

Research Article:

Explaining Rural-Urban Differences in The Academic Achievement of Secondary Students: An Empirical Study in Magura District of Bangladesh

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ABSTRACT

All the successive governments of Bangladesh – both civil or military – invested a considerable amount of national fortune in ensuring quality education for all, irrespective of caste or creed. Subsequently, Bangladesh has experienced significant growth in schools, colleges and universities in enrolment and completion rate of education with greater gender parity. However, the success stories were overshadowed by the persistent discrepancies, especially for spatial locations and social classes. This study, therefore, aimed at comparing the academic achievement of rural and urban students, and finding out the factors drawing differences in educational performances of the educands. Data were collected from 566 students selected from eight educational institutions following multistage proportionate random sampling administering a self-administered questionnaire. Findings suggest that age, sex, grades and track of education followed by the size of the class and student-teacher ratio played decisive roles for the educational disparities between the urbanites and ruralites. However, the most crucial factors were parental education and income and the family's overall financial capacity for supplementary education. Based on the results, it is strongly suggested that the government should involve all the stakeholders, including parents, students, and teachers, to formulate future education policies and address the socioeconomic composition of schools. Additionally, the administration also needs to provide adequate resources, including trained teachers and sufficient infrastructural and other academic facilities, to improve overall educational and learning environments to achieve all-inclusive quality education for all.

Keywords: Personal attributes, socioeconomic status, institutional factors, rural-urban disparity, academic achievement

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INTRODUCTION

Since independence in 1971, Bangladesh has been going through a steady economic shift – from an agro-based economy to a combination of import-substitution and export-oriented economy (Ministry of Finance, 2017). These changes in economic structure may have some decisive impacts on the education system at large (Ahmed, 2015; Al-Samarrai, 2009). The issues of inclusiveness with better quality education in schools, colleges and universities, are for manning various professions such as trade, finance and industries by semi-skilled and skilled human resources (Alam, 1994), and these issues have been getting importance in Bangladesh to meet the demands of the changing national and international conditions (Geske et al., 2006; Ministry of Finance, 2017). The first education commission, led by Qudrat-E-Khuda, acknowledged education as a means of harnessing social and economic transformation and advancement by a skilled and dedicated workforce, and this commission strongly advocated capital investment in the education sector to enhance optimum utilisation of available human and financial resources (Ministry of Education, 1974).

Henceforth, all the governments of Bangladesh, both military and civil, together with the development partners, stressed quality education for all and implemented policies and strategies, including subsidised universal primary education, stipend for female students, supply of free textbooks, school feeding program, at national and regional levels (Kono et al., 2018; Ministry of Finance, 2017; Rahman & Islam, 2009). To afford and boost up all those initiatives, the government spending for education increased gradually from 0.3% of the total GDP in 1973–1980 to 1.9% in 2015–2016, BDT295,100 million, constituting 10.7% share of the national budget (Bangladesh Bureau of Educational Information & Statistics, 2016).

With the amplified spending on education, Bangladesh eventually experienced tremendous improvement and growth in education at all dimensions and levels. The enrollment rate has improved at elementary levels, from 50% in 1970 to 97.3% in 2013 with increased gender parity (Bangladesh Bureau of Statistics, 2015b), and primary school students reached around 20 million, whereas the number of teachers rose from 0.1 million to 0.4 million, making the student-teacher ratio stabilise at 41: 1 (Nath et al., 2015; Bangladesh Bureau of Statistics, 2015b). Perhaps, the most notable changes took place at secondary and higher education levels. The net enrolment rate increased from around 20% in the 1980s to 47.3% in the second decade of the twenty-first century while the female enrolment crossed the 50% benchmark (Alam, 1994, Bangladesh Bureau of Statistics, 2015b). The number of secondary schools increased from 7,000 to 20,000, while the number of students rose from 1.5 million to over 10 million, where girls outnumbered boys by 8% (Rahaman, 2017; Nath et al., 2008; Bangladesh Bureau of Educational Information & Statistics, 2017). Furthermore, more than two and half a thousand colleges are dedicated entirely to intermediary education, and another two thousand are contributing for degrees, educating 3.8 million students altogether (Bangladesh Bureau of Educational Information & Statistics, 2017).

Despite these progressive changes in educational parameters, the Bangladeshi education system has some discrepancies. The rapid acceleration of literacy from the 90s has followed a sharp difference between sexes and between urban and rural areas (Bangladesh Bureau of Statistics, 2015b, Campaign for Popular Education, 2014). The net enrolment in all five levels of education is relatively low in rural areas compared to urban settings. The completion rate of public examinations by rural students in all three types of education systems is insignificant compared to their urban counterparts (Bangladesh Bureau of Statistics, 2015b). Moreover, the academic achievement remained heavily skewed between sexes and between spatial locations. In 2017, for example, a total of 1,42,487 students achieved A+; the highest grade in the education system in all three streams of education (general, *Madrasah* and vocational), out of which 68,596 were female (Bangladesh Bureau of Educational Information & Statistics, 2017). Among the high achievers, the lion's share was from urban areas with a sound-economic background (Nath et al., 2011).

This paper, aiming at identifying the determinants of rural-urban discrepancies in academic achievement, was set to answer two relevant questions:

1. What is the magnitude of the achievement gap among students of rural and urban areas in Bangladesh?
2. How are the personal profile, socioeconomic status (SES) or institutional characteristics influencing the academic disparity?

