

# **Investigating educational inequality in Bangladesh: A decomposition analysis**

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## Abstract

This study aims to assess the current state of educational inequality in Bangladesh and identify the key contributing factors to this inequality. The study reveals that although educational inequality as measured by educational gini is declining in Bangladesh, it is still quite high. It indicates that despite substantial progress in the country's education sector, the inequality in educational attainment remains across gender, location, socioeconomic status, and age. The decomposition result reveals that among the different factors, income contributes the overall inequality most, which suggests that enhancing educational opportunity for poor people could reduce overall educational inequality. The study also finds that while gender has little contribution to the overall educational inequality, the rural-urban divide in terms of educational opportunities and rising income inequality are deepening the overall education inequality in Bangladesh. Finally, the study suggests focusing on the educational needs of old age people, and disadvantaged groups ensuring balanced educational opportunities in all regions.

**Keywords:** education inequality, decomposition, regional divide, Bangladesh

## 1. Background

Measuring education inequality is a widely used method for characterizing the fairness and effectiveness of the education system, and monitoring and evaluating the process of educational development. Educational development has been a major policy concern for a long time which focuses on equal educational opportunities. It is crucial to provide equal educational opportunities for several reasons. Enhancing people's productivity requires providing them with equal educational options. Inequality in educational opportunities hinders people's ability to increase productivity and accumulate human capital, which has a major negative impact on societal welfare (Thomas et al., 2001). Uneven distribution of education leads to a significant negative association between average years of education and per capita income. However, the association will be positive and significant when controlling the distribution of education (López et al., 1998). It implies the unequal distribution of education affects the per capita income negatively. The national policy of Bangladesh underscores the eradication of disparities and equalization of educational opportunities across all sections of the society (Government of Bangladesh, 2010). Moreover, the elimination of all forms of discrimination in access to quality education is one of the sustainable development goals (SDG) that the Bangladesh government pledges to meet by 2030.

Education has a wide range of implications associated with the micro and macro levels. At the micro level, education enhances the productivity of an individual which turns the individual into human capital (Barro & Lee, 2001). Sen (1999, 2000) argued education is the fundamental input of the person's functioning and capacity to flourish and consequently, it increases the freedom and at last development of a person. At the macro level, education is the contributing factor to a country's accumulation of human capital, and human capital tends to generate higher economic growth (Barro, 1991; Mankiw et al., 1992). Though the classical economic growth theory considers labour productivity as an exogenous factor, new growth theories consider it as an endogenous factor; emphasising the significance of education as an element of labour productivity (Pelinescu, 2015). Moreover, education increases the labour force participation and the quality of jobs a person can avail in Bangladesh (Rahman & Islam, 2019; Raihan & Uddin, 2018).

Between micro and macro levels, the contribution of education is wide. For instance, education also has an impact on health status, and some cases on political participation (Ferreira & Gignoux, 2014). Moreover, recent studies found that education is a good predictor of earning and there is a correlation between education inequalities and income inequalities (Bedard & Ferrall, 2003). Earning gap between people with an advanced degree and a lower degree is significant and has been widening in recent times (Baum, 2014). Since education is related to a wide range of factors, having education inequality may create unfavourable gaps and gradients in all of these factors. Therefore, developing a more equal distribution of educational opportunities is a precondition to increasing fairness in those aspects of human well-being.

Educational inequality has been measured in many studies with cross-country and specific-country educational attainment data. Thomas et al., (2001) generated the Gini index using Barro & Lee, (2001) dataset for 85 countries and found, a negative relationship between the average years of schooling (AYS) and the Gini index. It indicates that countries with high educational attainment have a low inequality in educational attainment. Many studies in the context of a number of countries including

China (Yang et al., 2014; Yu et al., 2015), the Philippines (Mesa, 2007), Albania (Picard & Wolff, 2005), and India (Agrawal, 2014; Garg et al., 2022)), go beyond simply measuring educational inequality and instead use the decomposition analysis of education Gini to look into the factors that contribute to the inequality the most.

The result of each country is distinct and contingent upon the country's specific condition and state of the development of the education sector. For instance, in China, rural-urban differences and individual's socioeconomic status contributed the most while in India, rural-urban and caste differences contributed most to educational inequality. For the Philippines the discrimination of educational attainment is decreasing, however, there are still wide disparities across regions and among provinces. While many international studies use the education gini and decomposition method to see the factors that influence educational inequality, there is a dearth of literature in Bangladesh related to studies to identify whether a regional difference or the socio-economic or other differences has a major impact on educational inequality.

Matin, (2017) estimated the Gini coefficient of Bangladesh based on the population and housing census data in 2011 and 2001 and found that AYS is lower in female and rural areas with higher Gini coefficient compared to the male and urban areas among all divisional level in Bangladesh. This finding emphasized the gender gap and regional disparities in educational attainment in Bangladesh. However, it didn't use any decomposition technique. Al-Samarrai (2009) found that the weakness in the education sector governance affects educational inequality in Bangladesh. One recent study by (Mahmud & Akita, 2018) used the Blinder Oaxaca decomposition and found that there exists greater discrimination between rural and urban areas in terms of years of educational attainment since the rural area has a larger percentage of no schooling. However, this study didn't address the socio-economic factor.

Other than these, most of the studies in Bangladesh related to education focus on how education or public spending on education contributes to reducing income inequality or increasing the income and consumption of rural Bangladesh, or uplifting people from poverty (Ahmad, 2003; Karim, 2015; Moniruzzaman & Emran, 2021). However, there is no study in the existing literature on why inequality remains in the education sector and the factors that contribute to this inequality. Against this backdrop, departing from earlier Bangladeshi literature and following international research, the current study seeks to explore the current state of education inequality and the factors that influence educational inequality in Bangladesh. Moreover, the study aims to assess the relative importance of these socio-economic factors (e.g., gender, location, socio-economic status, and age) to this inequality. The findings of this study might pave the way for the development of comprehensive policy documents that would allow the policymaker to intervene to ensure more equal educational opportunities in the country.

In this regard, as a measure of educational inequality, this paper uses the education Gini coefficient estimated based on an individual's years of schooling for age seven and above. After measuring education inequality using the education Gini coefficient, a decomposition of Gini based on the location (rural-urban and divisions), gender (male and female), socio-economic status and age will be used to study within-group and between-group contributions to education inequality. Moreover, Shapley regression-based decomposition analysis of the Gini coefficient based on the above-

mentioned factors (i.e.; location, region, etc) will be used to assess the relative importance of these factors to the educational inequality in Bangladesh. The organization of the study is as follows: after the background, the following section comprises the data and methodology. The third section presents the findings of the study, the fourth section contains the bright spots of the education sector, and the final section ends with the conclusion and discussion.

## 1.1 Objective

Given the discussion in the introduction, the objectives of the study are

1. Identifying the current state of educational inequality in Bangladesh
2. Exploring the factors that contribute to overall educational inequality
3. Identifying the relative importance of factors that contribute most to educational inequality
4. Policy suggestion to ensure a more equal and equitable educational system in Bangladesh

## 2. Data and methodology

### 2.1. Source of data

This study relies on three consecutive rounds of the national representative Household Income and Expenditure Survey (HIES) of Bangladesh, (i.e., 2005, 2010, 2016 and 2022). HIES is considered the most important source of the socio-economic status of households in Bangladesh. It comprises useful information on household and individual expenditure, income, education, employment, consumption, savings, housing conditions, health, sanitation, water supply, electricity usage, etc. For education, it collects information on literacy and years of educational attainment of all members of the sample households that might be useful for this study.

Although the survey comprises a nationally representative sample from different divisions of the country, the sample size of different rounds of HIES is not the same. For example, while total number of sample households was 10,080 in HIES 2005, it became 12240 in HIES followed by 46076 in HIES 2016 and 14,395 in HIES 2022 (Table 1).

Table 1: A comparative overview of the three rounds of data

Different rounds of HIES	Rural households	Urban households	Total households
HIES 2005	6400	3680	10,080
HIES 2010	7840	4400	12240
HIES 2016	32096	13980	46076
HIES 2022	7,199	7,196	14,395

Based on the information of education attainment, we estimated the education attainment rate for the population of age seven and above into six education categories as follows: (1) illiterate or literate with no formal education (2) primary education (1-5) (3) secondary (6-10), (4) Higher Secondary (11-12), and (6) Tertiary (graduation and above).

