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Research Article

Exploring the Impact of Overage Status on the Academic Performance of Primary School Students in Bangladesh

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Abstract

This study explores the characteristics of overaged primary school students in Bangladesh and evaluates their academic performance compared to right-aged peers, based on data from the 2019 Multiple Indicator Cluster Survey (MICS). The findings indicate that socio-economic factors significantly influence overage status, with children from poorer households more likely to be overaged than those from wealthier backgrounds. Parental education emerges as a critical factor, as children with educated parents are less likely to be overaged. Gender differences are also evident, with female students less likely to be overaged compared to male students. In terms of academic performance, overaged students perform notably worse than their right-aged counterparts. Socio-economic disparities further shape learning outcomes, as children from wealthier households and those with educated parents achieve better results. Female students consistently outperform males, emphasizing the need to address socioeconomic inequalities and strengthen parental engagement to ensure equitable and improved educational outcomes.

Keywords

Overaged Students, Primary Education, Learning Outcome, Socio-economic Disparities

1. Introduction

Bangladesh has made remarkable progress in ensuring access to primary education, with the net enrolment rate surpassing 97% and the completion rate increasing from 28.5% in 1981 to 98.5% in 2015 [8, 17]. These achievements are attributed to government initiatives such as free primary education, stipends, and food-for-education programs. However, concerns about education quality persist. According to the World Bank [24], 57% of primary school students in Bangladesh face "learning poverty," defined as the inability to read and comprehend age-appropriate texts. Similarly, the 2017 National Student Assessment (NSA) revealed significant gaps in basic reading and comprehension skills among primary school students, which have been exacerbated by COVID-19 [21].

Quality education is essential to prepare students for the demands of a rapidly evolving global economy, particularly in the context of the Fourth Industrial Revolution (FIR). As noted by Khan [15], nations prioritizing human capital development are better positioned to harness technological advancements and compete in the global market. Without significant improvements in education quality, Bangladesh risks falling behind in equipping its workforce with the skills needed to meet these emerging challenges.

Academic performance is influenced by various factors, including socio-economic status, parental education, gender, school type, and grade level. Age is another critical yet un-

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derexplored factor, closely tied to cognitive and emotional development. Overaged primary school students—those older than the standard age for their grade—often encounter challenges such as delayed enrolment caused by financial constraints, limited access to early childhood education, family responsibilities, or health issues. Grade repetition, migration, language barriers, and special education needs also contribute to overage status [9, 12].

Although overage status is often associated with poverty, it is not exclusively determined by financial hardship. Economic difficulties can hinder access to early education, stable living conditions, and adequate nutrition, all of which are crucial for school readiness. Additionally, cultural norms, delayed school enrolment, and a tendency toward grade repetition can exacerbate the problem. These interconnected factors significantly affect students' educational trajectories and highlight the complexity of addressing overage status.

The relationship between age and academic performance has produced mixed findings. Some studies suggest that overaged students underperform due to developmental delays, stigma, and reduced confidence [14, 12]. Others argue that older students may benefit from increased maturity and enhanced cognitive development, which can positively impact their academic outcomes [26, 1]. Still, other research indicates that age alone may not be the defining factor, as classroom dynamics, teacher quality, and school resources often have a stronger influence [20, 23]. These variations underscore the need for further research into the interplay between age, socio-economic factors, and educational outcomes.

This study aims to investigate the academic performance of overaged primary school students in Bangladesh compared to their right-aged peers. It examines how age interacts with factors such as cognitive development, socio-economic conditions, and school environments to influence learning outcomes. The research also explores how social and cultural barriers, such as family responsibilities and poverty, shape the educational experiences of overaged students.

The findings of this research are expected to add depth to the understanding of the challenges faced by overaged students within Bangladesh's primary education system. By addressing the unique obstacles encountered by this group, the study seeks to provide practical recommendations for policymakers, educators, and stakeholders. Promoting equitable and inclusive education for all students, regardless of their age or socio-economic background, is essential to unlocking their full potential and fostering sustainable national development.

Against this backdrop, this study identifies the overaged children as well as evaluates their performances compared to the right-aged children. The following are the key objectives of this study:

1) Identifying overage primary school students in Bangladesh based on their socio-economic characteristics.
2) Evaluating the performance of overaged children compared to the children who are not overaged.

