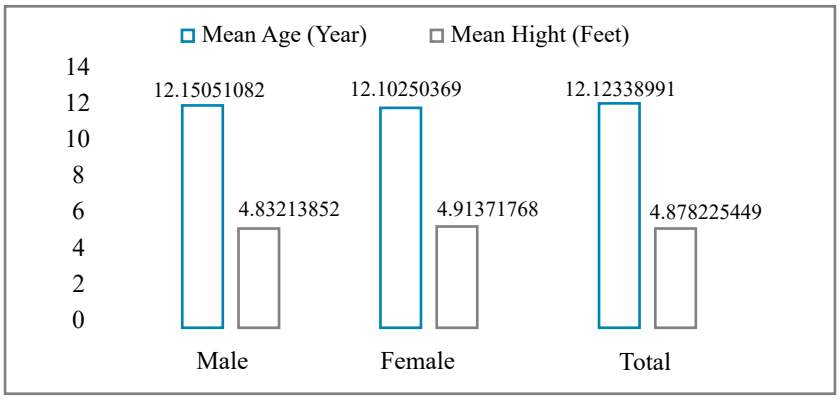

Figure 2: Age structure of Correspondents

Interestingly, female students had a slightly higher mean height (4.91 feet) compared to male students (4.83 feet). This result aligns with existing anthropometric literature suggesting that, in early adolescence, girls often experience growth spurts earlier than boys due to the earlier onset of puberty (WHO, 2007). However, this could also signal variations in gender-based nutritional allocation within households, where girls might be prioritized or disadvantaged depending on sociocultural norms. In regions with entrenched gender disparities, even small differences in stature may have broader implications for both health and education outcomes.

In the Table 2, the analysis reveals that the largest proportion of students (37.66%) came from families with five members (see in fig. 3). Family sizes of four to six members were the most common, representing a majority of households. However, 13 households (8.44%) had more than six members, classifying them as large families. Theoretically, larger family sizes can strain household resources, particularly in lower-income settings like the coastal regions of Bangladesh. According to the "resource dilution hypothesis" (Downey, 2001), when the number of children increases, parental attention, time, and income are spread thinner, leading to reduced investment per child—particularly in nutrition and education. This condition can contribute directly to chronic undernutrition and indirectly to poor educational outcomes.

Table 2: Family Size of correspondents

Family Size	Respondents
3	9
4	47
5	58
6	29
Above 6	13

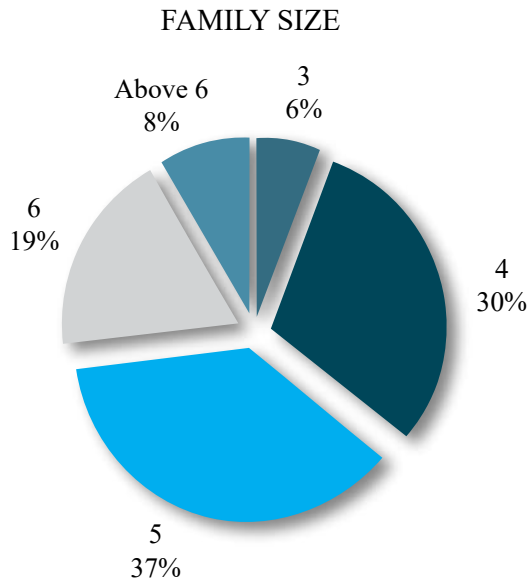

Figure 3: Family size of the respondents

Table 3: Education Level of Correspondents Parents

Parents Education Level	Father	Mother
No formal Education	6	10
Primary Education	17	27
Secondary Education	47	75
Higher Secondary	54	31
Bachelor Degree	22	11
Postgraduate	9	1

Table 3 discloses that parental education plays a foundational role in shaping child health and learning outcomes. Among fathers, 8.96% had no formal education, while 50.65% had at least secondary or higher education. In contrast, 13.79% of mothers were uneducated, and only 36.20% had reached secondary or higher education (see in fig. 4). Numerous empirical studies (Glewwe & King, 2001; Alderman et al., 2001) show that parental—especially maternal—education significantly influences children's nutritional status. Educated mothers are more likely to understand child feeding practices, health-seeking behavior, and hygiene, thereby reducing the risk of stunting. Furthermore, parental education fosters home environments that are conducive to learning, positively affecting academic performance.