In terms of defining socio-economic status, we divided the household into five socio-economic categories (i.e., poorest, poor, middle income, rich, and richest) based on the quintile. The first quintile

represents the poorest and the subsequent quintile represents subsequent socio-economic status. Quantile is divided based on monthly per capita household consumption expenditure. Typically, consumption expenditure can be used as a proxy for income.

## 2.2. Measuring educational inequality

The idea of measuring the education Gini based on years of educational attainment was popularized by Thomas et al. (2001). Before the study of Thomas et al. (2001), several studies measured education inequality based on the Gini coefficient of the school enrollment or standard deviation of the years of educational attainment (Maas, 1982; Ram, 1990). However, the use of the enrollment ratio as a proxy for human capital was criticized in the growth literature because the enrollment ratio only measures the flow of the population's education or access to education. It does not show the cumulated educational attainment. Hence, the enrollment ratio is an inappropriate measure of human capital since it does not reflect the stock of human capital. Psacharopoulos & Arriagada (1986) suggested the years the educational attainment reflect the stock of human capital, therefore, measuring the distribution of education based on this attainment data is appropriate. Moreover, measuring inequality through standard deviation is also inappropriate as the standard deviation of schooling seems to be more volatile and does not provide a consistent picture of whether the distribution of education in a country is improving or not (Thomas et al., 2001).

In this study, educational inequality has been estimated following the indirect method<sup>1</sup> of the Lorenz curve formula developed by Thomas et al. (2001) which is analogous to income Gini. The education Gini formula in this regard is

$$E_L = \left(\frac{1}{2\mu}\right) \sum_{i=1}^n \sum_{j=1}^n p_i |y_i - y_j| p_j \quad (1)$$

where  $E_L$  is the education Gini based on educational attainment distribution;  $\mu$  is the average years of schooling<sup>2</sup> for the concerned population;  $p_i$  and  $p_j$  stand for the proportions of the population with certain levels of schooling;  $y_i$  and  $y_j$  are the years of schooling  $i$  and  $j$ , respectively.  $N$  represents the number of people where the assumption is that the size of the population is large.  $i = 0, 1, \dots, 17$ <sup>3</sup>. Like the conventional measures, the value of this is between zero to one. If the education Gini is zero it reflects perfect equality of the education system. The higher the value of the Gini, the greater the inequality.

Though measuring educational inequality based on the education Lorenz curve is our primary method, we also use the education concentration curve to assess whether access to education is concentrated in poor or rich populations. The difference between Lorenz and the concentration curve is that while outcome variable  $Y$  (years of educational attainment) refers to cumulative outcome proportions of population members ranked by the values of  $Y$ , we do the same things in the concentration curve using alternative ranking variable  $X$  for measuring the cumulative proportion of population of years of

<sup>1</sup> The standard deviation is direct method which is less likely to be used by the recent studies

<sup>2</sup> The average attainment or years of education is defined as a total stock of formal schooling therefore non-formal schooling is clubbed with illiterate category. Gini coefficient and average years education is measured based on the formal schooling.

<sup>3</sup> We consider literate but no class passed as 0, class 1 as 1, class 2 as 2.....post-graduation as 17.

educational attainment. In this case, the alternative variable we have used is the monthly per capita consumption expenditure of the households.

### 2.3. Decomposition of Education Gini

In this study, educational inequality has been decomposed following two different approaches. Firstly, the decomposition of education Gini by subgroups where the education inequality is segregated into “within-group (intra-group)” and “between-group (Inter-group)” contributions. For instance, if we decompose the inequality based on the subgroup of the region, the within-group contribution indicates how much the inequality within rural or urban areas contributes to the overall inequality and the “between group” contribution indicates how the difference between rural and urban areas contributes to this overall inequality. By the same token, this decomposition method has been applied to all other subgroups such as male and female, poor and non-poor, and young and old. The present study uses the decomposition method of (Lambert & Aronson, 1993). Let  $G$  be the Gini coefficient and let the population subgroups be indexed by  $k = 1, 2, \dots, m$ . The decomposition takes the form

$$G = G(y^1, y^2, \dots, y^m) = \frac{2}{n^2 \mu} \sum_{k=1}^m \sum_{i \in N_k} r_i (y_i - \mu) \quad (2)$$

$$= \frac{2}{n^2 \mu} \sum_{k=1}^m \left\{ \sum_{i \in N_k} i (y_i - \mu_k) + \sum_{i \in N_k} i (\mu_k - \mu) + \sum_{i \in N_k} i (r_i - i) y_i \right\} \quad (3)$$

$$= W + B + R$$

The right side of equation (2) is within group contribution, while the second term is between group contribution, and the third term is interaction term—the portion of contribution that falls both within or between groups—is the third term or in other words called the overlapping term. The interaction term will be zero if subgroup ranges do not overlap. The population is divided into two subgroups ( $k=2$ ) if we want to decompose educational inequality based on urban-rural differences. For gender, division, age and income, subgroups are 2, 8, 10, and 5 respectively.

The second or final technique for the decomposition of educational inequality is to see the relative importance of different factors to influence the overall educational inequality. The Shapley value decomposition technique is applied in this case. G. Wan (2019) and G. H. Wan (2002) proposed the technique to combine the regression and Shapley value decomposition technique to identify the factor that contributes to educational inequality the most. It offers certain benefits over the alternative technique. For instance, it allows for more variables, the inclusion of dummy variables, and the interaction term, and it has no restrictions on the measurement of inequality<sup>4</sup>.

### 2.4. Tobit regression

Before using the second technique of decomposition (Shapley value decomposition), it is necessary first to identify factors that significantly affect the years of educational attainment. Though many factors may have an impact on education, we have to select some of the factors according to the data. In this regard, the model is specified as the following.

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<sup>4</sup> Gini index or Genreal entropy index or Theli index, any index can be suitable with this method



$$y_i = \beta X + u_i \quad (4)$$

However, the outcome variable of this study (education attainment) is likely to be truncated given that a significant percentage of the population in Bangladesh does not have any formal education resulting in zero values of the variable. Therefore, using the ordinary least square (OLS) regression may not provide a correct estimate of the factors affecting educational attainment and provide the negative predicted value (Wooldridge, 2016). One alternative technique to address such an issue is to use the Tobit model which is often considered the best fit in the case of truncated data (Gujarati, 2002).

The Tobit model is estimated by the maximum likelihood method which unlike the OLS method takes the regressand's positive and zero value explicitly. The OLS method treats both positive and zero values in an equal manner resulting in biased as well as inconsistent estimates (Gujarati, 2002). Hence the usual Tobit model is specified as the following

$$y_i = \begin{cases} y_i^* = \beta x_i + u_i, & \text{if } y_i^* > 0 \\ 0, & \text{if } y_i^* \leq 0 \end{cases} \quad (5)$$

Here  $y^*$  is an unobserved latent variable and  $y$  is the variable of the observed outcome variable which contains the years of educational attainment of an individual.  $x_i$  is the vector of the explanatory which has an impact on education attainment.

### 3. Findings of the study

#### 3.1. Educational attainment

Table 2 shows the percentage of population with different levels of education in 2005, 2010, 2016 and 2022. The table shows that Bangladesh has made significant progress in reducing the illiteracy rate as the percentage of people aged seven and above with no formal education has been reduced from 48.78 per cent in 2005 to 24 per cent in 2022. Despite this progress, two major limitations are still visible. First, a significant portion of the population is still illiterate, they can not read and write a letter. Second, only a small percentage of people (around 6.93%) have a graduation and above degree. Among the literates, the primary and secondary levels constituted a major proportion of the population and the secondary level experienced an increasing trend over time. The declining rate of the illiteracy rate from 2005 to 2022 is one per cent per annum which can mostly be attributed to the improvement in primary and secondary education attainment. There is an improvement in the higher secondary and tertiary education attainment from 2016 to 2022 which is a good sign in terms of human capital accumulation in Bangladesh

There is a substantial rural urban divide in terms of education attainment in Bangladesh. The proportion of the illiterate population is much higher in rural areas than the urban areas for all three years. A more pronounced spatial disparity is observed in higher secondary and tertiary levels of education. A relatively small percentage of people in rural areas have higher secondary or tertiary

levels of education compared to their urban counterparts which can be attributed to poorer facilities for higher education in rural areas.