2. Literature Review

The relationship between age and academic performance has been a subject of extensive investigation, shaped by varying socio-economic, cultural, and educational contexts. In Bangladesh, where primary education has faced enduring challenges, studies have consistently highlighted low levels of student achievement. For example, Greaney et al. [10] observed that a significant proportion of primary school graduates struggled with foundational skills in literacy and numeracy. Similarly, Mohsin et al. [18] found that parental education, household income, and geographic location were key determinants of students' academic outcomes. Nath et al. [19] reported that mathematical skills were particularly weak among rural students, with fewer than one-third demonstrating proficiency in basic arithmetic. Recent data from 2021 indicates that 17.1% of primary and 26.4% of lower secondary students in Bangladesh were overaged, primarily due to delayed school entry and grade repetition, both of which negatively impact academic performance [22].

The phenomenon of overage status is not exclusive to Bangladesh. In other parts of South Asia, such as India, Das and Zajonc [6] found that students in Orissa and Rajasthan performed poorly on international mathematics tests, ranking near the bottom globally. Similarly, Das et al. [5] documented substandard learning levels in Pakistan, where many primary school students were unable to construct simple sentences in their native language. These findings reflect the widespread difficulty in achieving foundational educational outcomes in regions with limited resources.

The debate over the impact of age on academic performance remains unresolved, with research offering mixed findings. Some studies suggest that overaged students tend to perform worse than their peers due to developmental delays, stigma, and lower confidence [12, 14]. Conversely, other research highlights potential advantages of delayed school entry, as older students may benefit from greater cognitive maturity and emotional development. For instance, a 2023 study found that students who began school at an older age consistently outperformed their younger classmates on standardized tests [23]. In higher-income countries, studies such as those by Datar [4] and Yesil-Dagli [25] have shown that older students achieve better academic outcomes, regardless of socio-economic background or ethnicity.

However, the advantages of being older do not appear to extend uniformly across all settings. Research in low- and middle-income countries often demonstrates that overaged students face substantial challenges. For instance, Hungi et al. [13] found that older students in sub-Saharan Africa consistently lagged behind their peers, even after accounting for socio-economic factors and school characteristics. In Malawi, Kunje et al. [17] observed that younger students outperformed older ones in key subjects like English, math, and local languages. Similarly, in francophone Africa, grade repetition—frequently linked to overage status—has been shown to

exacerbate educational inequalities, particularly for disadvantaged children [9].

Interestingly, findings from India provide a counterpoint to this narrative. Alcott and Rose [1] reported that overaged students often outperformed their peers, suggesting that developmental readiness and cognitive maturity can sometimes offset the disadvantages of delayed progression. Such results align with those from high-income countries, where supportive learning environments and access to resources allow older students to leverage their maturity for better academic outcomes [20, 3]. However, systemic barriers, such as large class sizes, inadequate teacher training, and limited school infrastructure, often prevent overaged students in low-income regions from realizing these potential benefits [22].

Despite these findings, significant gaps remain in understanding how age interacts with socio-economic factors and systemic challenges to influence academic performance, particularly in resource-constrained settings like Bangladesh. While programs like stipends and free schooling have improved enrolment rates [16, 11], their impact on learning outcomes remains unclear. Alam [2] emphasized that addressing structural issues, such as teacher shortages and limited educational resources, is crucial for improving academic performance.

Globally, research underscores the importance of contextual factors in shaping the relationship between age and learning outcomes. In high-income settings, older students may benefit from their relative maturity and more robust educational systems [20, 3]. Conversely, in low-income regions, systemic inequities often hinder the academic potential of overaged students [7, 9]. This study aims to contribute to the discourse by exploring the academic performance of overaged primary school students in Bangladesh. By situating the findings within a broader global context, the research seeks to provide actionable insights for designing policies and interventions that promote equitable educational opportunities for students across diverse socio-economic backgrounds.

3. Data and Methodology

3.1. Data

This study is based on secondary data from the 2019 Multiple Indicator Cluster Survey (MICS), a comprehensive and nationally representative dataset for Bangladesh. Jointly conducted by the Bangladesh Bureau of Statistics (BBS) and UNICEF, the MICS 2019 dataset provides extensive insights into various child-related indicators, including school participation and basic literacy skills for children aged 5 to 17. The data will be utilized to analyze and compare the academic performance of overaged students with their right-aged counterparts. For this purpose, the study focuses exclusively on children currently attending grades 1 through 5, enabling a targeted evaluation of learning outcomes within the primary education system.

3.2. Regression Model

This study proposes two regression models to identify the overaged children as well as to evaluate the performances of the overaged children compared to those who are not overaged.

Model 1: Identifying the overaged students

The regression model to identify the overaged children is

$$Y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots\ldots + \beta_k x_k$$

where the dependent variable (Y) is binary, taking the value 1 if the child is overaged and 0 otherwise. A student is classified as overaged if they are two years older than the official age for their grade level. For instance, a grade 1 student aged eight or older is considered overaged.