The outcome of this study may form the basis of future research endeavors and assist the policymakers to devise and execute educational plans to ensure the egalitarian educational system and improve students' performance in public examinations irrespective of geographical locations.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

There is no denial of the fact that the disparities between spatial location regarding quality education and performance in public examinations are widening at an alarming rate both in developing and developed countries (Amini & Nivorozhkin, 2015; Ansong et al., 2015; Ataç, 2019; Zhao et al., 2017). Studies conducted in developing and developed countries found many factors, including social, economic, academic and structural, that contribute directly or indirectly to the growing academic attainment-related inequalities among students. However, a handful of theories that identified the potential issues explaining the differences in academic achievement; and social capital theory by Coleman (1988) is one of them. To Coleman (1988), the desired academic achievement cannot be attained in absence of capital. To explain the significance of capital for academic achievement, he further delineated three distinct yet mutually constitutive elements of capital: e.g., *human*, *financial* and *social* capitals (see Figure 1). *Human* capital refers to the 'skills and capabilities' of individuals that allows to bring or shape the desired change in acts and actions; *financial*

capital includes ‘tangible resources’ often measured by wealth or income; while *social* capital denotes certain ‘social elements’ that not only facilitate the actions and interactions, but also produce different behavior and outcomes for individuals.

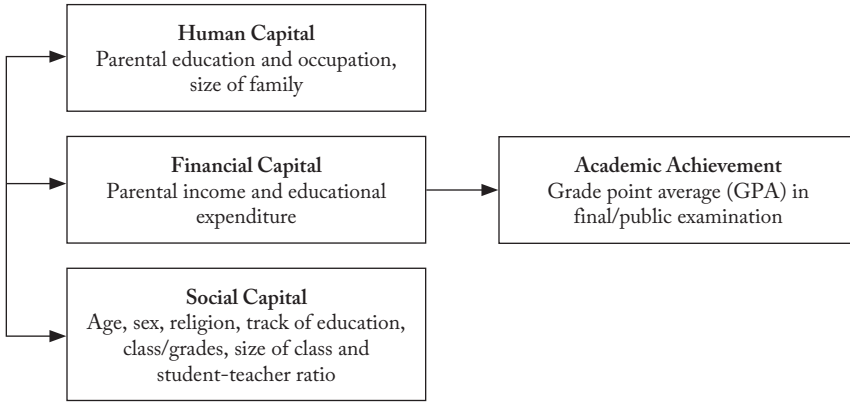


Figure 1. Conceptual framework based on social capital theory by Coleman (1988)

Studies related to academic achievement suggest that the most dominant issue influencing the access to education and academic achievement is the SES, i.e., parental education, occupation, and income (Amini & Nivorozhkin, 2015; Ansong et al., 2015; Ataç, 2019; Hao et al., 2014; Kainuwa et al., 2017). A study on Russian secondary students suggested that having both or one parent with tertiary education has a significant and positive impact on students' academic attainment (Amini & Nivorozhkin, 2015). A similar result was observed in a study on tertiary students in Turkey (Ataç, 2019). The findings indicated that children of high-educated parents were more successful than those with low education. In fact, the impact of a father's education on children's academic achievement is more apparent than a mother's education. Earlier studies in Bangladesh also found that a father's education has a greater predictive power than that of a mother's education (Nath, 2012; Suhi et al., 2020), while the findings of Mohsin et al. (1996) indicated that mother's education has greater influence on children's academic competency. Besides, parental occupation also influences the academic achievement of children. For example, Ataç (2019) found that students whose fathers were involved in white-collar jobs were more academically successful than blue-collar work families. Ansong et al. (2017) also observed that parental employment played a critical role in explaining academic disparities between urban and rural children. They, however, found that the father's employment was positively associated with children's academic achievement, while it was negative for the mother's employment. They suggested that the absence of a mother in home-based teaching and learning may have led to a decline in children's academic achievement. In an educational trajectory analysis, Hao et al. (2014) found that lower parental education and occupation are the two most important SES risk factors for students in rural and urban areas to succeed academically.

Likewise, parental income plays a pivotal role in the academic achievement of children. Kainuwa et al. (2017), reviewing the influence of parental economic factors on children's dropouts in Nigeria, concluded that parental income determines children's academic progress, whether the children continue the education or not. Also, parental income influences a family's capacity to spend for children's education and well-being (Kainuwa et al., 2017; Suhi et al., 2020). Parents from economically well-off families, especially those living in urban areas, are more proactive in reviewing their children's achievements or contacting teachers about their children's academic progress (Zhao et al., 2017). This is because they have financial and social resources to extend the learning opportunities for their children compared to those from low-income families (Witte, 2000). Ismail et al. (2019), assessing the role of SES in predicting reading comprehension by Malaysian university students, hypothesised that SES predicts reading comprehension of English as a second language (ESL) learner. Because SES influenced the cognitive development of educators, especially children from higher SES, i.e., highly educated parents with better employment and financial capability, generally embodies superior knowledge, skills, habits, and personality that in turn produce better academic attainment (Kainuwa et al., 2017; Strayhorn, 2009; Zhao et al., 2017). In contrast, lower SES families could not afford books, nutritious foods and a congenial home environment for their children. Moreover, parents, struggling to manage day-to-day living, could not pay attention to or care for engaged round the day for children's academic achievement (Uddin, 2017).

However, the financial support for education depends on the family composition, i.e., large or small family size. Ansong et al. (2017) found that household size was negatively associated with the academic achievement of Ghanaian students irrespective of spatial distribution. A study on parental choice of schools for children suggested that parents from nuclear or smaller families generally enroll their children in costly private schools; otherwise, they turned to inexpensive government schools in Bangladesh (Hossain et al., 2017). Another study on Chinese junior high school students suggested that urban students often outperform their compatriots from rural areas because urban students have fewer siblings. Thereby, their parents have more financial resources to mobilise for after-school classes and other facilities to boost the academic excellence of children (Zhao et al., 2017). Nevertheless, students from high SES families have greater access to information and relevant opportunities, which in turn accelerate their chances of performing better in academic examinations (Strayhorn, 2009).