Table 2: Percentage of population across education level

	Education levels	2005	2010	2016	2022
National	Illiterate (and no formal education)	48.78	43.28	32.68	24.00
	Primary (Class 1-5)	19.33	22.46	29.23	25.38
	Secondary (Class 6-10)	25.67	27.36	30.28	35.39
	Higher Secondary (Class 12)	3.06	3.74	4.59	7.94
	Tertiary	3.15	3.15	3.22	6.93
Rural	Illiterate (and no formal education)	55.76	49.62	38.07	28.67
	Primary (Class 1-5)	19.09	22.01	29.18	27.41
	secondary (Class 6-10)	22.32	23.58	27.54	34.45
	Higher Secondary (Class 12)	1.61	2.39	3.38	5.78
	Tertiary	1.22	1.37	1.84	3.46
Urban	Illiterate (and no formal education)	38.77	33.04	28.76	19.29
	Primary (Class 1-5)	19.67	21.37	26.17	23.33
	Secondary (Class 6-10)	30.21	31.75	32.32	36.34
	Higher Secondary (Class 12)	5.17	6.3	6.76	10.11
	Tertiary	6.18	5.18	6	10.42

Source: Authors' calculation from various rounds of HIES

Table 3 shows the education attainment of the people from different socio-economic backgrounds in different years. It shows that the percentage of the poorest and poor groups of people in primary education attainment is large. However, it declines at the higher socioeconomic class, whereas the percentage of the poorest and poor group of people in secondary and subsequent education level starts at a low rate, however, the percentage increases across socio-economic classes as they move up from lower to higher income ladder. It implies the percentage of the poorest and poor groups of people attaining secondary, higher secondary and tertiary levels of education is significantly lower than their richer counterparts. For instance, the percentage of the population attaining tertiary level education of the richest group is 10 times higher than that of the poorest group in 2022 (2.71% vs 19.59%). It indicates the significant socio-economic disparity in accessing higher education in Bangladesh.

Table 3: Distribution of education attainment across individual's socioeconomic status

	Education Category	Poorest (%)	Poor (%)	Middle Class (%)	Rich (%)	Richest (%)
2005	Literate but no class passed <sup>5</sup>	45.07	35.28	25.53	17.16	9.84
	Primary (Class 1-5)	35.04	34.23	33.57	28.23	19.88
	Secondary (Class 6-10)	19.14	28.53	37.09	46.4	48
	Higher Secondary (Class 12)	0.42	1.19	2.12	4.65	10.19
	Tertiary	0.33	0.78	1.69	3.56	12.1
2010	Literate but no class passed	37.93	25.66	20.12	14.34	9.86
	Primary (Class 1-5)	40.81	39.7	35.36	29.63	20.59
	secondary (Class 6-10)	20.66	32.56	39.68	46.4	45.73
	Higher Secondary (Class 12)	0.45	1.24	3.42	5.84	11.68

<sup>5</sup> Here we ignore the proportion of population which have no formal schooling or illiterate.

	Tertiary	0.16	0.83	1.42	3.8	12.14
2016	Literate but no class passed	7.65	6.81	5.64	5.18	3.96
	Primary (Class 1-5)	54.15	50.18	45.92	42.29	31.76
	secondary (Class 6-10)	34.69	37.42	40.69	41.76	43.9
	Higher Secondary (Class 12)	2.47	3.74	4.92	6.38	10.96
	Tertiary	1.04	1.84	2.83	4.39	9.43
2022	Literate but no class passed	2.16	2.17	1.46	1.21	0.95
	Primary (Class 1-5)	49.41	42.11	38.08	31.38	22.00
	secondary (Class 6-10)	40.43	45.06	46.01	46.71	41.50
	Higher Secondary (Class 12)	5.04	6.43	8.63	11.95	15.26
	Tertiary	2.71	3.99	5.49	8.16	19.59

Source: Authors' calculation from various rounds of HIES

The gender disparity in attaining different levels of education has been presented in Table 4 which makes two points obvious. Firstly, there is little or no gender disparity in primary and secondary education which reflects the success of Bangladesh in making primary and secondary education more equitable. In fact, the percentage of female attending secondary education increases over time exceeding the male percentage in 2010, 2016 and 2022. Therefore discrimination against females has been eliminated due to females increased participation in the primary and secondary levels over time. Secondly, there is a gender disparity in accessing higher education, where males outperform women. For instance, while male participation in post secondary education is 21.55 per cent in 2022, female participation is only 15.83 per cent. A probable explanation for the female lower participation is due to less government and NGO support in higher education. However, there is another explanation that has some reflection on reality; the regressive attitude toward females favoured by patriarchal society in developing countries. Under this, there is a tendency in Bangladesh to marry off the girls at an early age. When they get married, they are mostly engaged in household activities (i.e. child-caring). Bangladesh had the highest instances of early marriage for girls in south Asia; around 50% of girls aged 20-24 were married before the age of 18 (BDHS, 2023). The early marriage is the significant factors in Bangladesh which refrain females from accessing the higher level of education.

Table 4: Distribution of educational attainment between males and females (%)

Education category	2005		2010		2016		2022	
	Male	Female	Male	Female	Male	Female	Male	Female
Literate but no class passed	22.57	27.18	19.67	19.88	5.87	5.46	1.72	1.35
Primary	29.18	29.56	31.42	32.2	44.38	43.32	36.66	34.47
Secondary	36.92	37.75	36.7	40.82	37.18	43.22	40.07	48.03
HSC/Tertiary	11.34	5.52	12.22	7.1	12.56	7.99	21.55	15.83

Source: Authors' calculation from various rounds of HIES

### 3.2. Educational inequality

The estimates of average years of schooling and educational Gini have been presented in Table 5. The results show over time average years of schooling (AYS) have increased significantly from 5.39 years in 2005 to 7.68 years in 2022. It indicates the significant progress of Bangladesh in ensuring educational opportunities for its citizens. Moreover, the educational Gini has consistently declined over time falling from 0.44 in 2005 to 0.30 in 2022 implying that there has been significant progress in making the education more accessible to the poorer section of the society. However, the value of gini

coefficient is still very high which indicates that there still exists significant inequality in terms of access to educational opportunities in Bangladesh.

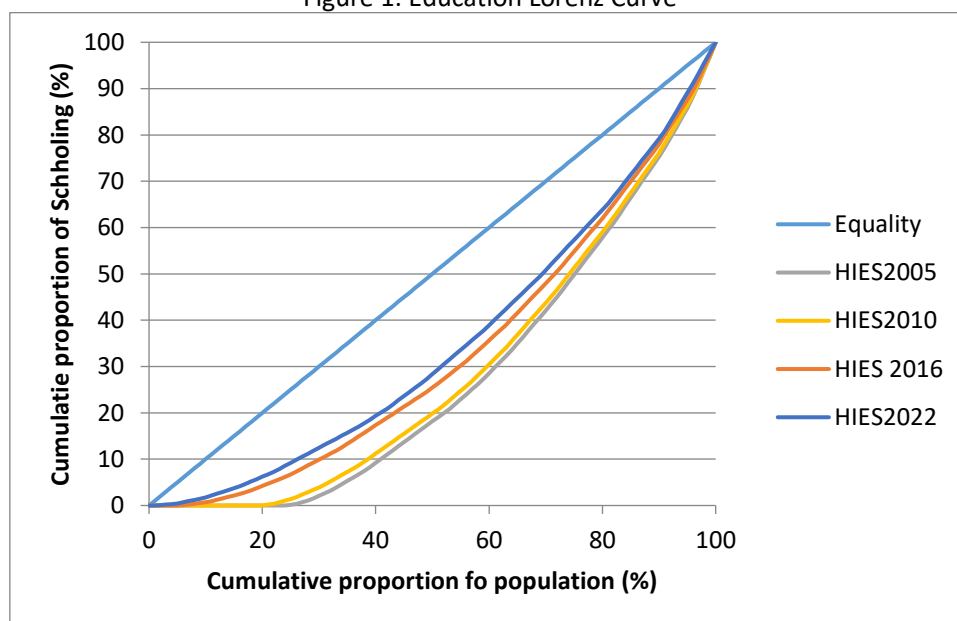
Table 5: Average years of Schooling (AYS) and education Gini coefficient over the time.<sup>6</sup>

