



National Assessment of Secondary Students- 2023 (NASS- 23)

Public Report



Monitoring and Evaluation Wing
Directorate of Secondary and Higher Education
Bangladesh, Dhaka

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Hon'ble Minister
Ministry of Education
Bangladesh

Message

It is with great pride that I present the National Assessment of Secondary Students 2023 (NASS-23) report, a landmark initiative that reflects Bangladesh's continued commitment to strengthening the quality of education through evidence-based monitoring and evaluation. This nationwide assessment provides a comprehensive and reliable picture of student learning achievements across the country and serves as a vital tool for guiding future reforms.

NASS is a grade-level competency test aligned with the National Curriculum and Textbook Board (NCTB) framework. It follows the internationally recognized Item Response Theory (IRT) model, ensuring technical rigor and comparability with global standards. Importantly, this analysis is also aligned with Sustainable Development Goal (SDG) 4.1.1, which emphasizes proficiency in reading and mathematics as a measure of quality education. The 2023 cycle assessed Grade X students in Bangla, English, and Mathematics, and Grade VIII students in Bangla, English, Mathematics, and Science. These subjects form the foundation of academic learning and are critical for preparing students to succeed in higher education, the labor market, and society at large.

The scope of NASS-23 was extensive and inclusive. It covered 8 divisions, 64 districts, 88 upazilas, and 999 institutions, including both schools and madrasahs. Stratification was carefully designed to reflect Bangladesh's diverse education landscape, incorporating geographic areas such as hilly, coastal, haor, industrial, char, and plain land regions, as well as urban-rural locations and gender representation. This breadth ensures that the findings capture the realities of student learning across varied contexts and communities.

It is important to emphasize that expanding educational facilities and increasing enrolment, while commendable, are not sufficient on their own to guarantee meaningful progress. True educational advancement must be measured by improved learning outcomes and the development of competencies that prepare students to analyze, reason, and communicate effectively. In this regard, NASS-23 plays a crucial role in tracking progress, identifying gaps, and informing targeted interventions to ensure that every child receives a high-quality education.

I extend my sincere appreciation to the Monitoring and Evaluation Wing (MEW) of the Directorate of Secondary and Higher Education (DSHE) for their dedicated efforts in implementing this assessment. Their professionalism and commitment have ensured that NASS-23 meets international standards and provides robust evidence for policy and practice. I also acknowledge the support of the Secondary Education Development Program (SEDP) in funding this important initiative.

I am confident that the findings of NASS-23 will serve as a valuable resource for policymakers, researchers, and stakeholders. They will guide us in designing strategies that strengthen learning outcomes, promote equity, and build a resilient education system capable of meeting the aspirations of our nation.

Dr. A N M Ehsanul Hoque Milon, M.P



Secretary

Secondary and Higher Education Division
Ministry of Education
Govt. of the People's Republic of Bangladesh

Message

It is a great pleasure to me that after successfully conducting National Assessment of Secondary students- 2023 (NASS- 23) survey throughout the country for grades VIII and X, its final report is ready to publish. The current NASS- 23 is to assess the levels of the learning achievement of the students in Bangla, English and Mathematics.

It can be mentioned that merely expanding the education facilities is not adequate. Instead, enhanced learning outcomes in the form of competencies are a key to bring about quality in education and ensure its sustainability. Acquiring the relevant competencies and skills are fundamental to materialize the Sustainable Development Goals (SDGs) 4.1.1. Students need to develop the competencies to analyze, reason and communicate their ideas effectively and build their capacity for being a life-long learner. In this direction, periodic and technically robust learning assessment surveys play a vital role to gauge the competencies attained by the students and its subsequent progress through the grades.

The Monitoring & Evaluation Wing (MEW) of the Directorate of Secondary and Higher Education (DSHE) has been periodically conducting the large-scale surveys of student learning achievement at grades VI and VIII since 2012 with an interval of two years. In the year 2017, MEW conducted learning assessment survey on grade X students for the first time. In 2023, the third cycle of NASS for Class X was conducted.

I hope that the NASS- 23 report will be playing vital role to understand the progress towards achieving learning outcomes of the students and also will suggest ways to improve learning levels of our students. Prove learning levels of our students.

I wish this endeavor a great success.

Abdul Khaleque



Directorate General
Director of Secondary and Higher Education
Bangladesh, Dhaka

Message

Education is widely acknowledged as a cornerstone of national development, shaping not only the intellectual capacity of students but also their ability to participate meaningfully in economic, social and civic life. A strong education system nurtures critical thinking, creativity and resilience while also supporting the social and emotional well-being of learners. As students' progress from lower to higher grades, it is essential that they demonstrate continuous improvement in key subject areas ensuring that they acquire the competencies necessary for success in both personal and professional spheres.