In addition to SES, some other factors significantly influence academic achievement. In explaining the rural-urban divide in the educational outcome, Amini and Nivorozhkin (2015) found that younger students performed better than their older counterparts, while female students underperformed in mathematics and science but did exceedingly well in reading comprehension when compared to male students. They further observed that students in higher grades performed better than students from lower grades. The results of Suhi et al. (2020) complemented that of Amini and Nivorozhkin (2015) except for sex. Suhi et al. (2020) found that female students outperformed their male colleagues in public examinations. They, however, found no significant relation between religion

and the academic achievement of secondary students. Hao et al. (2014), regarding the association between sex and academic achievement, concluded that being female posed the highest risk of achieving a great fit in academia in both urban and rural areas. Luschei and Fagioli (2016) observed that the academic performance, e.g., reading and mathematics, of female students was lower than that of male students, both in rural and urban areas. Additionally, they found that students from lower grades performed better in reading and solving mathematical problems than higher-grade students. The track of education also influences the academic achievement of students. A German panel data on secondary students showed that academic track students (e.g., bright students) performed considerably higher than non-academic track (e.g., mediocre) and comprehensive school students (e.g., below average) in intelligence tests as well as in mathematics, language, social and science studies (Guill et al., 2017). Another study on K-12 students of the Philippines indicated that students of science, technology, engineering and mathematics (STEM) outperformed their compatriots from business, humanities and social science, vocational and general academic strands in all six subsets of the scholastic abilities test for adults (SATA) (Almerino et al., 2020).

Apart from family background and personal characteristics, school characteristics influence the academic attainment of students. Amini and Nivorozhkin (2015), for example, observed that the school size and students-to-teacher ratio varied significantly between urban and rural areas, where the former showed a large concentration of students. Yet, the rural students performed relatively poorer than the urban students because of the disparity in school resources. Nath (2012), determining the factors influencing the academic achievement of primary school students, found a significant negative relation between student-teacher ratio while it was positive for class size. Because the number of students per teacher was higher, but the number of students in the class was lower.

Considering all these issues, this study was designed to reveal the academic disparity between urban and rural students in Bangladesh, and how the human capital (parental education, occupation, and size of family), financial capital (parental income and educational expenditure) and social capital (age, sex, religion, track of education, education, size of class and student-teacher ratio) influence the spatial academic disparity. However, it is important to note that there is almost non-existence of any initiative that has been taken by the government and its development stakeholders to identify the existing problems of spatial disparity in academia and to sort out the determining factors driving such inequality, with some exceptions by private organisations and civil societies (Ahmed et al., 2006; Nath et al., 2008, Nath & Chowdhury, 2009; Nath et al., 2011, Campaign for Popular Education, 2014). Hence, this study is expected to guide future programs, policies, and strategies to minimise spatial academic inequalities by addressing the social, economic and infrastructural issues explored in the current research endeavour.

METHODOLOGY

Study Area and Participants

This study was carried out in *Magura* District, the fifth most densely populated sub-divisional area under the Khulna Division of Bangladesh, covering 1,039.10 km² (Bangladesh Bureau of Statistics, 2015c). There are four *upazilas* (sub-districts) in *Magura* District, and most of the people resides in rural areas (86.89%); the literacy rate, however, is higher in urban (65.17%) than rural areas (48.41%) with an overall literacy rate of 50.64% (Bangladesh Bureau of Statistics, 2015a). This study collected data from two *upazilas*, namely *Magura Sadar* and *Shalikha*, of *Magura* District. There are 85,888 households in *Magura upazila* with a literacy rate of 45.01%, whereas the literacy rate is around 42% in *Shalikha upazila* with 36,867 households (Bangladesh Bureau of Statistics, 2015a).

In this study, the participants were picked using multistage proportionate random sampling. At first, four educational institutions, including schools and colleges from each *upazila*, were picked considering their academic performance in national public examinations. Then, in the second step, some specific characteristics were identified to pick the samples, i.e., the participants must have completed the junior secondary certification (JSC), secondary school certificate (SSC) and higher secondary certificate (HSC) examinations, or their equivalent in *Madrasah* education, without repetition, and enrolled in Class Nine (IX), Class Eleven (XI) and Honours/Degree First Year (XIII), respectively.

Based on the criteria mentioned above, an inventory list of eligible students was developed, comprising 1,899 students of secondary, higher secondary and tertiary levels. Finally, 566 students were selected randomly, proportionate to the number of students from each educational institution (See Table 1). The academic achievement of secondary and higher secondary students is of critical importance for an expanding economy of Bangladesh as a satisfactory educational achievement at this stage offers better educational opportunities in colleges and universities and employment in different professions, including trade, business, civil or military services (Alam, 1994).

Table 1. Sample distribution with the type of educational institutions

Educational institutions	Type of institutions	Samples drawn	
		Rural	Urban
School	Female	0	54
	Male	0	48
	Co-education	141	49
Madrasah	Co-education	19	0
College	Co-education	122	133
Total		282	284

Note: The names of the educational institutions were not disclosed because of the confidential issue

Instrument and Procedure

A semi-structured self-administered questionnaire (SAQ) in English, containing both open- and close-ended items, was used in this study. The SAQ, developed after reviewing relevant literature, was divided into three sections: Section one extracted necessary information, including age, sex, religion, academic achievement, section two highlighted the family and household information, such as parental education, occupation, income, as well as household composition and expenditure, and the last section extracted information about educational institutions, type and size of institution, student-teacher ratio as well class size.