The explanatory variables consist of various socio-economic characteristics, including household wealth, parental education, type of school attended, and geographic location. A detailed description of these variables is provided in Table 1. Since the dependent variable is binary, standard linear regression techniques are not suitable for this analysis. To address this, the study employs a logistic regression (logit) model to estimate the relationships between the predictors and the likelihood of a child being overaged. This approach is appropriate for modeling binary outcomes and allows for a more accurate interpretation of the data.

As a binary dependent variable is used in this model, the main goal of using the logit model is to find the response probability: $(y = 1|x1, x2, ..., xk)$.

The model in terms of probability can be specified as

$$P(Y= 1|X) = \beta_0 + \beta_1 X_1 + \beta 2 X_2 + ... + \rightleftarrows \beta_k X_k$$

Here it needs to be noted the coefficient of logit model cannot be directly interpreted. Therefore, the study will also estimate the average marginal effect.

Model 2: Evaluating the performances of overaged students

Now the regression model to evaluate the performances of overaged children is

$$Y_2 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots\ldots + \beta_k x_k$$

The dependent variable in this model reflects students' academic performance. In the MICS 2019 dataset, children were assessed on their ability to read a paragraph containing 72 words. The number of words a student can correctly read from this paragraph is used as a measure of their performance. Thus, the dependent variable is the count of correctly read words out of 72.

The key independent variable in this model is the overage status of the students, as determined in the first model. Additionally, other variables that may influence learning outcomes, such as socio-economic factors, parental education, school type, and location, are included as explanatory variables to

provide a more comprehensive analysis.

Since the dependent variable is continuous, the Ordinary Least Squares (OLS) regression method is applied to estimate the model. This technique is well-suited for analyzing continuous outcomes and allows for the identification of factors that significantly influence students' reading abilities.

3.3. Descriptive Statistics

As part of the descriptive analysis, the key variables of interest have been specified at the outset. A brief description of the key variables of interest along with their mean has been presented in Table 1. The dependent variable for the first regression model of identifying the overaged children is binary categorizing the overaged and right-aged children. A child aged two years higher than the official age for a particular grade has been identified as overage. For example, the official age for grade 1 students in Bangladesh is 6. Therefore, a student in grade 1 will be considered overaged if his/her reported age is higher than 8. The average value of the dummy variable for the overage student is 0.30 indicating that around 30 percent of the children in this study are overaged. It is important to highlight that while the overage status dummy variable serves as the dependent variable in the first model (used to identify overaged students), it becomes the primary independent variable in the second model, which focuses on assessing the academic performance of the students.

The dependent variable for the second model is learning skill which is the number of words the students can correctly read in a story of 72 words. The average value of this variable is 60.52 implying that the students on average can correctly read 60 words which is 83 percent of the total words.

Now looking into the explanatory variable, the key variables that may affect the overage status of the children are the parent's education and socio-economic status. For the parents' education, two dummy variables have been used. The first dummy variable mother's education takes the value of 1 if the child's mother has ever been to school implying that she has at least some education and 0 otherwise. Table 1 indicates that the mother of around 78 percent of children has attended school. The second dummy variable for the father's education categories the children whose father has at least some education and those whose father has no education meaning that he has never attended school. The study finds that fathers of around 60 percent of the sampled children have attended school.

As indicated in the literature, the economic and social status of the children's household is a major determinant of the overage status of the children as well as their performances. To proxy the social and economic standing of the children, this research has utilized the wealth index of the children's households. The wealth index is given in the MICS data set constructed based on the principle component analysis. Based on this wealth index, all the households have been divided into five quintiles to categorize them into different socio-economic groups. Children from the poorest 20% of households were put in the first quintile of the wealth index. The children from the richest 20% of households were categories as the 5th quintile. The five categories of households have been presented in this study in the form of five dummy variables.

With regard to the gender of the children as a determinant of student performance, a dummy variable has been added for the female students where the base category is male students. The location of the children might be an important determinant of the overage status as well as their performances. In this regard, the rural-urban dummy has been added where the base category is urban. To control for the type of schools, the school-type dummy has been used. The private school has been added as a binary variable which takes the value of 1 if the student is attending a private school and 0 otherwise (if the student is from a public or other type of school).