	2005	2010	2016	<b>2022</b>
<b>AYS</b>	5.39	5.78	6.25	7.68
<b>Gini (lorenz)</b>	0.44	0.41	0.34	0.30

Source: Authors' estimates from various rounds of HIES

Figure 1 represents the Lorenz curve of education which shows the overall improvement in access to education over time. The lower distribution of the curve reveals the improvement of education from no education to attaining some level of education over time. The Lorenz curve also shows that 10 per cent of the population is taking more than 20 per cent of accumulated education in Bangladesh in the period 2022. Moreover, the concentration curve is provided in Figure 2 which shows that education inequality based on income exists though it is declining over time. However, it reflects that the richest 10 per cent of the population occupies around 20 per cent of total education- double compared to their share of the population in 2022. Therefore, education is concentrated on the higher-income group in Bangladesh.

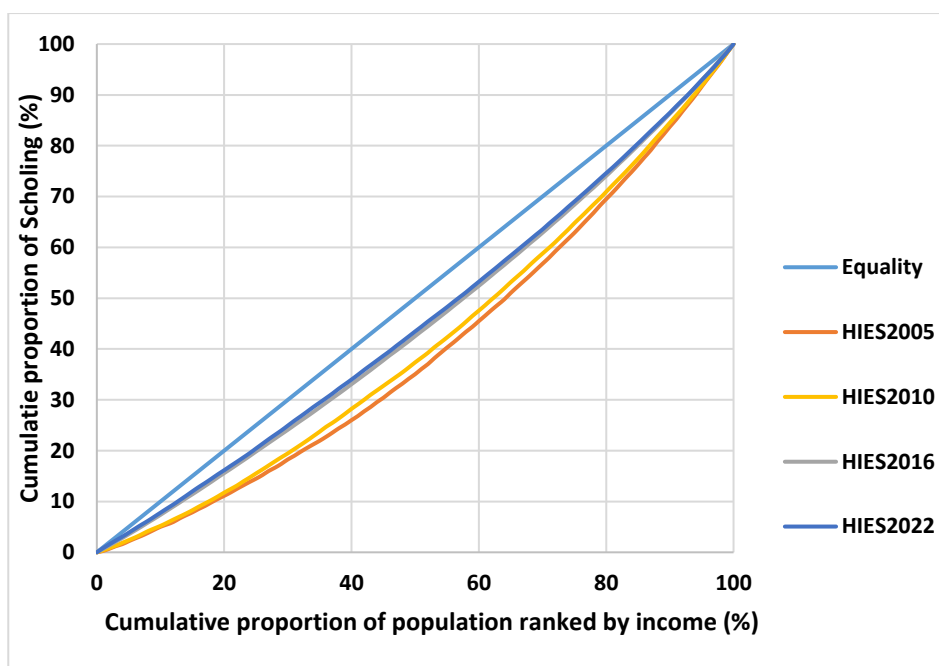
Figure 1: Education Lorenz Curve



Source: Authors' estimates from various rounds of HIES

Figure 2: Concentration curve

<sup>6</sup> If we consider the illiterate people, the estimated Gini coefficient would be larger. For instance, in that case, the Gini coefficient for people aged seven and above would be 0.51 in 2016 and 0.45 in 2022. Since we are measuring the inequality in accessing the education attainment, we avoid the illiterate portion of population.



Source: Authors' estimates from various rounds of HIES

The average years of schooling for different groups show that a clear disparity exists in terms of access to education across gender, region, and socio-economic groups (Table 6). The educational disparity is highest in terms of the region in 2022. AYS in the urban area is 1.33 years higher than that of the rural area. The higher AYS for urban than rural for each year indicates that there is a rural-urban divide in terms of educational attainment in Bangladesh.

Table 6: AYS and education Gini coefficient across the subgroups<sup>7</sup>

		2005		2010		2016		2022	
		AYS	Gini	AYS	Gini	AYS	Gini	AYS	Gini
By Region	Rural	4.74	0.47	5.14	0.43	5.86	0.34	6.97	0.30
	Urban	6.73	0.39	6.68	0.39	7.06	0.33	8.30	0.29
By Gender	Male	5.88	0.43	6.00	0.42	6.38	0.36	7.80	0.32
	Female	5.06	0.45	5.57	0.40	6.12	0.33	7.55	0.29
By Division	Barisal	5.53	0.42	6.06	0.39	6.48	0.33	8.42	0.28
	Chattogram	5.52	0.45	5.73	0.42	6.07	0.34	8.58	0.26
	Dhaka	5.75	0.44	5.86	0.42	6.41	0.34	8.78	0.28
	Khulna	5.50	0.43	5.97	0.40	6.37	0.33	8.56	0.26
	Mymensingh					6.09	0.36	8.37	0.29
	Rajshahi	5.12	0.46	5.85	0.40	6.42	0.35	8.63	0.28
	Rangpur			5.80	0.42	6.22	0.36	9.07	0.28
Sylhet	5.12	0.46	5.06	0.46	5.51	0.36	7.80	0.28	
By Age	Age 14-18	6.63	0.23	6.38	0.28	7.38	0.17	7.78	0.14
	Age 18-22	7.39	0.26	6.69	0.34	8.47	0.21	9.23	0.17
	Age 22-26	7.59	0.32	6.18	0.40	8.21	0.24	9.63	0.22
	Age 26-32	6.94	0.39	5.44	0.51	7.67	0.26	9.52	0.26
	Age 32-38	6.17	0.44	4.49	0.60	7.37	0.27	8.56	0.26

<sup>7</sup> Rangpur and Mymensingh became divisions in 2010 and 2015 respectively. Therefore, the study ignores Rangpur for the analysis in 2005 and Mymensingh for the analysis in 2005 & 2010.

	Age 38-44	5.79	0.48	3.89	0.65	7.28	0.29	8.22	0.28
	Age 44-50	5.95	0.47	3.59	0.68	7.06	0.3	8.37	0.29
	Age 50-56	5.68	0.50	3.34	0.70	6.9	0.3	7.96	0.30
	Age 56-62	4.84	0.54	2.97	0.73	6.69	0.3	7.73	0.31
	Age 62-70	4.06	0.60	2.29	0.79	6.71	0.32	7.56	0.30
By income quintile	First quintile	2.94	0.59	3.19	0.54	5.08	0.35	6.15	0.31
	Second quintile	3.90	0.51	4.39	0.45	5.51	0.35	6.74	0.30
	Third quintile	4.93	0.43	5.25	0.40	5.98	0.34	7.24	0.29
	Fourth quintile	6.16	0.37	6.36	0.36	6.4	0.33	8.00	0.28
	Fifth quintile	8.16	0.31	8.14	0.32	7.69	0.31	9.57	0.27

Source: Authors' calculation from various rounds of HIES

The estimates of the Gini coefficient for different groups show that access to education is less equal among the poorer groups compared to the richer ones. In addition, across the divisional level, Mymensingh, Rangpur, and Sylhet divisions are more unequal in terms of access to education compared to the other division. The result also implies the population with a higher AYS can have a more equal educational opportunity than those with a lower AYS. A similar result has been found by (Castelló & Doménech, 2002), where they found a negative relationship between average education levels and human capital inequality for a wide group of countries. With respect to gender, average years of schooling of male surpasses that of female for all the years. However, the gender divide in terms of educational gini is not homogenous in all the years. The education gini for male is lower than that of female in all the years except in 2005. Therefore, the negative relationship between average years of schooling and educational gini does not completely hold with respect to gender.