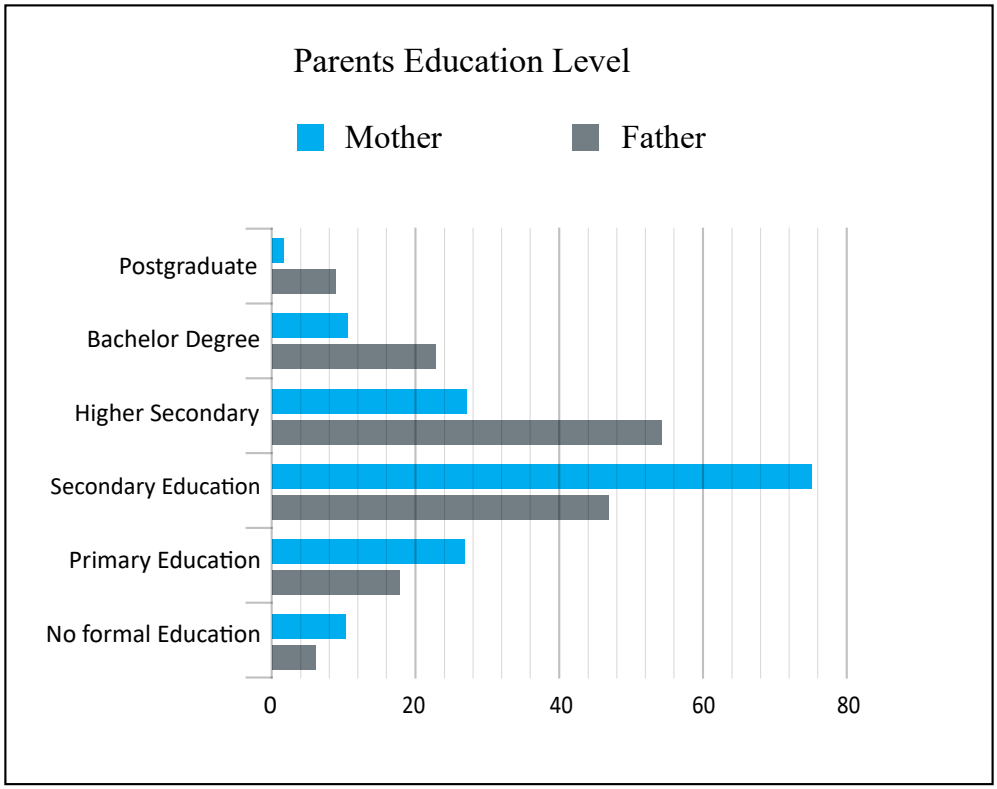

Figure 4: Education Level of Respondent Parents

However, following the Table 4 and 5, we see that most households (40.91%) earned a monthly income between BDT 20,000 and 40,000, while 7.14% earned less than BDT 10,000—indicating a segment of the population living near or below the poverty line (see in fig.5). Income sources were diverse: private jobs (20.78%), small businesses (19.48%), remittances (19.48%), and informal sectors like agriculture (13.64%) and fishing (3.89%). Income instability, especially in agriculture- and fishing-based households, increases the risk of food insecurity and limits healthcare access. The literature suggests that income volatility—common in informal sectors— results in inconsistent nutrition and delays in seeking healthcare (FAO, 2018). This makes children more vulnerable to chronic undernutrition and related cognitive delays.

Table 4: Correspondents Family Income

Thousand(K) Taka	No. of Families
<10K	11
10K+ - 20K	34
20K+ - 40K	63
40K+ - 60K	35
60K+	12