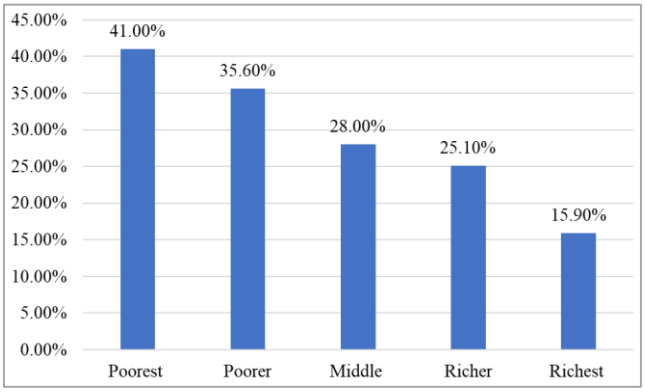
Finally, given that the sampled students are from five different grades (class 1-class 5), it is important to control for their current grades/classes. In this regard, this study uses five dummy variables for the classes of the students where the base category is class 1.

Table 1. *Overview of the variables utilized in the regression analysis.*

	Variable name	Description	Mean
Dependent variables	Overage status	A binary variable that equals 1 if the student is overaged, defined as being two years older than the official age for their grade, and 0 otherwise.	0.300
	Learning skill	Number of words a student can correctly read in a story of 72 words	60.52
Explanatory variables	Maternal education	=1 if the student's mother holds at least some education, 0 otherwise	0.780
	Paternal education	=1 if the student's father holds at least some education, 0 otherwise	0.594
	Poorest (reference category)	Takes value 1 if the student is from a household in 1st quintile of the wealth index (poorest 20%); 0 otherwise	0.231
	Poorer	=1 if the student is from households of 2nd quintile of wealth index; 0 otherwise	0.220

Variable name	Description	Mean
Middle	Takes the value 1 if the student belongs to a household in the third quintile of the wealth index, and 0 otherwise.	0.196
Richer	=1 if the student is from households of 4th quintile of wealth index; 0 otherwise	0.176
Richest	=1 if the student is from household of the 2nd quintile of the wealth index; 0 otherwise	0.170
Rural (base urban)	=1 if the student is from a rural area; 0 otherwise	0.80
Female (base male)	Takes a value of 1 if the student is male, and 0 if otherwise.	0.50
Private School (reference category: other schools)	= If the student attends a private school, 1; if not, 0	0.176
Class 1 (base category)	=1 if the student is from class 1; 0 otherwise	0.043
Class 2	=1 if the student is from class 2; 0 otherwise	0.13
Class 3-++++++	=1 if the student is from class 3; 0 otherwise	0.25
Class 4	=1 if the student is from class 4; 0 otherwise	0.26
Class 5	=1 if the student is from class 5; 0 otherwise	0.27

Source: Author's presentation based on MICS 2019



Source: Estimation from MICS 2019

Figure 1. *Percentage of overaged students by socio-economic status (wealth quintile).*

To address the primary research objectives, this analysis begins with descriptive statistics before progressing to regression modeling. The descriptive analysis highlights that the economic standing of a child's household is a significant factor contributing to overage status. Examining the distribution of overaged children across wealth quintiles (Figure 1) reveals that children from lower-income households are disproportionately overaged compared to those from wealthier households. For instance, Figure 1 illustrates that 41% of children in the lowest wealth quintile (first quintile) are overaged, whereas this proportion drops to just 15% among children in the highest wealth quintile (fifth quintile).

The descriptive analysis in Table 2 shows that while 50 percent of the children whose mothers have not attended school are overaged, this percentage is 24 for those whose mothers have attended schools. The education of the children's father might also be an important factor behind the overage status of the children. Table 2 shows that while 23 percent of the children whose fathers have attended schools are overaged, around 41 percent of the children whose fathers have not attended school are overaged. The result also shows that a larger percentage of male students (35 percent) are overaged compared to 25 percent for female children.

Now looking into the distribution of the overage children by school type, this study finds that a relatively lower percentage of children from private schools are overaged compared to the children from public or other types of schools (Table 2). It is common for children from less advantaged social and economic standing to attend public schools, which increases their likelihood of being overaged.

Finally, this study also looks into the distribution of the overaged children by their current grade. From the following table, we find that a relatively larger percentage of the children from the relatively lower grades are overaged. However, this relationship is not linear.