### 3.3. Decomposition of educational inequality

As mentioned earlier, one major objective of this study is to decompose the education Gini for different subgroups into within-group and between-group contributions to this overall inequality for the different periods. The decomposition result is shown in Table 7. The number shows for a given subgroup (region), out of 100% inequality, which explains most; whether the difference within the subgroup (within rural and within urban) or the difference between subgroups (rural vs urban). For example, in the subgroup of the region, out of 100% inequality in 2022, the difference within rural and within urban contributes 49.60% of inequality and the difference between rural and urban contributes 14.38% of inequality. The rest of 36.02% remains explained by region.

The decomposition for each year's result suggests that, for the region and gender, the overall education inequality is mostly reliant on the within-group contribution rather than the between-group contribution. It indicates that within-group contribution is stronger than the between-group contribution, thus the differences between rural and urban, and male and female, have a less significant contribution to rising overall inequality. Rather, the inequality within rural or urban or male or female might contribute to the growing educational inequality in the country. The insignificant between-group contribution also indicates Bangladesh's significant progress in reducing the gender gap in educational attainment in the past three decades. However, the between-group contribution

to regional inequality is quite significant, indicating that rural area is falling behind the urban area in educational attainment.

Table 7: Decomposition by subgroups: out of the total contribution for a subgroup (100%)

subgroups	Within group contribution (%)				Between group contribution (%)				W/B			
	2005	2010	2016	2022	2005	2010	2016	2022	2005	2010	2016	2022
Region	50.36	52.32	54.33	49.60	19.32	14.81	12.08	14.38	2.61	3.53	4.50	3.45
Gender	49.92	50.07	50.04	49.99	8.43	4.54	3.70	2.66	5.92	11.03	13.52	18.79
Division	20.00	17.33	14.28	12.48	4.15	4.36	5.54	7.61	4.82	3.97	2.58	1.64
Age	10.75	9.92	11.79	10.58	20.36	33.30	15.03	19.13	0.53	0.30	0.78	0.55
Income groups (5)	18.18	19.32	20.00	19.46	42.80	39.86	23.43	29.00	0.42	0.48	0.85	0.67
Income groups (10)	9.04	9.62	10.00	9.69	44.50	41.43	24.38	30.29	0.20	0.23	0.41	0.32

Source: Authors' calculation from various rounds of HIES

When decomposing educational Gini for the divisions, the within-group contribution has been found more dominating. This within-group contribution mainly comes from the gaps between the relatively advanced and comparatively backward districts in the same division. For example, within the Dhaka division, education enrollment and quality are higher in Dhaka city corporations than in the Rajbari or Tangail district. The finding of this result is corroborated by the ratio GPA 5 holding in SSC and HSC exam to held each year. Backward districts and districts with poor facilities attain poor pass rates and GPA 5 rates in the SSC or HSC exam.

The decomposition with respect to age groups suggests that inequality across age groups is a key factor in overall inequality. This between group contributions by age is mostly caused by the educational attainment gap between older and younger age groups. The younger generation is now taking more education than their parents or grandparents did as a result of the increase in educational opportunities over the past few decades. Therefore, there is a disparity in educational attainment between young and old, and if we do not include the older age population in the formal education system, the gap may widen for the subsequent one or two generations in Bangladesh. A policy option for decreasing educational disparity may be to increase educational opportunities for older people.

Though within-group contribution is dominating for most of the subgroups, the between-group contribution is dominating in the subgroup of the household's socio-economic status (income quintiles). When educational inequality is decomposed based on household socio-economic status for each year, the between contributions is significantly larger for each year. However, the between groups contribution has declined over time and reduced from 44.80 percent in 2005 to 29 percent in 2022. It could lead that, the contribution of the within-group relative to the between-group may be increased over time.

However, one major finding of this study is that while decomposing the education Gini based on household socio-economic status, the contribution of within-group relative to between groups is increasing over time. However, while decomposing the Gini by 10 income groups (deciles), the within-group contribution significantly reduces, leading to a larger between-group contribution. This indicates that the more disintegrated income groups we consider, the greater will be the contribution of the between groups to the overall inequality. It implies that socioeconomic inequality has a significant contribution to the present educational inequality in Bangladesh.

### 3.4. Factors affecting educational disparity and their relative importance

The decomposition of educational Gini between within group and between group contribution in terms of regions, divisions, gender, socio-economic status and age does not provide evidence about the relative importance of these factors to the overall inequality. In this regard, a decomposition-based regression analysis can be helpful. In contrast to other conventional decomposition techniques like Gini and General Entropy, it not only enables all factors that impact inequality to be identified and quantified but also includes a large number of variables.

The first step to using the regression-based Shapley value decomposition method is to identify factors that may have a significant impact on educational attainment. Since the sample is left censored by zero, the Tobit regression model has been applied for estimating correct results. The Tobit regression model is

$$Education = f(gender, region, division, age, income)$$

Here, education represents the years of educational attainment and, gender and region are dummy variables, gender is equal to 1 when an individual is male, 0 otherwise, the region is equal to 1 when the region is rural, 0 otherwise. The divisional dummy variables have been included to identify the regional differences in educational attainment considering Dhaka division as the base category. An individual's age is represented by age. The income dummy variables have been added to identify the difference in socioeconomic status in educational attainment. The average monthly income of the households is used to represent the socioeconomic status of the households. Socioeconomic status is then ranked based on categorizing the income into quintiles, with the first to fourth quintiles indicating the poorest and richest groups, respectively, and considering the first quintiles as the base category. Since heteroscedasticity is a common problem for the cross section data, which can lead to inefficient standard error for the coefficient, the robust standard deviation for estimating coefficient is used to minimize the heteroscedasticity in the regression .

The result of Tobit regression is shown in Table 8 where all independent variables are significant and this result can be used to conduct Shapley value decomposition effectively. Regression result shows male has, on average, significantly higher than females, and rural area has, on average, significantly lower than urban areas, years of educational attainment. Among the divisions, in 2022, all of the division except Rangpur has on average lower education than Barishal (base category). Years of educational attainment rise significantly, on average, as the age of individuals rises. However, there is a nonlinear relationship between age and education attainment since after a critical age, the years of education fall as age increases. Moreover, an individual belonging to a high-income household has,



on average, significantly higher educational attainment compared to those in a low-income household.

Table 8: Tobit regression result and marginal effect

Years of educational attainment	2005	2010	2016	2022
Female	-1.190*** (0.0576)	-1.306*** (0.0582)	-0.916*** (0.0279)	-0.361*** (0.0344)
Age	0.216*** (0.00828)	0.191*** (0.00893)	0.162*** (0.00454)	0.362*** (0.00513)
Age squared	-0.00343*** (0.000121)	-0.00381*** (0.000133)	-0.00364*** (6.79e-05)	-0.00447*** (7.51e-05)
Urban	1.184*** (0.0601)	1.128*** (0.0677)	0.924*** (0.0321)	0.648*** (0.0355)
Chittagong	-0.805*** (0.107)	-1.718*** (0.124)	-2.195*** (0.0535)	-0.491*** (0.0666)
Dhaka	-0.975*** (0.103)	-1.574*** (0.119)	-2.010*** (0.0530)	-0.686*** (0.0714)
Khulna	-0.517*** (0.112)	-0.646*** (0.130)	-0.867*** (0.0549)	-0.343*** (0.0700)
Rajshahi	-0.152 (0.103)	-1.161*** (0.134)	-1.775*** (0.0739)	-0.377*** (0.0717)
Rangpur		-0.561*** (0.139)	-1.331*** (0.0598)	0.288*** (0.0722)
Syllhet	-1.155*** (0.154)	-1.351*** (0.144)	-1.226*** (0.0603)	-0.735*** (0.0653)
Mymensingh			-2.498*** (0.0663)	-0.443*** (0.0711)
2 <sup>nd</sup> quantile	1.281*** (0.109)	2.082*** (0.104)	1.102*** (0.0462)	0.441*** (0.0544)
3 <sup>rd</sup> quantile	2.619*** (0.106)	3.513*** (0.102)	1.952*** (0.0463)	0.847*** (0.0545)
4 <sup>th</sup> quantile	4.068*** (0.103)	5.524*** (0.100)	3.110*** (0.0467)	1.498*** (0.0555)
5 <sup>th</sup> quantile	6.109*** (0.103)	8.366*** (0.101)	5.307*** (0.0478)	2.931*** (0.0582)
Constant	0.318** (0.153)	-0.213 (0.177)	2.416*** (0.0835)	1.046*** (0.0897)
Observations	26,492	47,318	159,056	43,635