The researchers visited the selected educational institutions with the written official permission from the District Education Officer (DEO) of Magura District and the Head/Principal of each institution following a written request from the Head of Sociology Discipline, Social Science School, Khulna University, Bangladesh. The researchers verified the participants' identity by their class teachers, then introduced themselves and gave a short briefing on the purpose of the study. There were six data enumerators trained extensively about the content of the SAQ to maintain uniformity and keep the anonymity of the participants. After the briefing, the students were reorganised to avoid duplication of the answer to preserve the integrity of the data and extract authentic information. After the distribution of SAQ, it was collected from the students around 15 to 20 minutes later. It is, however, noteworthy that the SAQ was pre-tested on 30 participants, 15 each from *Magura* and *Shalikha Upazilas*, who were later dropped from the actual fieldwork. Some modifications were made in the content, style, and language from the feedback of the pre-test. Data were collected from January to March 2017, and it was administered at the convenient time of the students – usually during the lunch break – from each educational institution. The students verbally agreed to participate voluntarily in the survey, and they were free to decline at any time of the survey.

Measures

Personal attributes

The personal profile is assessed by the individual's age, sex, and other socio-demographic factors. In this study, personal attributes include age, sex, religion, educational status (measured in years), and the track of education based on groupings of humanities, science, and business studies.

Socioeconomic status (SES)

SES is, in general, measured by an individual's social and economic position regarding their financial capacity, educational background and professional record. In educational research, the SES is a composite of five components, including parental education, paternal occupation, income, and family assets (Snyder et al., 2009; Li et al., 2016). However, this

study measured SES by parental education, occupation, income, monthly expenditure for education, and family composition.

Characteristics of educational institutions

There is no universal definition of the characteristics of the educational institution. However, it means the attributes of any educational institute which may include its location, size, teacher and student number, training, school facilities, including the library, potable water, and proper sanitation facilities (Nath, 2012). In this study, the size of the class and the student–teacher ratio were used as the features of the educational institution.

Academic achievement

Researchers across the world defined academic achievement from various perspectives. Some referred to a collection of teacher ratings, academic grades, and test scores (Chowa et al., 2015; Ataç, 2019), while others assessed it not by grades only, but by regular school attendance as well as participation in class discussion (Bandura et al., 1996; Uddin, 2017). In this study, however, the grade point average (GPA) attained by the participants in preceding national public examinations, ranging from the lowest letter grade ‘F’ (0–32 marks with grade point 0.00) to the highest letter grade ‘A+’ (80–100 marks with grade point 5.00), was used as a proxy of academic attainment. In addition, this study considered GPA in the public examination as a dependent variable because it has been a nationally accepted benchmark to assess an individual’s academic excellence in Bangladesh since 2001.

Data Analysis

Data were analysed by SPSS in three stages. At the first stage, the distinction between rural and urban students by several key characteristics, such as personal attributes and SES, were drawn by using descriptive statistics, including percentage analysis, mean and standard deviation. At the second stage, the gaps between rural and urban students, regarding their academic achievement, were drawn by independent–samples *t*-test and the effect size, recommended by Cohen (1988). At the third stage, the determinants were identified by executing Pearson’s chi-square (χ^2) test for independence, by defining both independent and dependent variables categorically, firstly to evaluate the relationship between independent variables (personal profile, SES) and dependent variable, in this case, the academic achievement (Gravetter & Wallnau, 2017), and finally to address the research questions. It is important to note that whenever the expected values in one or more cells in Pearson’s chi-square analysis were less than 5, the Fisher’s exact test was reported, whereas for 2×2 table Yate’s continuity correction was reported (Pallant, 2011). Phi-coefficient (ϕ), as well as Cramer’s V (ϕ_c), were executed additionally to present the effect size, suggested by Cohen (1988), of the association between independent variables (personal attributes and SES) and dependent variable (academic achievement). The former was used for 2 by 2 tables, and the latter was used for more than 2 by 2 tables (Pallant, 2011, Field, 2013).

RESULTS

Rural-urban Gaps in Academic Achievement

An independent *t* test was executed to assess to what extent does the academic differences exist between the students of rural and urban areas (see Table 2). Findings suggest a significant difference between the students, $t(598) = -11.294, p < 0.01$, with urban ones ($M = 4.38, SD = 0.56$) were performing better than their rural counterparts ($M = 3.80, SD = 0.67$) in public examinations. The differences between means (mean difference = 0.59, 95% CI: -0.69 to -0.48) was large ($\eta^2 = 0.43$).

Table 2. Comparing the academic achievement

Variable	Rural		Urban		<i>t</i>	η^2
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Academic achievement	3.80	0.67	4.38	0.56	-11.294***	-0.43

Note: *** $p < 0.01$

Determinants of Academic Achievement

Table 3 shows the association between independent variables with academic achievement. Findings suggest that younger educands outperformed their older counterparts, both at rural ($\chi^2_{Yates} = 11.547, p = 0.001, \phi = -0.210$) and urban areas ($\chi^2_{Yates} = 32.855, p = 0.000, \phi = -0.348$), however, the effect size was stronger in the urban areas. About sex differences, female students, both in rural ($\chi^2_{Yates} = 7.337, p = 0.007, \phi = 0.169$) and urban ($\chi^2_{Yates} = 8.198, p = 0.004, \phi = 0.178$) areas, performed better than male students irrespective of regions, however, the urban females academically performed proportionately better than their rural counterparts. In contrast to age and sex, religion have no effect on academic achievement, both at rural ($\chi^2_{Yates} = 1.685, p = 0.194, \phi = 0.087$) and urban areas ($\chi^2_{Yates} = 1.413, p = 0.235, \phi = -0.081$). In case of academic track, the students of humanities performed relatively better than the students of science and business studies in rural area ($\chi^2_{Yates} = 14.516, p = 0.000, \phi = 0.331$), however, no statistically significant relation found between academic track and academic attainment in urban area ($\chi^2_{Yates} = 0.452, p = 0.501, \phi = 0.049$). Like the age categories, it was found that students of Class IX performed relatively better than the students of Class XI and Class XIII in public examinations both at rural ($\chi^2 = 15.342, p = 0.000, \phi_c = 0.233$) and urban ($\chi^2 = 52.349, p = 0.000, \phi_c = 0.429$) areas, but the effect size of class or grade was stronger for urban cases.