Table 2. *Percentage of overaged children in different socio-economic groups.*

	Key characteristics of the students	Percent of overaged children
By mother's education	Mother attended school	24.30%
	Mother did not attend school	50.90%
By father's education	Father attended school	22.80%
	Father did not attend school	40.90%
By gender	Male	35.00%
	Female	25.30%
By school type	Private school	25.60%
	Public/other school	29.30%
By grade	Grade 1	42.50%
	Grade 2	29.40%
	Grade 3	35.60%
	Grade 4	30.20%
	Grade 5	23.60%

Source: Estimation from MICS 2019

Now in looking into the second research question regarding the impact of children's overage status on their academic performance, the average value of the outcome variable (the number of words the students can correctly read) has been presented for those who are overaged and those who are not. From the following table (Table 3), it is shown that the overaged children on average can correctly read a fewer number of words (52.79) compared to those who are not overaged (63.87). However, as mentioned earlier, along with overage status there might be some important factors affecting the performances of the children. Therefore, this study also investigates the average performances of the children based on these control variables.

Firstly, the study finds a difference in the average number of words based on their parents' education. For example, students whose fathers have attended school can correctly read 62.77 words while students whose fathers have not attended schools can correctly read 57.22 words. A similar difference is found between the students whose mothers have attended schools and those whose mothers have not attended schools. Students whose mothers have not attended schools can correctly read a fewer number of words (53.91) compared to those whose mothers have not attended schools (62.38).

Since socio-economic status is an important factor affecting the performances of the students, the study looks into the performances of the students coming from different wealth quintiles. A clear socioeconomic disparity in terms of students' performances is visible in the following table where children from the lowest quintiles achieve notably lower outcomes compared to those from the highest quintile.. For example, students from the richest (5^{th}) quintile can correctly read 66.85 words while students from the poorest quintile can correctly read only 55 words.

While looking into the performances of the students based on their gender, the study finds that female students outperform their male counterparts. While the female students can correctly read 61.79 words, the male students can correctly read 59.26 words. The study also finds a difference in the students' performances based on the type of schools where students from private schools outperform students from public or other types of schools.

Finally looking into the performances of the students by their current grades, we find that students from the higher grades perform better compared to the students from the lower grade. While students from class 5 can correctly read 66 words, the students from class 1 can correctly read only 48 words.

Table 3. *Average number of words the students can read by key characteristics.*

Children groups	Key characteristics of the students	Average number of words
By overage status	Students are Overaged	52.79

Children groups	Key characteristics of the students	Average number of words
By mother's education	Students are not overaged	63.87
	Mother has at least some education	62.38
	Mother does not have any education	53.91
By father's education	Father has at least some education	62.77
	Father does not have any education	57.22
By gender of the students	Male	59.26
	Female	61.79
By school type	Private school	64.78
	Public/other school	59.61
By current grade	Grade 1	48.02
	Grade 2	53.32
	Grade 3	59.26
	Grade 4	61.89
	Grade 5	66.02
By wealth quintiles	Poorest (base category)	55.00
	Second	58.34
	Middle	61.49
	Fourth	63.37
	Richest	66.85

Source: Estimation from MICS 2019

3.4. Findings from Regression Analysis

In this section, the result of the regression models specified earlier has been presented. Initially, the result of the first regression model has been presented which helps us to identify the overaged students. Then the result of the second regression model has been presented which helps us evaluate the effect of the overage status on the students' performances.

3.5. Logistic Regression to Identify the Overaged Students

As mentioned earlier, in the first regression model this study attempts to identify the overage students. Given that the dependent variable is binary (=1 if overaged; 0 otherwise) for this model, the conventional logistic regression model has been used to estimate the model. The result of the logistic regression model has been presented in Table 4. However, as we cannot directly interpret the coefficients of the logit model, the average marginal effects have also been reported.

Table 4. *Result of the logit model to identify the overage children.*

VARIABLES	Logistic regression (=1 if Overage, 0 otherwise)	Average marginal effects
Female (base male)	-0.509***	-0.102
	(0.050)	
Maternal education (base no education)	-0.820***	-0.179
	(0.061)	

VARIABLES	Logistic regression (=1 if Overage, 0 otherwise)	Average marginal effects
Paternal education (base no education)	-0.514***	-0.105
	(0.054)	
Private school (base category; other schools)	0.057	0.011
	(0.073)	
Socio-economic status dummies (base category poorest)		
Poorer	-0.111	-0.022
	(0.070)	
Middle	-0.381***	-0.072
	(0.075)	
Richer	-0.457***	-0.086
	(0.081)	
Richest	-0.992***	-0.172
	(0.100)	
Rural	-0.133*	-0.027
	(0.070)	
Current grades dummy (class 1 base category)		
Class 2	-0.620***	-0.112
	(0.128)	
Class 3	-0.335***	-0.065
	(0.121)	
Class 4	-0.662***	-0.124
	(0.121)	
Class 5	-0.950***	-0.173
	(0.122)	
Constant	1.338***	
	(0.143)	
Observations	8,542	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The regression results indicate that gender significantly impacts the probability of being overaged, with female students having a notably lower likelihood compared to male students. Specifically, the average marginal effect for the female variable is -0.10, suggesting that female students are 10% less prone to being overaged than their male counterparts.