While traditional examinations have long been the primary tool for measuring student achievement they often provide only a partial view of learning outcomes. Examinations tend to emphasize memorization and test-taking skills which may not fully reflect the competencies outlined in the curriculum. Recognizing this limitation many countries have adopted national-level assessments to generate a more comprehensive understanding of student learning. These assessments focus on actual competency attainment and provide valuable evidence to guide education policy and practice. Bangladesh has taken a significant step in this direction through the National Assessment of Secondary Students 2023 (NASS- 23).

The findings of NASS-23 offer important insights into student achievement across diverse contexts including geographic regions such as plain lands, haor areas and hilly regions as well as across divisions, gender, and institutional types such as schools and madrasahs. One of the most encouraging outcomes of the assessment is the evidence of gender equity in learning. The report indicates no significant disparity between male and female students with girls performing on par with boys in Bangla, English and Mathematics. This reflects meaningful progress toward inclusive education and gender equality.

I commend the Monitoring and Evaluation Wing of the Directorate of Secondary and Higher Education (DSHE) for their dedicated efforts in conducting this assessment and preparing the report. The findings will serve as a valuable resource for researchers, policymakers and stakeholders guiding future initiatives to strengthen learning outcomes and ensure that all students benefit from a high-quality, equitable education system.

PROF. Dr. Khan Moinuddin Al Mahmud Soheli



Program Co-ordinator & Additional Secretary
SEDP-PCU
SHED, Ministry of Education

Message

It gives me immense pleasure to present the National Assessment of Secondary Students 2023 (NASS-23) report. This landmark initiative stands as a significant achievement in Bangladesh's pursuit of quality and equity in secondary education. By offering clear, evidence-based insights into student learning outcomes, NASS-23 provides invaluable guidance for shaping future policies and programs that respond to national priorities while also fulfilling our global commitments.

NASS is a grade-level competency test aligned with the National Curriculum and Textbook Board (NCTB) framework. In 2023, it assessed Grade X students in Bangla, English, and Mathematics, and Grade VIII students in Bangla, English, Mathematics, and Science. These core subjects form the foundation of academic learning and are vital for success in higher education, the labour market, and society. NASS 2023 employed the internationally recognized Item Response Theory (IRT), ensuring technical rigor, global comparability, and alignment with SDG 4.1.1.

The scope of NASS-23 was extensive, encompassing 8 divisions, 64 districts, 88 upazillas, and 1,000 institutions, including both schools and madrasahs. Stratification considered diverse geographic contexts hilly, coastal, haor, industrial, char, and plain land as well as urban-rural locations and gender representation. These dimensions ensure that the findings reflect the realities of Bangladesh's diverse education landscape. The disruptions caused by the COVID-19 pandemic further highlight the resilience of our students and teachers, while also underscoring areas where recovery must be strengthened.

It is a remarkable achievement for national capacity development that, for the first time, every stage of the assessment process including framework design, test development, data analysis and report preparation was successfully completed by the national consultant. This effort, carried out in close collaboration with subject teachers, NCTB experts, national specialists, and the Monitoring and Evaluation Wing (MEW) of the Directorate of Secondary and Higher Education (DSHE), with financial support from SEDP, marks a milestone in building sustainable capacity and reducing reliance on international firms.

This report highlights both successes and challenges. It reflects the dedication and resilience of our teachers and students, while pointing to areas where enhanced resources, innovative teaching practices, and stronger support systems are urgently required. Expanding facilities and increasing enrolment are commendable achievements, but they must be matched by improved learning outcomes.

As Program Coordinator of SEDP, I reaffirm our unwavering commitment to ensuring that the recommendations of this report guide strategies to raise academic standards, promote equity, and prepare our youth for the demands of a rapidly changing world. I extend my heartfelt gratitude to national consultant, MEW, DSHE, SEDP partners, and all educators and administrators whose tireless efforts made NASS-23 possible. Together, we will continue to build a stronger, more inclusive education system that embodies the aspirations of our nation and empowers the next generation to thrive.

Md. Shahjahan Miah



Director
Monitoring and Evaluation Wing
Directorate of Secondary and Higher Education
Bangladesh, Dhaka

Acknowledgment

It is a matter of great pleasure that, the successful nationwide completion of the National Assessment of Secondary Students 2023 (NASS- 23) for Grades VIII and X, the final public report is now available.