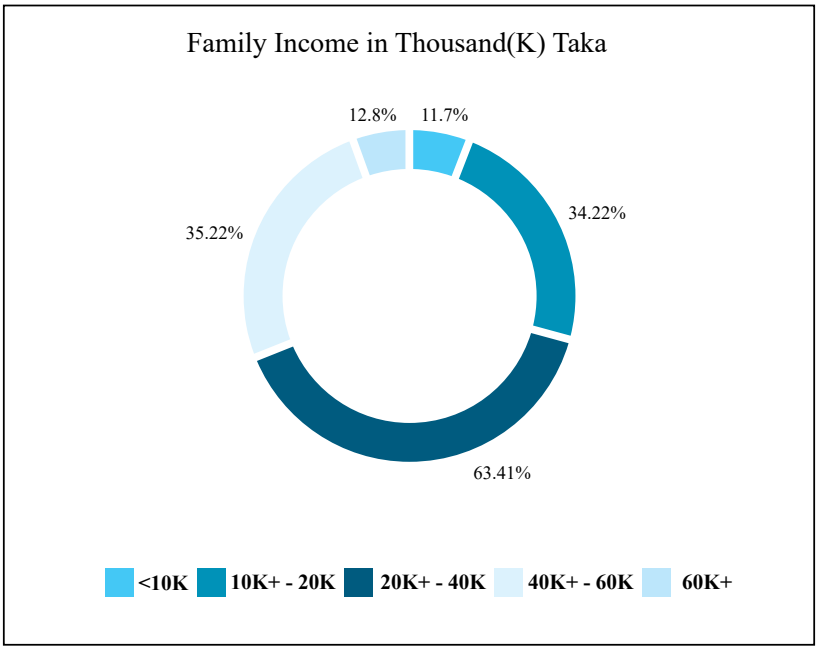

Figure 5: Family income of the respondents

Table 5: Family Income Source

Source of Income	No. of Families
Agriculture	7
Fishing	20
Small Business (e.g., Shop)	30
Govt. Job	12
Private Job	32
Remittance	30
Day Labour	25

Now, Table 6 presents the prevalence of stunting among the students based on WHO growth standards. Out of 154 students, 18 (11.7%) were moderately stunted, and 2 (1.3%) were severely stunted, resulting in a combined stunting rate of 13%. Stunting is a cumulative indicator of chronic malnutrition resulting from persistent dietary deficiencies, recurrent infections, inadequate maternal care, and poor socioeconomic conditions in early childhood.

The Noakhali coastal area is particularly vulnerable due to saline intrusion, frequent cyclones, and river erosion, which disrupt agricultural activities and limit access to clean water—factors that can exacerbate undernutrition. Even a 13% stunting rate warrants public health attention, as the affected children are at risk of impaired brain development, lower school achievement, and reduced future productivity.

Table 6: Stunting Scenario

Category	Total	Percentage
Non-Stunt	134	87.01299
Stunt	18	11.68831
Stunt	2	1.298701

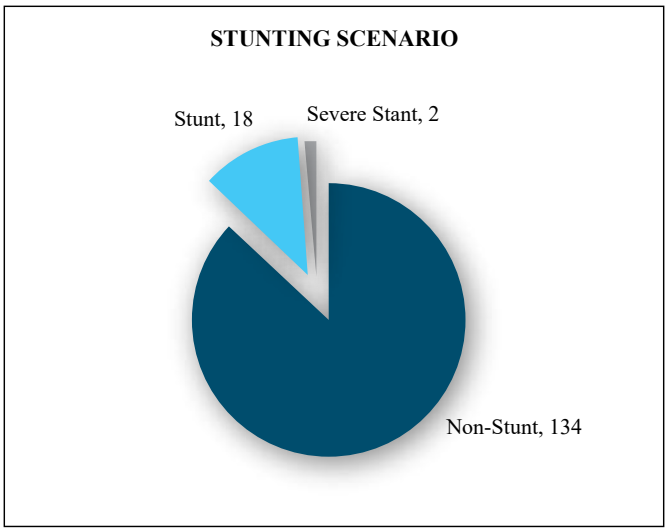

Figure 6: Stunting observation

Using the findings of Table 7, we see that student academic performance was categorized into four proficiency levels:

- Needs Improvement: 6 students (3.9%)
- Developing Proficiency: 82 students (53.2%)
- Proficient: 60 students (39.0%)
- Advanced Proficiency: 6 students (3.9%)

The data suggests that more than half of the students were still developing proficiency, with only a small proportion reaching advanced academic levels. This trend reflects broader challenges in education quality, resource constraints in schools, and home learning environments, especially in rural coastal areas.