Parental education also emerges as a crucial determinant of overage status. Children whose parents, particularly mothers, have attended school are significantly less likely to be overaged. For instance, students whose mothers have attended school are 18% less likely to be overaged than those whose mothers have not. Although paternal education also has a positive effect, its impact is comparatively smaller, with children whose fathers have attended school being 10% less likely to be overaged than those whose fathers have not. Both maternal and paternal education are statistically significant, underscoring their importance in reducing overage status among children.

When analyzing the socio-economic characteristics of households, the focus is on wealth quintiles, with the lowest quintile representing the base category. The findings reveal

that children from more affluent households are less prone to being overaged. For instance, children from the second quintile (lower-income households) are 2% less prone to being overaged than those from the lowest-income households. Similarly, children from the middle quintile are 7% less prone to being overaged, while those from the fourth and fifth quintiles (higher-income and highest-income households) are 8% and 17% less prone to being overaged, respectively.

Geographic location also influences overage status, with children from rural areas being more prone to overage compared to their urban peers. Additionally, the grade level of students emerges as an important factor. Students in higher grades show a progressively reduced likelihood of being overaged compared to those in lower grades. For example, students in grade 2 are 11% less likely to be overaged than those in grade 1. Similarly, the likelihood of being overaged decreases further for students in grades 3, 4, and 5 by 6%, 12%, and 17%, respectively, compared to grade 1 students. These results emphasize the interplay of socio-economic, educational, and geographic factors in shaping the likelihood of overage status among children.

3.6. OLS Regression to Evaluate the Performances of Overaged Students

As specified earlier, the second regression model is about evaluating the effect of overage status on the students' performances. The performances of the students have been measured based on the reading skills of the students. The dependent variable of this model is the number of words the students can correctly read in a story of 72 words. The regression model tries to figure out if there is a significant difference between the number of words that the overaged children and non-overaged children can read. In this regard, an OLS regression model has been estimated. However, given that along with overage status, there are different variables that might affect the students' performances, this study controls for such variables adding them in the regression model. The result of the regression model has been presented in Table 5.

Table 5. Result of OLS regression to evaluate the effect of the performances of overaged children.

VARIABLES	Learning skill (number of words)
Overage status (base category not overaged)	-7.848***
	(0.527)
Female (base category male)	1.686***
	(0.461)
Maternal education (base no education)	3.708***
	(0.623)
Paternal education (base no education)	1.904***
	(0.511)
Private school (base category; other schools)	3.679***
	(0.646)
Socio-economic status dummies (base category poorest)	
Poorer	2.067***
	(0.683)
Middle	3.857***
	(0.712)
Richer	4.720***
	(0.755)
Richest	6.131***
	(0.852)
Rural (base category urban)	-1.540**
	(0.629)

VARIABLES	Learning skill (number of words)
Current grades dummy (class 1 base category)	
Class 2	4.623***
	(1.246)
Class 3	11.519***
	(1.188)
Class 4	14.104***
	(1.181)
Class 5	17.372***
	(1.183)
Constant	43.114***
	(1.432)
Observations	8,542
R-squared	0.125

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Looking into the regression result, this study finds that the coefficient for the overage status dummy variable is negative and highly statistically significant. It indicates that the over-aged children perform significantly worse compared to the students who are not overaged. For example, the result shows that the overaged children on average can correctly read 8 words less compared to the students who are not overaged.

There is also an extremely strong correlation between the gender of the students and the performances of the students. The fact that the coefficient for the female dummy is positive in this instance demonstrates that the performance of the female students is noticeably higher than that of the male students.

Now looking into the effect of the parents' education on the students' performances, this study finds that students whose father have at least some education (at least attended school) significantly perform better compared to the students whose parents have never attended schools. However, here the mothers' education has a larger effect on the students compared to the fathers' education. For example, students whose mothers have attended school can correctly read four words more compared to the students whose mothers have not attended school. In the case of father education, this difference is only two words.

The school type of the students might also affect the students' performances. In this regard, the study discovers a positive correlation for the private school dummy, indicating that students from private schools outperform students from other types of schools (public schools or madrassa).