NASS-23 aims to assess students' learning achievement levels in Bangla, English, Mathematics, and Science for Grade VIII and Bangla, English, and Mathematics for Grade X.

It is important to note that the mere expansion of educational facilities is not sufficient to ensure meaningful progress. While improved enrolment is necessary, it alone cannot guarantee quality education. Rather, enhanced learning outcomes reflected through the development of competencies are essential for improving educational quality and ensuring its sustainability. Students must acquire the ability to analyze, reason and communicate effectively, while developing the capacity to become lifelong learners.

In this context, periodic and technically robust large-scale learning assessments play a crucial role in measuring students' competency levels and tracking their progress across grades.

The Monitoring & Evaluation Wing (MEW) of the Directorate of Secondary and Higher Education (DSHE) has been conducting large-scale student learning achievement surveys at Grades VI and VIII since 2012 at two-year intervals. In 2017, MEW conducted the learning assessment survey for Grade X for the first time. The second cycle was completed in 2019, followed by the third cycle in 2023.

I hope that the NASS-23 report will serve as an important tool in understanding students' progress toward achieving learning outcomes and will guide future initiatives aimed at improving learning levels.

I wish this endeavor every success.

Professor Tipu Sultan

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List of Acronyms

Acronyms

ACER	Australian Council for Educational Research
ADSL	Associates for Development Services Limited
AIR	American Institutes for Research
AUEO	Assistant Upazila Education Officer
BRAC	Bangladesh Rural Advancement Committee
CELS	Child Education and Literacy Survey
CPE	Compulsory Primary Education
CRQ	Constructed Response Question
CTT	Classical Test Theory
DIF	Differential Item Functioning
DPE	Directorate of Primary Education
DSHE	Directorate of Secondary and Higher Education
EFA	Education for All
GOB	Government of Bangladesh
IER	Institute of Education Research
IRT	Item Response Theory
LASI	Learning Assessment of Secondary Institutions
MCQ	Multiple Choice Question
MEW	Monitoring and Evaluation Wing
MoE	Ministry of Education
MoPME	Ministry of Primary and Mass Education
NASS	National Assessment of Secondary Students
NCTB	National Curriculum and Textbook Board
NSA	National Student Assessment
PPS	Probability Proportionate to Size
SEDP	Secondary Education Development Program
SS	Scale Score
PIRLS	Progress in International Reading Literacy Study
PISA	Program for International Student Assessment
SRQ	Selected Response Question
TIMSS	Trends in International Mathematics and Science Study
URC	Upazila Resource Centre

1 Introduction

In addition to making a significant progress in increasing access to primary and secondary education, the government of Bangladesh focuses on improving educational quality, which has become a top strategic priority. Quality education provides students with the opportunity to acquire the knowledge and skills needed to participate productively in the growth of their country and improving the educational performance of secondary grade students is critical for both economic progress and for the development of active and well-educated citizens. Following this strategy, the Learning Assessment of Secondary Institutions (LASI) program was initiated with a key purpose to provide accurate data and information about student performance in Bangla, English, and Mathematics in grades 6 and 8, to inform policy planning, enhance teacher education, and improve instruction with ultimate goal to improve student achievement in secondary schools.

The LASI has been carried out by Monitoring and Evaluation Wing (MEW) of Directorate of Secondary Education (DSHE), the Ministry of Secondary and Higher Education, Bangladesh, starting from 2012. The first two administration cycles of the program (2012, and 2013) were limited to Secondary Education Quality and Access Enhancement Project (SEQAEP) schools, and in 2015 the LASI program was extended to include all types of secondary institutions. Further in 2017, the program was extended to include grade 10 assessments, so the final coverage of the LASI program encompasses student learning assessments in three subjects (Bangla, English, and Mathematics) at three grade levels (6, 8, and 10). In addition to cognitive assessments, the program also collects contextual data by means of student, teacher, and school head teacher's questionnaires. In 2019 the LASI program was renamed into National Assessment of Secondary Students (NASS), keeping the same scope, but administered on a larger sample, with further deliberation to enhance quality of items by making them more competency based, and to increase the focus on using data for improving student learning outcomes.

1.1 Scope and Organization of the Report

The NASS 2023 public report presents the results of the student learning assessments that were administered after the end of school year 2023, with actual administration date on 12 July, 2024 for grades 8 and 10. This report is being produced in comparison with the results from the previous administration year NASS 2019, but it also includes comparative discussion about student achievement across previous administration years (LASI 2015 and 2017).

This presentation of student results is organized in four sections, each of them focusing on one of the four targeted subjects: Bangla, English, and Mathematics at grades 8 and 10, and Science at grade 8. Student achievement is presented at each grade level using two reporting modes:

- Average scale scores,
- Percentage of students in achievement bands.