Robust standard errors in parentheses

Note: \*\*\* = significant at 1 percent level ( $p < 0.01$ ) \*\* = significant at 5 percent level ( $p < 0.05$ ) \* = significant at 10 percent level ( $p < 0.10$ )

Source: Authors' calculation from various rounds of HIES

Finally, the study attempts to investigate the relative contribution of different factors (region, gender, divisions, age, and income) to education inequality in Bangladesh. For this, the regression-based shapely decomposition technique has been applied and the result is given in Table 9. The result of the regression decomposition shows that age contributes the most to the overall inequality of education for the years 2010 and 2016. This might be due to the fact that educational attainment among older

people might be lower compared to their young counterparts. The rapid education expansion policies over the last decades have improved the young's educational attainment. Especially, the nearly perfect score of Bangladesh in primary school enrollment, leads to significant increase in the average years of schooling of the young population compared to their older counterparts leading to a significant inequality in the educational attainment of different aged people. As a result, the relative contribution of age to the overall educational inequality has been increasing over time as the young aged people are continuously having more years of schooling compared to the constant educational attainment of the old aged people.

Although gender gap in educational opportunities significantly contributed to educational inequality in 2005 and 2010, its contribution is absent in 2016 and 2022. This might be due to equal educational opportunities for males and females over the last decade that helped to reduce the gender gap in at least primary and secondary education making gender an insignificant factor in the overall educational inequality in Bangladesh.

Table 9: Shapley decomposition result of age 7 and above (out of 100%)

Factors	Education inequality index (Gini)			
	2005	2010	2016	2022
Gender	6.35	4.16	0.54	0.57
Region	11.68	7.40	6.06	5.84
Division	0.00	0.07	0.00	0.27
Age	8.70	20.67	15.78	11.32
Income	13.44	14.79	8.03	13.30
Residual	59.84	52.91	69.59	68.70

Source: Authors' calculation from various rounds of HIES

The results also show that while gender and divisions do not have any contribution to the overall educational inequality, income and regions significantly contribute to the overall educational inequality for each year. Income contributed most to the overall educational inequality in 2005 and 2022. Therefore, the result indicates that rural-urban differences and income inequality are significant factors for the rising educational inequality for all the years. The reason is that, since there are inequalities in many regions and among many groups of people as a result of unbalanced economic development and rising income inequality, there is an unequal distribution of basic needs, which leads to an increase in educational inequality. However, since each division has its own resources and adopted the policy to guarantee equal educational opportunities for all, this policy has resulted in divisional differences having a negligible impact on Bangladesh's overall educational inequality. Although the study's main limitation—the large residual of overall inequality—the factor used to assess overall educational inequality in this study is a policy concern for further reducing educational inequality in Bangladesh. However, there might be an issue with the educational system and other causes such as culture, custom, and family notion create the educational gap and consequently the high residual share for the overall educational inequality.

### 3.5. Decomposition of educational inequality for a subgroup

The analysis in the previous sections show that age is relatively more dominating contributing factor to the educational inequality in most of the years. It might result from considering all the age groups

in the analysis. However, the opportunity of accessing education for the different age groups might not be the same. The educational opportunity for the young aged people might be different from that of old aged people. The government and NGO support in education sector started in the last decades of the nineties and took wider spread in the early twenty-first century. Hence, the opportunity of accessing education for the old age population was lower at their time than younger age at present time. The unequal educational opportunities for different age groups might make age a major contributing factor to the educational inequality while considering all age groups. Against this backdrop, in this section we consider a particular age group 15 to 30 who are currently not students to identify the relative contribution of different factors to the educational inequality. The analysis excludes the current students as they are yet to fully reap the educational opportunities and consider the young aged non-students as they are most likely fall in the time period when government support was wide and therefore enjoyed the benefit of these opportunities. Table 10 shows that while considering this subgroup, the contribution of age has decreased while income becomes a more dominating factor in all the years. It implies at present in spite of government and NGO support in education, there must be educational inequality caused largely by the income difference.

Table 10: Shapley decomposition result of age between 15 to 30 (out of 100%)

Factors	Education inequality index (Gini)			
	2005	2010	2016	2022
Gender	2.00	1.28	2.8	1.62
Region	6.80	1.96	5.07	2.37
Division	0.11	0.73	1.02	0.87
Age	3.70	15.34	6.65	13.00
Income	18.54	16.57	9.42	15.51
Residual	68.85	64.12	75.04	66.63

#### 4. Bright spots of the education sector

The education system of Bangladesh is inherited from the British colonial education system. The expansion of education among the people started during that period. However, Bangladesh has been able to make its own education development policy and strategies after getting independence in 1971. At that time, the education sector was beset with serious problems. The literacy rate was low, very few women participated in education, and a large percentage of the population was outside of any formal education system. This was due to Pakistan's discriminatory policies regarding the allocation of educational facilities toward Bangladesh (Asadullah, 2010).<sup>8</sup>

Since education is necessary to develop the human capital for the country, over the last two decades, Bangladesh has made significant strides in ensuring educational opportunities for its citizens. The development of the education sector was the main target of the subsequent government irrespective of their political affiliation and motives. Along with governmental initiatives, non-governmental organizations (NGOs) play a significant role in reaching out the education to unreached out-of-school

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<sup>8</sup> Bangladesh was the province of Pakistan from 1947 to 1971. Bangladesh was known as West Pakistan at that time

children. As a result, the literacy rate has significantly increased from 35.32 per cent in 1990 to 74.66 per cent in 2022 (BBS, 2022). This achievement in the literacy rate has been successful due to the dedicated effort of GoB, different NGOs and other stakeholders over time. The policy support of the GoB was not only limited to the infrastructure development, compulsory education, distribution of free textbooks and creation of greater gender coverage, but also it included dynamic policy actions like the Food for Education program (FFE), the female stipend program and the free education for the Girls (Kono et al., 2018). Moreover, the national education policy has made eight years of compulsory education for all citizens which consists of five years of primary school level and three years of junior school level (Government of Bangladesh, 2010). GoB provides free textbooks to both public and private schools up to the secondary education level. Moreover, Primary and secondary education is financed by the state and free of charge in public schools.

Among the different measures, the Food for Education<sup>9</sup> (FFE) program was widely successful in terms of increasing enrollment and school attendance, and consequently reducing the dropout rate (Ahmed et al., 2002). Under the FFE, the students were conditional to attend schools for receiving meals as well as taking home rations. This conditional disbursement of meals persuaded both boys and girls to attend the school. This strategy, however, was inadequate to make up for the female students' already poorer attainment rate at the school. Therefore, affirmative action policy was taken simultaneously for ensuring greater school attendance for females.

For instance, under the Female Secondary School Assistant Project (FSSAP), the government provides stipend to the female students at the secondary level which incentive the girls to get enrolled into school. Khandker et al. (2003) found that it increases the enrollment rate significantly since 1990s by reducing the cost of schooling for female students. In addition, the steady economic growth mainly driven by export-led-readymade garment manufacturing generated a greater return from schooling for females as this industry constitutes nearly 80 per cent of the female workers (Pitt et al., 2012; Heath & Mushfiq Mobarak, 2015). Hence, it is obvious that the increased female educational attainment is pushed by the different supportive measures of the government and labour market opportunities (Kono et al., 2018). Since the female literacy rate in Bangladesh was all-time lower since its independence of Bangladesh, this affirmative action made a positive change in female school attendance. As a result, the current success of the rising literacy rate is largely contributed by the increase in female attendance at the school.