Among the issues of SES, it was found that parental education significantly influenced the academic achievement, irrespective of regions (rural $\chi^2 = 24.428, p = 0.000, \phi_c = 0.294$, urban $\chi^2 = 32.905, p = 0.000, \phi_c = 0.336$ for father, and rural $\chi^2 = 12.702, p = 0.009, \phi_c = 0.213$, urban $\chi^2 = 39.923, p = 0.000, \phi_c = 0.375$ for mother, respectively). Indeed, parents' education has a significant association with their children's learning; however, Cramer's V suggests that the education of urban parents has stronger effects on academic

performance than their rural equivalents. Unlike education, the influence of parental occupation and income varied in terms of association and effect size across the location of schools. For example, the occupation of fathers, both in rural and urban areas, has a significant association with the academic performance of their children. However, income of urban fathers ($\chi^2 = 23.405$, $p = 0.000$, $\phi_c = 0.287$) was more intensely associated with academic success than their rural counterparts ($\chi^2 = 6.201$, $p = 0.041$, $\phi_c = 0.150$). Unlike the fathers, the occupation and income of only urban mothers influenced children's academic triumph, while rural mothers – due to their minimum educational qualifications and extensive engagement in household chores (99%) – could not influence their children's educational accomplishment.

Apart from background factors, some other issues may have a critical association with academic performance. For example, the small families, particularly in urban areas, have notable influence on academic performance ($\chi^2_{\text{Yates}} = 12.658$, $p = 0.000$, $\phi = -0.219$). Nonetheless, the resource mobilisation capacity of the household, measured by educational expenditure in this research, exhibited a key role in extending the academic performance of students, especially in urban areas ($\chi^2_{\text{Yates}} = 23.096$, $p = 0.000$, $\phi = 0.293$). Meanwhile, rural students' achievement was not influenced by any of the factors described above.

Besides, some institutional factors may also mold scholastic performance. For example, the rural students from large class size ($\chi^2_{\text{Yates}} = 19.047$, $p = 0.000$, $\phi = -0.267$) poorly performed in public examinations. On the contrary, urban students from greater class size performed better in public examinations ($\chi^2_{\text{Yates}} = 27.886$, $p = 0.000$, $\phi = -0.322$), and the effect size was greater in urban areas. Regarding the student-teacher ratio, better academic attainment or success stories for both urban and rural areas depend on the number of students per teacher, meaning the fewer the students per teacher in an educational institution, the better their performance in public examinations in Bangladesh.

DISCUSSION

This study aimed to identify the determinants of academic disparity between secondary students of rural and urban areas. About the first research question, assessing the achievement gap, it is evident that the urban students performed better in public examinations than their rural counterparts, and this finding complements the results of previous studies (Amini & Nivorozhkin, 2015; Ataç, 2019; Ansong et al., 2015). About the second research question, addressing the influence of personal, SES and institutional characteristics on academic achievement, it is evident that personal traits are at the focal point to explain the rural-urban variations in academic performance. The results suggest an inverse relationship between age and class/grades with the academic performance, as young and lower grade students performed better in public examinations than older and higher-grade students in both rural and urban areas, and such findings contradict the results of Li et al. (2016), however, confirm the findings of Amini and Nivorozhkin (2015). Previous Bangladeshi studies also differ regarding the influence of age on academic achievement. For example, Suhi et al. (2020) found that older and higher-grade students performed better than that of younger

Table 3. Determinants of geographical variability in academic achievement

Variables	Rural ^o		Test statistics	p-value	Effect size	Urban ^o		Test statistics	p-value	Effect size
	≤ 3.99	4.00 ≥				≤ 3.99	4.00 ≥			
Age										
≤ 16	84 (50.0)	81 (71.1)	11.547 ^a	0.001 ^{***}	-0.210 ^{***d}	22 (30.6)	148 (69.8)	32.855 ^a	0.000 ^{***}	-0.348 ^{***d}
17 ≥	84 (50.0)	33 (28.9)				50 (69.4)	64 (30.2)			
Sex										
Male	101 (60.1)	49 (43.0)	7.337 ^a	0.007 ^{***}	0.169 ^{***d}	50 (69.4)	104 (49.1)	8.198 ^a	0.004 ^{***}	0.178 ^{***d}
Female	67 (39.9)	65 (53.4)				22 (30.6)	108 (50.9)			
Religion										
Hinduism	35 (20.8)	16 (14.0)	1.685 ^a	0.194	0.087 ^d	10 (12.5)	47 (21.4)	1.413 ^a	0.235	-0.081 ^d
Islam	133 (79.2)	98 (86.0)				70 (87.5)	173 (78.6)			
Track of education										
Humanities	143 (85.1)	74 (64.9)	14.516 ^c	0.000 ^{***}	0.235 ^{***d}	23 (31.9)	57 (26.9)	0.452 ^a	0.501	0.049 ^d
Science & business studies	25 (14.9)	40 (35.1)				49 (68.1)	155 (73.1)			
Education										
Class IX	68 (40.5)	73 (64.0)				16 (22.2)	135 (63.7)			
Class XI	71 (42.3)	31 (27.2)	15.342 ^b	0.000 ^{***}	0.233 ^{***e}	25 (34.7)	57 (26.9)	52.349 ^b	0.000 ^{***}	0.429 ^{***e}
Class XIII	29 (17.3)	10 (8.8)				31 (43.1)	20 (9.4)			
Education of father										
No education	24 (14.3)	14 (12.3)				10 (13.9)	9 (4.2)			
Primary (I-V)	44 (26.2)	22 (19.2)				9 (12.5)	14 (6.6)			
Secondary (VI-X)	84 (50.0)	46 (40.4)	24.428 ^b	0.000 ^{***}	0.294 ^{***e}	24 (33.3)	36 (17.0)	32.905 ^c	0.000 ^{***}	0.336 ^{***e}
Higher secondary (XI-XII)	14 (8.3)	14 (12.3)				11 (15.3)	21 (9.9)			
Tertiary (XIII-XVII)	2 (1.2)	18 (15.8)				18 (25.0)	132 (62.3)			