Following the Table 8 and 9, a comparative breakdown of performance by stunting status reveals stark inequalities:

Among stunted students (n=20):

- 30% required improvement
- 65% were developing proficiency
- Only 5% were proficient
- 0% achieved advanced proficiency

Among non-stunted students (n=134):

- 0% required improvement
- 51.49% were developing proficiency
- 44.03% were proficient
- 4.48% were advanced

These results highlight a strong negative association between stunting and academic performance. Stunted students underperformed significantly across all academic categories. The link between nutrition and cognitive ability is well-established: chronic undernutrition affects brain structure and function, slows neural processing, and hampers memory and attention (Grantham-McGregor et al., 2007). Furthermore, stunted children are more likely to suffer from fatigue and frequent illness, increasing absenteeism and reducing classroom engagement. The academic underachievement of stunted students may result in long-term educational delays, reduced chances of completing secondary education, and lower lifetime earnings—thus perpetuating the cycle of poverty and malnutrition.

Table 7: Overall Educational Performance

Educational Performance	No. of Student
Needs Improvements	6
Developing Proficiency	82
Proficient	60
Advanced Proficiency	6

Table 8: Educational Performance of Stunt Students

Types	Need Improvements	Developing Proficiency	Proficient	Advance Proficient
Moderate Stunt	6	12		
Severe Stunt		1	1	

Table 9: Educational Performance Comparison

Types	Need Improvements	Developing Proficiency	Proficient	Advance Proficient
Stunt	6	13	1	
Stunt %	30%	65%	5%	0
Non-Stunt		69	59	6
Non-Stunt %	0.00	51.49%	44.03%	4.48%

5. Conclusion and Recommendations

The findings of this study underscore the persistent public health challenge posed by childhood stunting in the coastal regions of Bangladesh, particularly in areas like Noakhali. Although the prevalence of severe stunting is relatively low (1.29%), the rate of moderate stunting remains significant at 11.68%, reflecting ongoing nutritional vulnerabilities. Consistent with national and global research, our study confirms a clear association between stunting and lower educational performance among school-aged children. Stunted students in the Noakhali coastal region demonstrated significantly weaker academic outcomes compared to their non-stunted peers, suggesting that chronic undernutrition not only hampers physical growth but also impairs cognitive development and school achievement.

This evidence reinforces the critical need for targeted, region-specific interventions to improve children's nutritional status, especially in socioeconomically vulnerable coastal zones. Addressing stunting is not merely a health imperative but also a foundational step toward achieving Sustainable Development Goals (SDGs) related to quality education, health, and inequality reduction. Tackling this issue will require an integrated approach that combines food security initiatives, parental education, healthcare access, and school-based nutrition and hygiene programs. Without such interventions, stunting will continue to undermine the human capital potential of future generations in Bangladesh.

In order to tackle the stunting and improve the academic performance of the children of the coastal area in Noakhali, the study suggests some policy recommendations:

Integrate Nutrition Programs into School

Given the significant impact of stunting on academic performance, school-based nutrition programs, such as mid-day meals, micronutrient supplementation, and growth monitoring, should be integrated into the regular school system, particularly targeting high-risk coastal and rural regions like Noakhali. In addition to this, regular health screenings in schools can help in the early detection of malnutrition and allow for timely referral to healthcare services.

Strengthen Maternal and Child Health Services

Since poor maternal health is a key driver of childhood stunting, public health interventions should focus on improving antenatal and postnatal care, maternal nutrition education, and child feeding practices, especially in vulnerable coastal communities.

Expand Community-Based Nutrition Education

The inadequate knowledge, attitude, and practices related to food safety and hygiene among mothers in coastal areas highlight the need for community-level campaigns and training. These should be led by local health workers and educators to ensure cultural relevance and wider reach.

Targeted Support for Disadvantaged Households

Social safety nets, including conditional cash transfers and food assistance programs, should be designed to support low-income families in coastal and hill-tract regions. Targeting should prioritize households with children at risk of malnutrition and poor academic performance. This support requires collaboration across education, health, agriculture, and social welfare sectors. Local governments should work with NGOs to implement integrated interventions that promote food security, health awareness, and education access.

Address Regional Disparities through Decentralized Planning

The higher stunting rates in coastal and northern regions, as well as disparities between urban and rural students, call for decentralized, region-specific policy responses that consider local socioeconomic and environmental vulnerabilities.

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