Now as found in the literature, the socio-economic status of the children might affect their performances. In this regard, this study finds that students from richer families perform significantly better compared to students from poorer families. For example, the students from poorer families (2nd quintile of the wealth index) can correctly two words more compared to the students from the poorest families (1st quintile of the wealth index which is the base category). Moreover, students from the middle (3rd quintile), richer (4th quintile), and richest (5th quintile) can correctly read 4, 5, and 6 words more respectively compared to the students from the base category (students from poorest households). The finding indicates that there is a significant socio-economic disparity in terms of students' performances.

Focusing on the location of the students, this study finds a negative coefficient for the rural-urban dummy. It indicates that rural children perform significantly worse compared to urban children. Finally, the looking into the performances of the students from different grades/classes, the study finds that the dummy variables for all the included classes have a positive coefficient. It implies that students from higher grades perform significantly better compared to the base category (students from class 1). For example, students from class 2 can correctly read 5 words more compared to the students from class 1 (base category). Moreover, students from classes 3, 4, and 5 can correctly read 11, 14, and 17 words more respectively compared to the students from class 1 (the base category). It implies that although students are learning at a higher class/grade, they are learning late as this kind of story is designed for class 1. However, they are learning at a higher class what they should have learned in a lower class.

4. Conclusion

This study highlights the intricate relationship between socio-economic conditions, parental education, gender, and school type in influencing both the overage status and academic outcomes of primary school students in Bangladesh. Children who are overaged, typically from low-income households and families with uneducated parents, face significant disadvantages compared to their peers. Their academic performance, particularly in reading, is notably weaker, with overaged students reading fewer words on average. These disparities underscore the long-term impact of delayed school progression, often tied to structural challenges like poverty, limited access to quality education, and inadequate parental support.

The findings demonstrate that economic status is a major factor in educational outcomes. Children from wealthier families are much less likely to be overaged and consistently perform better academically than those from disadvantaged households. For example, students from the wealthiest quintile are 17% less likely to be overaged than those from the poorest quintile and, on average, read six more words correctly. This reflects the pervasive role of economic inequality in shaping access to and quality of education.

Parental education, especially maternal education, also plays a significant role in shaping children's academic achievements and likelihood of being overaged. Children with educated parents tend to perform better academically and are less likely to fall behind in their educational progression. This finding emphasizes the importance of intergenerational education and suggests that adult education programs could have transformative effects on children’s learning outcomes.

Gender differences further reveal unique dynamics in educational achievement. Female students are not only less likely to be overaged but also perform better academically than their male counterparts. This finding challenges traditional assumptions about gender and education in Bangladesh and highlights the importance of ensuring equal opportunities for female students.

The type of school a child attends also emerges as a significant factor, with students in private schools outperforming those in public or other types of schools. This disparity reflects differences in resources, teacher quality, and classroom environments, pointing to the need for greater investment in public schools to provide equitable educational opportunities for all students, regardless of their socio-economic background.

Geographic disparities are also evident, as children in rural areas are more likely to be overaged and have lower academic performance compared to their urban peers. These findings underscore systemic challenges in rural education, such as a lack of qualified teachers, larger class sizes, and insufficient infrastructure, all of which hinder learning outcomes for rural students.

Furthermore, while students in higher grades tend to perform better than those in lower grades, this improvement highlights a concerning issue: many students acquire foundational skills, such as reading, much later than expected. This delayed acquisition reflects inefficiencies in the education system and underscores the need for early intervention programs to ensure students master basic competencies at the appropriate grade level.

The study suggests several policy implications. Reducing overage status and improving academic outcomes requires addressing socio-economic inequalities, improving rural education infrastructure, and offering financial and academic support to marginalized students. Initiatives like conditional cash transfers, scholarships, and community-based programs could help mitigate barriers for children from low-income households. Moreover, parental education programs and greater engagement with families could break the cycle of educational disadvantages.

Strengthening public schools is also critical to addressing these challenges. Investments in teacher training, classroom infrastructure, and learning materials are essential to reducing performance gaps between public and private schools. Additionally, remedial programs tailored to overaged students' needs could help them catch up academically and improve their chances of success.

In conclusion, this study sheds light on the multi-layered challenges within Bangladesh's primary education system. Addressing overage status and improving student performance requires a comprehensive approach that tackles socio-economic inequalities, encourages parental involvement, improves public education, and provides targeted support to disadvantaged students. By addressing these issues, Bangladesh can create a more inclusive education system where all children, regardless of their background, have an equal opportunity to thrive academically and realize their full potential.

Abbreviations

FIR	Fourth Industrial Revolution
MICS	Multiple Indicator Cluster Survey
OLS	Ordinary Least Squares

Author Contributions

Sakil Ahmmed is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

There is no conflict of interest.