(Continued on next page)

Table 3. (Continued)

Variables	Rural ^a		Test statistics	p-value	Effect size	Urban ^a		Test statistics	p-value	Effect size
	≤ 3.99	4.00 ≥				≤ 3.99	4.00 ≥			
Occupation of father										
Irregular job	123 (73.2)	61 (53.5)	10.778 ^c	0.001 ^{***}	0.203 ^{***d}	20 (27.8)	18 (8.5)	15.627 ^a	0.000 ^{***}	0.246 ^{***d}
Regular job	45 (26.8)	53 (46.5)				52 (72.2)	194 (91.5)			
Monthly income of father (in BDT ¹)										
≤ 15,000	151 (89.9)	93 (81.6)				49 (68.1)	79 (37.3)			
15,001-30,000	11 (6.5)	18 (15.8)	6.201 ^c	0.041 ^{**}	0.150 ^{***e}	17 (23.6)	119 (56.1)	23.405 ^b	0.000 ^{***}	0.287 ^{***e}
30,001≥	6 (3.6)	3 (2.6)				6 (8.3)	14 (6.6)			
Education of mother										
No education	27 (16.1)	17 (14.9)				14 (19.4)	13 (6.1)			
Primary (I-V)	73 (43.5)	30 (26.3)				14 (19.4)	14 (6.6)			
Secondary (VI-X)	61 (36.3)	54 (47.4)	12.702 ^c	0.009 ^{***}	0.213 ^{***e}	27 (37.5)	49 (23.1)	39.923 ^b	0.000 ^{***}	0.375 ^{***e}
Higher Secondary (XI-XII)	6 (3.6)	10 (8.8)				5 (6.9)	28 (13.2)			
Tertiary (XIII-XVII)	1 (0.6)	3 (2.6)				12 (16.7)	108 (50.9)			
Occupation of mother										
Housewife	167 (99.4)	114 (100.0)	0.000 ^c	1.000	-0.049 ^d	69 (95.8)	170 (80.2)	8.727 ^a	0.003 ^{***}	0.186 ^{***d}
Working mother	1 (0.6)	0 (0.0)				3 (4.2)	42 (19.8)			
Monthly income of mother (in BDT)										
No income	167 (99.4)	114 (100.0)				69 (95.8)	170 (80.2)			
1-10,000	1 (0.6)	0 (0.0)	0.000 ^c	1.000	-0.049 ^e	0 (0.0)	3 (1.4)	10.516 ^c	0.003 ^{***}	0.187 ^{***e}
10,001 ≥	0 (0.0)	0 (0.0)				3 (4.2)	39 (18.4)			
Size of family										
Small family (≤4)	70 (41.7)	40 (35.1)	0.974 ^a	0.324	0.066 ^d	29 (40.3)	138 (65.1)	12.658 ^a	0.000 ^{***}	-0.219 ^{***d}
Large family (≥5)	98 (58.3)	74 (64.9)				43 (59.7)	74 (34.9)			

(Continued on next page)

Table 3. (Continued)

Variables	Rural ^e		Test statistics	p-value	Effect size	Urban ^e		Test statistics	p-value	Effect size
	≤ 3.99	4.00 ≥				≤ 3.99	4.00 ≥			
Educational expenditure (in BDT)										
≤ 5,000	167 (99.4)	112 (98.2)	0.115 ^c	0.568	0.055 ^d	62 (86.1)	113 (53.3)	23.096 ^a	0.000 ^{***}	0.293 ^{***d}
≥ 5,001	1 (0.6)	2 (1.2)				10 (13.9)	99 (46.7)			
Size of the class										
≤ 150	77 (45.8)	83 (72.8)	19.047 ^a	0.000 ^{***}	-0.267 ^{***d}	7 (9.7)	96 (45.3)	27.886 ^a	0.000 ^{***}	-0.322 ^{***d}
151 ≥	91 (54.2)	31 (27.2)				65 (90.3)	116 (54.7)			
Student-teacher ratio										
≤ 40	126 (75.0)	65 (57.0)	9.242 ^a	0.002 ^{***}	0.189 ^{***d}	16 (22.2)	135 (63.7)	35.452 ^a	0.000 ^{***}	-0.361 ^{***d}
41 ≥	42 (25.0)	49 (43.0)				56 (77.8)	77 (36.3)			