Currently, GoB is running the Primary Education Stipend Program (PESP) at the primary education level and Secondary Education Stipends (SES) at the secondary education level. PESP is a conditional cash transfer program and targets poor family students. To qualify for the stipend support, a student must have 85 per cent monthly attendance, attend all the examinations and earn the minimum score of 33 per cent in each subject in her grade (Ministry of Finance, 2017). The stipends vary with the number of eligible children in the student's family. A family with up to two eligible children gets BDT 100 for each, with three and four children, the family gets a total of BDT 250 and BDT 300 per month respectively. At the secondary level, SES is also a conditional cash transfer program given to poor students from grades 6 to 10. To be eligible for the program, students must maintain minimum

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<sup>9</sup> FEE was replaced by the School Feeding Program (SFE) in 2001 ended in 2021 and was operationalized until 2021

attendance, pass the annual examination and remain unmarried till secondary completion. Eligible student also gets full tuition waiver and different amounts of stipends depending on which program covers them<sup>10</sup>. Depending on the program, the cash amount varies for a student from BDT 1380 to 3510 yearly. These stipend programs in the primary and secondary education levels constitute an important demand-side intervention to increase access to education. As a result, the access in the primary and secondary levels has been more equal.

The Contribution of NGOs to the education of Bangladesh was in the area of providing non-formal primary education (NFPE) to children aged 8-14 years in the rural area. They included those who dropped out from or never enrolled in primary school (Sabur & Ahmed, 2010). National NGOs such as Brac and other international NGOs, such as Save the Children and Plan International, provide NEPE to millions of children across the country (A. M. R. Chowdhury et al., 2002). Moreover, they run a number of primary schools which follow the national curriculum and made a significant contribution to providing the teaching and learning materials for both primary and secondary levels. Since girls have fallen behind in terms of getting a formal education, NGOs provide the opportunity for girls to take non-formal and formal education, as a result, girls were 60% of NEPE students (Falkowska, 2012).

As a single NGO, the contribution of Brac in the expansion of education is greater compared to any national and international NGO. Brac developed a unique model for non-formal education. Brac expanded this education support to the ethnic community and reached out education to the extremely rural areas (Char or Hoar areas). This expansion was under the Brac's Education Support Program (ESP) launched in 1992 which facilitates community-based organizations to run the school. Brac provided financial and technical support to these organizations. Moreover, Brac expanded the ESP to children with special needs (CSN) in 2003. Apart from taking different measures for students, Brac also undertakes different programs to engage the community in learning and teaching. For instance, the Union Library or Gonokendra Pathagars and Kishori Pathagars for girls are built to develop reading habits in the community residents. Under the Mainstream Secondary Schools Support initiative, Brac builds the capacities of rural secondary school teachers and helps to improve classroom pedagogy as well as the overall quality of education (Hossen, 2015).

To sum up, the increase in the country's literacy rate and female participation in primary and secondary levels is directly linked to the political will of the successive government, and the undertaking of appropriate policies, plans and programs (Nath, 2016). These government initiatives are supported and supplemented by many national and international NGOs. The contribution of the NGOs to girls, ethnic communities, remote residences and the poor in providing primary education is worth mentioning. Therefore, through these efforts, the expansion of education in Bangladesh over time has been successful.

## 5. Discussion

This study attempts to explore the current state of educational inequality in Bangladesh as well as identify the key driving forces of educational inequality. The study finds that over time educational

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<sup>10</sup> There are different project under SES such as Secondary Education Stipend Project (SESP), Secondary Education Development Program (SEDP), and the Secondary Education Sector Investment Program (SESIP)

inequality has been declining in Bangladesh although it is still very high. One major contributing factor to this high educational inequality is the unequal distribution of educational facilities among different income groups. The study clearly points out that the richer groups enjoy a larger share of the benefits of educational opportunities compared to their poorer counterparts. In this regard, two major questions arise including why the educational inequality is declining while the income inequality is growing and is income inequality leading to educational inequality or the educational inequality contributing to income inequality.<sup>11</sup>

Bangladesh has made a nearly perfect score in terms of primary school enrollment. The government as well as other stakeholders' initiatives of ensuring universal primary education leaves no scope of socio-economic inequality in accessing primary education. Therefore, the declining trend of education inequality despite the growing income inequality can be explained by more equal educational opportunity at the primary levels. However, the government or other stakeholders' support for higher education is mostly inadequate in Bangladesh leading to significant socio-economic inequality in accessing higher education. Therefore, although education inequality decreases due to the heavy concentration in primary education, educational inequality remains high due to unequal access to higher education.

The above analysis clearly points out that income inequality leads to higher educational inequality in Bangladesh. However, the link between educational and income inequality may not be uni-directional, rather it might be bi-directional; the very high educational inequality might also contribute to the growing income inequality. Evidences show that an individual having primary, secondary, higher secondary, and tertiary levels of education can gain more return from education compared to those who have no education. In addition, the return is higher for each subsequent education category, especially after crossing the threshold of secondary or higher secondary (Bhatta et al., 2019; B. Sen & Rahman, 2016). Although the poorer section of the society are participating in the primary education, a relatively smaller percentage of them can access higher education and therefore, are deprived of the benefits of higher returns of education. However, the higher income groups can attain a higher level of education, and get a greater return from education and thus exacerbate the existing income inequality. Therefore, income inequality leads to education inequality at the tertiary level and, educational inequality at the tertiary level may also lead to rising income inequality in Bangladesh.

It is evident that the deprivation of the poorer groups from the access to higher education creates the dual problem of educational and income inequality by mutually reinforcing and thus perputing the two problems. In this regard, it is important to investigate why the poor people are taking low education or in other words why their education attainment is largely concentrated on the primary level or secondary level. There are two corresponding answers in the relevant literature. First, there is a trade-off between short-run poverty reduction and long-run intergenerational mobility through human capital accumulation. Poor people are more likely to engage in work at an early age as they prefer to short-run gain from the labor market (Galor & Zeira, 1993). Second, less public and private sector support in higher secondary and tertiary levels of education prevents the poor from getting easy access to these education levels- this can be more predicted. These could lead to the actual cost and opportunity cost of taking higher education may exceed the return from higher education.

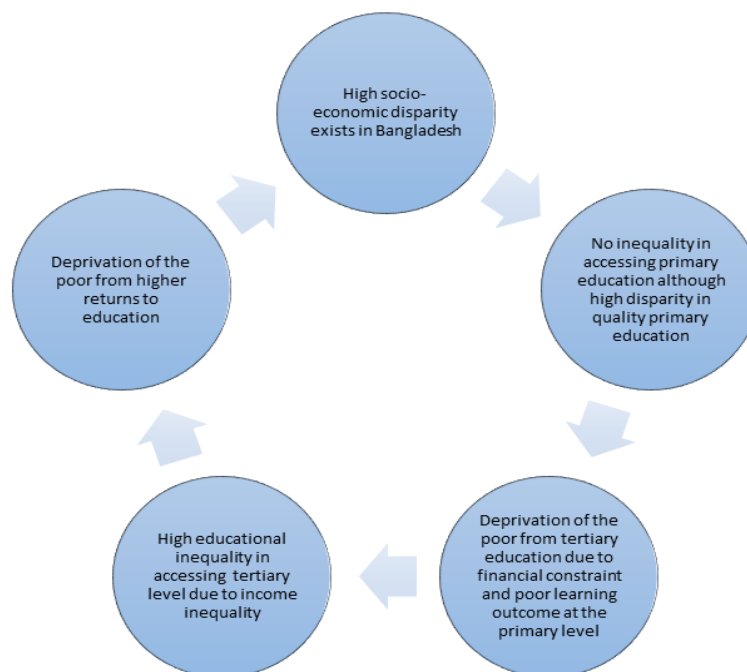
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<sup>11</sup> The income gini has grown from 0.46 in 2005 to 0.48 in 2016

Therefore, poor groups optimally choose the low education equilibrium which is supported (Spence, 1973).

Another issue related to the nexus between income and educational inequality is a divide in terms of the quality of education in Bangladesh which can also contribute to the rising income inequality or inequality in accessing higher education. There has been evidences that a significant learning gap exists in primary education of Bangladesh associated with the socio-economic status as well as background characteristics of the students where the students from richer families outperform than their poorer counterparts (Ahmmed & Uddin, 2022). Therefore, income inequality leads to disparity in accessing quality of education at the primary level, which makes higher education more expensive and less lucrative to the poorer section of the society and causing them to drop out of higher education. Therefore, the inequality in terms of access to quality education at the primary level causes inequality in terms of access to higher education and thus creating both educational and the income inequality.