References

[1] Alcott, B., & Rose, P. (2017). Does being overage for grade affect learning? Progression and outcomes in South Asia. *International Journal of Educational Development, 52,* 80–89. https://doi.org/10.1016/j.ijedudev.2016.11.004

[2] Alam, M. (2000). The role of socio-economic factors in determining educational outcomes in Bangladesh. *Journal of Education and Development, 10*(2), 45–62.

[3] Bedard, K., & Dhuey, E. (2006). The persistence of early childhood maturity: International evidence of long-run age effects. *Quarterly Journal of Economics, 121*(4), 1437–1472.

[4] Cascio, E. U., & Schanzenbach, D. W. (2007). First in the class? Age and the education production function. *NBER Working Paper Series.*

[5] Datar, A. (2006). Does delaying kindergarten entrance give children a head start? *Economics of Education Review, 25*(1), 43–62.

[6] Das, J., Pandey, P., & Zajonc, T. (2012). Learning levels and gaps in Pakistan. *World Bank Policy Research Working Paper.*

[7] Das, J., & Zajonc, T. (2010). India shining and Bharat drowning: Comparing two Indian states to the worldwide distribution in mathematics achievement. *Journal of Development Economics, 92*(2), 175–187.

[8] Directorate of Primary Education (DPE). (2019). *Annual primary education statistics.* Dhaka: Ministry of Primary and Mass Education.

[9] Fantuzzo, J., Perry, M. A., & McDermott, P. (2007). Preschool approaches to learning and their relationship to school readiness. *Early Childhood Research Quarterly, 22*(3), 294–311. https://doi.org/10.1016/j.ecresq.2007.04.001

[10] Glick, P., & Sahn, D. E. (2010). Schooling of girls and boys in a West African country: The effects of parental education, income, and household structure. *Economics of Education Review, 29*(4), 517–533.

[11] Greaney, V., Khandker, S. R., & Alam, M. (1998). *Bangladesh: Assessing basic learning skills.* Washington, DC: World Bank.

[12] Hungi, N., & Thuku, F. W. (2010). Differences in pupil achievement in Kenya: Implications for policy and practice. *International Journal of Educational Development, 30*(1), 33–43.

[13] Hungi, N., Wangu, F. M., & Thuku, F. W. (2014). School effectiveness in Southern and Eastern Africa: A study on overaged pupils. *SACMEQ Policy Research Report.*

[14] Jones, S. (2014). The overage enrollment problem in education: Causes and consequences in sub-Saharan Africa. *International Journal of Educational Development, 37,* 110–120.

[15] Khan, M. H. (2019). Education for the Fourth Industrial Revolution: Opportunities and challenges. *Journal of Education Policy and Leadership, 35*(1), 12–21.

[16] Khandker, S. R., Pitt, M. M., & Fuwa, N. (2003). Subsidy to promote girls' secondary education: Evidence from Bangladesh. *World Bank Policy Research Working Paper.*

[17] Knoema. (2020). Bangladesh primary education completion rate. Retrieved from https://knoema.com

[18] Kunje, D., Selemani-Meke, E., & Ogawa, K. (2009). An investigation of the relationship between school and pupil characteristics and achievement at the basic education level in Malawi. *South African Journal of Education, 29*(1), 1–18.

[19] Nath, S. R. (2012). The effects of preschool education on the primary education outcomes in Bangladesh. *International Journal of Educational Research, 56*(2), 15–28.

[20] Ngware, M. W., Oketch, M., & Ezeh, A. C. (2010). Quality of primary education inputs in urban schools: Evidence from Nairobi. *Education Research International, 2010,* 1–9.

[21] ReliefWeb. (2023). Survey on children's education in Bangladesh, 2021. Retrieved from https://reliefweb.int

[22] ResearchGate. (2021). The relative age effects in educational development: A systematic review. Retrieved from https://www.researchgate.net

[23] Sharp, C., George, N., Sargent, C., O'Donnell, S., & Heron, M. (2009). The influence of age on learning in early childhood. *Early Education and Development, 20*(3), 446–472.

[24] World Bank. (2022). Learning poverty: Tackling the education crisis in developing countries. Retrieved from https://www.worldbank.org

[25] Yesil-Dagli, U. (2006). Kindergarten retention and its predictors in high-poverty urban schools. *Journal of Educational Research, 100*(4), 1–12.

[26] Zhong, Z. (2012). The relationship between age and academic performance: Evidence from PISA data. *Educational Research International, 2012,* 10–19.