Notes: ^e Numbers in parenthesis are the percentage; ^{***} Significant at 1% level; ^{**} Significant at 5% level; ^a Yates's continuity correction; ^b Pearson's chi-square; ^c Fisher's exact test; ^d Phi-coefficient (^e); ^e Cramer's V (^e); ¹ BDT 1 = US \$ 0.012

and lower grade students, while Nath (2012) reported negative association between older age and academic achievement. The reasons for underperformance in public examinations by older students at higher grades may be attributed to the reduced supervision and monitoring of parents, involvement in co-curricular activities – sports, cultural events – problems of adjustment in transition from the familiar environment at school to a newer academic environment at colleges, exposure to the Internet, more interaction with peers and outside world than reading materials. Moreover, in this study, the association of age with academic achievement was assessed between groups, not within as it was done by Amini and Nivorozhkin (2015), and they found that older students underperformed in the same grade compared to younger students. To comprehend the effects of age on academic achievement. Thus, this study recommends further intensive study in this regard.

The results also suggest a positive change in Bangladesh, meaning female students are better positioned in public examinations than male students. The performance of female students in urban areas also exceeded that of rural ones. Unlike boys, who are more involved in co-curricular issues and addicted to non-academic activities (Golder et al., 2017), girls in Bangladesh generally have more time at their disposal to spend in academic activities, despite their household responsibilities (Glick & Sahn, 2000), especially in rural areas. The results of this study complement the findings of Suhi et al. (2020) but contradict Nath (2012). The possible explanation of such contradiction could be the measurement of academic achievement. The current study, like Suhi et al. (2020) did in their investigation, measured the academic achievement by GPA in public examinations, and the academic feat in such examinations depend more on rote learning rather than competence. It is well evidenced that female students underperformed in competence tests compared to male students, whether in Bangladesh (Nath, 2012) or other countries (Amini & Nivorozhkin, 2015; Hao et al., 2014; Luschei & Fagioli, 2016), while Ismail et al. (2018) found no significant difference between male and female regarding reading comprehension. However, to understand the dynamics between sex and improved academic achievement at secondary levels, further study is required to explore the role of regular academic activities and participation in co-curricular activities, nature, and pattern of involvement in household chores, type and use of supplementary classes of students both at rural and urban settings.

As evident in this study, religion does not play an important role when explaining discrepancies in academic performance between rural and urban areas concerning public examination, and such findings replicate the results of Nath (2008) and Suhi et al. (2020). However, a recent study in a heterogeneous ethnoreligious society suggests that students from marginal or minority groups often underperform in public examinations than the ethnic majority does, mainly due to persistent social, economic, and political inequalities (Friedlander et al., 2016). Bangladesh, being a homogeneous society where more than 90% of people are ethnically Bengali Muslims, does not relate ethnoreligious identity with academic disparity but rather concerns disparities between geographical locations or socioeconomic backgrounds.

One of the significant factors drawing academic differences in the preference of academic track. As findings suggest, students from urban areas preferred science and business studies over the humanities track, and they achieved the highest feat academically, whereas the rural students from science and business studies backgrounds also performed exceedingly well. However, the number of students in science and business studies in rural areas was lower than that of urban areas. Studies from other studies also reflected the same results. For example, Guill et al. (2017) found that academic track students were more intelligent than other students, and they performed way better in mathematics, language, social and science studies. Likewise, Almerino et al. (2020) observed that STEM students outshined academically when compared to students from other tracks. However, the findings from this study can be interpreted in three possible ways. The first one is the inability of rural students to live up to the expectation when selecting science and business studies, because more efficient teachers often concentrate in urban schools that offer better academic resources (Tayyaba, 2012). The second one could be that the rural low or not educated parents, fighting for daily livelihood, are less passionate about the learning outcome of their children compared to the highly educated and more affluent parents in urban areas (Strayhorn, 2009; Uddin, 2017; Zhao et al., 2017). The third and the final explanation is the incapacity of rural educational institutions to offer quality education and other technical supports, including lack of quality teachers and insufficient funding to afford science laboratory facilities, little to no financial support for supplementary classes (Amini & Nivorozhkin, 2015; Kainuwa et al., 2017; *The Daily Star*, 2011). For an equitable and all-inclusive education, in-depth studies are strongly advocated to find out the underlying issues, such as personal, social, economic and institutional, of rural students' reluctance to pursue an academic career in science and business studies.

Among other factors that proved to be critical to understanding spatial differences in academic performance are parental education, occupation, and income. Parental education, especially for parents with greater than higher secondary levels, has a significant impact on children's chances of getting the highest GPA in public examinations for both areas. An earlier study on tertiary students in Turkey suggested that a father's education is decisive for academic achievement of children both in urban and rural areas (Ataç, 2019). In the current study, it is found that the mother's education was more influential compared to the father's education, and this result complements the findings of Suhi et al. (2020). It is also evident that parents' involvement in income-generating activities, especially government jobs for fathers in urban areas and businesses in rural areas, increased the possibility of achieving a better GPA for their children. Likewise, parents with more financial resources, measured by monthly income in this study, assured relatively better academic performance by children irrespective of geographical locations. It is needless to say that parents from urban areas generally have better education, more stable jobs, and higher income than their rural counterparts; hence, they often offer more cognitive stimulants in the forms of instructions, reading materials and financial incentives (Kainuwa et al., (2017). Moreover, urban students have a better home environment, often enrolled in schools with a competitive academic environment with sufficient human and infrastructural resources and could reach out to well-trained teachers (Tayyaba, 2012). These findings complement previous

studies suggesting children from better socioeconomic backgrounds often outperform their counterparts from lower SES, both in Bangladesh and other countries (Amini & Nivorozhkin, 2015; Asadullah et al., 2007; Ataç, 2019; Li et al., 2016;). Because well-off families have more resources – both human and financial – to invest in education, and they consider it a gateway to secure a future for their children, academically and socially (Hossain et al., 2017).