Figure 3: Cycle of educational and income inequality in Bangladesh



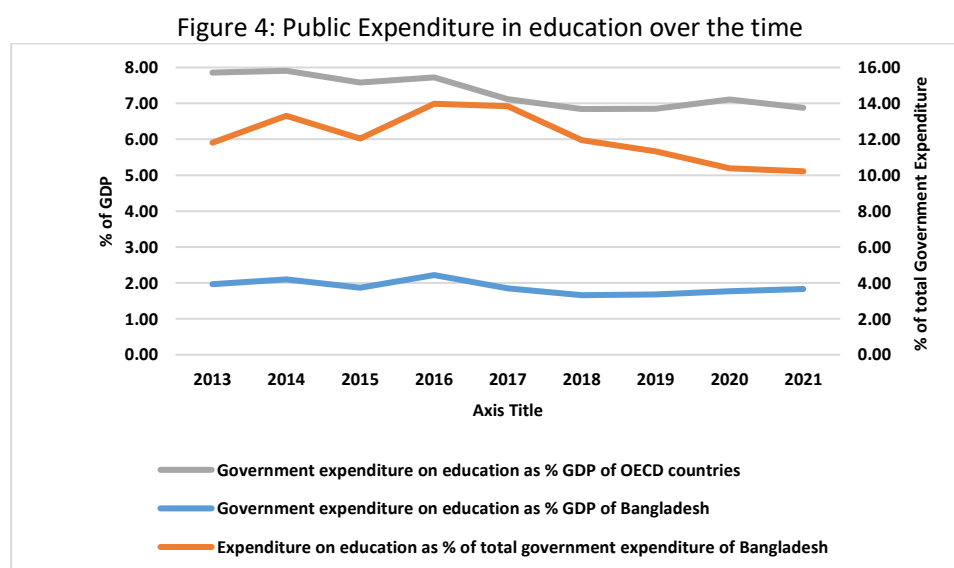
Source: Authors' illustration

In summary, income inequality does not have any effect on the access to primary education although affects the access to quality primary education. It also affects the access to higher education directly by creating financial constraint as well as making education more expensive. The education inequality in turn creates income inequality as the rich people are more likely to attain higher education due to better learning outcome at the primary level as well less financial constraints.

The other contributing factor to the educational inequality is the age and regional divide in Bangladesh. However, Bangladesh has made significant headway to address the issue of gender divide as a contributing factor to the educational inequality. The contribution of age to the educational inequality is mostly structural as the old aged people do have a constant level of education while the education attainment of the young people is growing leading to significant educational inequality with respect to age. With respect to the contribution of spatial divide to the educational inequality is mostly

due to the imbalanced development of the educational facilities in the rural and urban areas in Bangladesh.

Against this backdrop, a more equitable distribution of government expenditure is imperative to ensure equal access to education. Equitable distribution of expenditure implies spending or allocating relatively more budget to disadvantage groups who encounter difficulty in accessing education (i.e. poor or rural population) so that they can access education by addressing the difficulties. In this regard, the size of the education budget is often considered an important factor for ensuring both equity and equality in education. Currently the government of Bangladesh spends around 10 to 13 per cent of its total spending on education which is around two per cent of the country's total GDP (Figure 4). This expenditure remains low compared to the OECD countries, they spend around 6% of their collective GDP, even it is also low relative to India (around 5%) the average of Least Developed countries, and the South Asian average. It implies Bangladesh spends a very modest amount on education out of total revenue financing. Insufficient educational investment always leads to unbalanced educational development and education inequality.



Source: WDI

Now looking into the composition of the education budget, it is evident that around 80 per cent of the total budget goes to the primary and secondary education level and the rest goes to higher secondary and tertiary levels (1). However, in terms of per student expenditure, tertiary education receives the highest level of allotment, and the gap between tertiary and other education levels is much wider (Bhatta et al., 2019). The study already shows that a relatively richer portion of the population takes a tertiary level of education, this spending pattern is likely to have a negative impact on equity. Moreover, there may be a link between education spending and the quality of education. Since per student allotment in tertiary education is higher, the students at the tertiary level get many resources with better infrastructure, quality teaching, and environment. However, receiving a high share of total spending with poor per-student allotment by primary and secondary levels can ensure only access to education, however, cannot ensure the quality of education in primary and secondary levels. Hence, public spending in education ensures equity in terms of access but not the quality of education at the primary and secondary levels. Therefore, at first it is imperative to take necessary measures to ensure



the access of the children from disadvantaged household to the quality primary and secondary education. Secondly, there should be focus on a balanced development of education sector by breaking the spatial divide. Finally, the government as well as other stakeholders should focus on ensuring the access of the disadvantaged people to tertiary education.

Table 11: Percentage of public spending on education across different education level

Education Level	FY2015-16	FY2018-19	FY2020-21	FY2021-22
Primary (Grade 1-5)	43.5	42.94	39.73	40.52
Junior Secondary (Grade 6-8)	17.26	15.53	23.39	23.21
Upper Secondary (Grade 9-10)	20.52	20.44	24.33	24.04
Higher Secondary	2	1.45	0.99	1.02
Tertiary	16.71	19.64	11.56	11.21

Source: Author's calculation from Bangladesh Education Statistics

## 6. Conclusion

The purpose of the study is to understand the current state of educational inequality and propose policy support to make more equal distribution of the education system. The analyses of the study found that different education expansion policy, particularly for female, reduces educational inequality and increases the AYS over time in Bangladesh. However, there exists educational inequality associated with the regions, age and socio-economic status. Hence, the educational development path would deteriorate if factors affecting educational inequality would not properly be addressed.

The decomposition of inequality based on gender shows the contribution of male-female differences on overall educational equality is insignificant. This progress might be attributed to the country's affirmative action towards female education expansion at the primary and secondary levels (R. Chowdhury & Sarkar, 2018). However, the data of this study revealed that the gender gap exists at the tertiary educational level having a lower percentage of females attaining higher education. Early marriage, teenage motherhood and the prevalence of violence are the main obstacles for women to getting into higher education (Shilpi et al., 2017). The insignificant contribution of gender to overall inequality does not indicate that the current pro-female education policy is no longer relevant; rather it is more relevant to encourage female tertiary educational attainment to close the gender gap at the tertiary level.

The decomposition result based on region and division indicates that the regional gap is to some extent deep whereas the divisional difference is negligible. It suggests that people from rural areas are lagging behind their urban counterparts in terms of getting access to higher educational opportunities and quality education. Moreover, rural poverty has an acute implication for education such that lower income leads to lower education, as they engage their children in low-paid jobs from the very beginning. Overall, differences in socioeconomic status (across income group) influence educational attainment much. The individual belonging to a high-income household would have more opportunities to have more education than those of a low-income household. Decomposition based on the age group revealed country's eight-year compulsory education system significantly rises educational attainment among the young.

Next, the result of regression-based Shapley value decomposition shows that among the factors, age contributes to the overall educational inequality most. Moreover, regions and socioeconomic status

have an impact on rising overall educational inequality while gender and division have a negligent impact. Therefore, the result suggests the expansion of education to old age people, disadvantaged people (rural) and low-income people is the policy option for Bangladesh to reduce the existence of education inequality. Moreover, the high value of residual is the study's key limitation as this study does not explain more than half a portion of education inequality. Therefore, there is a scope for future research to explain the sources of those inequalities.

Finally, Bangladesh has achieved tremendous progress in the last few decades in terms of economic growth and development at the expense of rising income inequality. The country has set to achieve the sustainable development goals (SDGs) by 2030 and target to achieve 'equality for all' and eliminate 'all forms of discrimination'. However, rising income inequality, poor allocation of the education budget and unequal distribution of quality education make achieving the target challenging. So, policy options should be included to address the disadvantages group education desire and emphasize inclusive development in education for all areas.

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