Parental education, occupation, and income, indeed, influenced academic achievement. Nevertheless, the significance of family composition – the size of the family – cannot be ignored. Generally, a large family means less per-capita expenditure for education and other social needs (Zhao et al., 2017). In this study, however, it has been observed that the academic performance of urban students was negatively associated with small families, suggesting students from large families are doing well academically than their counterparts from small families, and such result opposes the results of Ansong et al. (2015). Previous studies suggested that students from nuclear or smaller families generally perform better than those from extended or larger families because small or nuclear families have more financial resources to support the academic endeavor of their children than extended families (Hossain et al., 2017; Strayhorn, 2009; Zhao et al., 2017). However, children from large families may perform well if the family members of larger families play a positive role in the socialization process, such as inspiring young family members by setting examples of the elders, guiding them to find out the best possible means to get supplementary classes after school, providing financial support and so on. This study also exhibits that families in urban areas offer more financial help to meet educational costs compared to rural families, which in turn positively affects the academic excellence of young educands in urban areas, as was also evident in other studies across the globe (Strayhorn, 2009; Zhao et al., 2017).

In addition to personal and SES factors, the size of the class seems to bring about a positive outcome on academics. Generally, many students in a class require more logistic support and resources, including teachers, officials, books, library, laboratory, and more attention to discipline them. In rural Bangladesh, where the resources mentioned above are scarce, it would be impossible for the teachers to look after or care for every student if the numbers go beyond their capacity. In urban areas, however, students and teachers usually gather in well-reputed educational institutions in large numbers (Amini & Nivorozhkin, 2015). Having all available resources, both financial and human, these urban institutions can house more students and assure better performance in public examinations through internal competitions and by providing after-school supplementary classes (Nath et al., 2014). Therefore, it is imperative that the student-teacher ratio substantially influences the academic performance of students in both settings. However, with the advantage of a sheer number of teachers and other supplementary academic resources, including private tuition, coaching centers, in urban areas, the burden on educational institutions is reduced. At the same time, for rural students, due to financial constraints, and problems of transportation and communication, their performance is conditioned upon reduced class size and student-teacher ratio (Hattie, 2005).

Several issues are determining the strengths and limitations of the current study. First, it is based on a random sampling approach; hence, the results methodologically can be generalized to understand the academic disparity both at regional and national levels. Second, the data were collected by administering globally standardized and validated research tools for quantitative analysis. This study, however, used the personal and SES factors to understand the spatial variations in the academic achievement of secondary students without addressing the institutional factors, which may limit the interpretation of the findings. Moreover, the data were collected from students who completed the terminal public examinations, e.g., JSC, SSC and HSC, and did not cover students from primary schools, universities and those who failed to pass the public examinations. In addition, this cross-sectional study, together with recall errors and a tendency to provide socially desirable information, could produce biasness in the findings.

CONCLUSION

Though there are some limitations, this study brings forth three crucial determinants of growing spatial academic inequalities in Bangladesh, the human, financial and social capitals, i.e., personal characteristics, SES or family background and institutional factors. Hence, to achieve and ensure a comprehensive, equitable and quality education, Bangladesh needs specific strategies and policies. The possible strategies could be:

1. Supervising and monitoring the academic records of primary and secondary students by engaging both parents and teachers in regular parent-teacher meetings to address and minimise academic gaps between age groups, sexes and classes/grades in both urban and rural areas.
2. Raising consciousness of people – irrespective of geographical locations – about the significance of science and technology education by engaging mass media, including television, newspaper, magazines and social media, to reach both young and old to encourage the students, parents and teachers for science-based education.
3. Allocating more budget for education to universalise the use and application of science and technology and subsidising the educational institutions to access the required resources, including software, devices and so on, and arranging proper training for both teachers and students to familiarise with online learning and its platforms.
4. Promoting blended education system, including offline (on-campus) and online (off-campus) at primary, secondary and tertiary levels specially to deal with emergencies, like the ongoing COVID-19 pandemic across the world, to ensure continuation of both academic and professional career and to minimise mental health problems among educands and educators.

5. Increasing the national budget allocation for establishing dedicated science and computer laboratory to prepare a skilled workforce through practical knowledge rather than rote-learning in both urban and rural areas.
6. Preparing teaching manuals, improvising curriculum and providing regular training for teachers across the country to teach the students at class, and encourage transparency and accountability of teachers and educational administrators to minimise the domination of shadow-education at primary and secondary levels by increasing salaries and other remunerations.
7. Institutionalising the private tuition irrespective of geographical location – allowing teachers to teach in after-school classes for not more than 80 students per teacher – would enable the government to make it taxable, therefore, minimise and control the household expenditure and dependency, as well as the magnitude of private tuition.
8. Appointing skilled teachers to ensure quality education for all students; in urban and rural areas; keeping in mind the student-teacher ratio to allow teachers to reach out to each student to ensure quality, all-inclusive and comprehensible education.
9. Establishing government schools at *Upazila* levels and controlling the number of teachers and students to ensure optimum utilisation of limited resources through increased competition among schools and avoiding monopolisation of education.

In addition to implement the strategies mentioned above, the government should direct rigorous empirical studies on the effectiveness of teaching and learning in both urban and rural areas periodically in primary, secondary, and tertiary education levels. It would enable the policymakers to identify the factors contributing to spatial inequality in academic achievement and to assess the overall progress of education and implement appropriate measures when needed.

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