Student results are presented at overall national level and by each division. Also, the comparisons of student performance by gender (boys vs. girls), school location (urban vs. rural), institution type (General education vs. Madrasah education), and geographical area (Plain land vs. others), are given for each subject and grade.

1.2 Guidelines for Understandings Assessment and Statistical Terms

1.2.1 Scale Scores

Assessment in education aims to capture information about student knowledge, skills, and competencies in order to convey this information to various types of users (teachers, students, parents, instructional support teams, policy makers) with the ultimate objective that this information

will be used for improving teaching-learning process. Scale scores are carriers of this information, and they are developed through the complex process of scaling that attempts to create a numerical continuum that is parallel to the continuum of student inner characteristics being measured. The characteristics of a numerical scale used for reporting of student assessment results can be various, including its range, central value, dispersion, and the unit size. Usually, the range of the reporting scale is chosen in such a way that it can be easily explained to users, and that meaning can be easily attached to its numerical values.

NASS 2023 employs the reporting scale that has been established by vertical scaling study conducted by AIR in 2015. This scale is used for reporting student results obtained by national assessments in both primary and secondary grades (3, 5, 6, 8, and 10). The scale originates from the value 300, which was centered on the mean of student distribution in grade 3, with a dispersion (standard deviation) set to 50. Through the vertical scaling process, the scale scores for other grades were constructed showing incremental pattern across the grades, which is believed to reflect the learning growth curve.

1.2.2 Achievement Bands

The purpose of achievement bands is to broaden the meaning of scale scores by providing extensive descriptions of the competencies assessed at different levels of the scale. The total distribution of scale scores is being divided into five intervals and the characteristics of student knowledge, skills, competencies within each interval are determined and described. These bands enable a meaningful way to report student performance by presenting a percentage of students attaining specific performance level.

The descriptors of the currently used **achievement bands** (or “legacy bands”) are presented at the beginning of each subject’s section. Their design originates from previous cycles of the LASI program, and they were intended to capture student achievement across multiple grades. To develop the achievement band descriptors, “each subject expert team examined the content of the items and analyzed them to describe achievement for each subject according to what students know and can do at different points on the scale” (MEW/ACER, 2015).

Although the concept of these grade-cutting achievement bands looks conceptually appealing, there are practical issues related to comparability of performance of students at different grade levels. Considering that students are exposed to incrementally different curriculum and performance expectations at successive grade levels, designing a common performance scale used across grade levels poses a virtually unattainable task. The results may be confusing for end users, and these bands still do not convey the information about how well students perform in relation to their current grade objectives and expectations. That is why MEW/DSHE plans to develop **on-grade performance standards aligned with the national on-grade curricula**, so that a set of performance bands will be designed at each grade level.

1.2.3 Statistical Significance and Standard Error

National educational assessments are typically conducted on a sample of students randomly selected from a total number of students in the country, region, or any other defined population. Depending on the sample size, we are obtaining greater or smaller accuracy in estimating student achievement in the population. It is quite understandable that with larger samples we can expect that the data will provide more accurate evidence about student performance, and vice versa. Thus, with larger samples our statistical indices will bear smaller **standard error**, and we can have more confidence in our results.

Related to standard error is a concept of **statistical significance**. When we compare the results of different student groups, for example boys and girls, we can ask ourselves whether the difference

between these two groups that we observed on a sample is a result of standard error associated with inaccuracy of the sample, or the difference really exists in the population. In other words, we need to know if the difference is statistically significant. There are many different statistical procedures that can answer this question indicating how likely it is that a difference observed on the sample exists in the population, which is called a statistical significance of difference. Statistical significance is expressed in terms of probability, conventionally called p-value, representing a probability that a chance variation in the sample (standard error) is a sole factor attributable to the observed difference. When this probability falls below 5% ($p\text{-value} < 0.05$) then we declare that the difference is statistically significant.

1.2.4 Effect Size

Once we know that the difference is statistically significant, we should evaluate how large is that difference, what are possible practical implications, in other words, what is practical significance of this observed difference. Because tests of statistical significance in large scale assessments frequently result in the rejection of the null hypothesis (as sample sizes are large), an effect size needs to be estimated to determine the practical significance of the differences. One of the most used indicators of effect size is Cohen's d , which expresses the size of the difference as a fraction of standard deviation (Cohen, 1977). For our report readers, education practitioners and policy makers, as a rule of thumb for understanding effect size values, Cohen (1977) suggested that $d = 0.2$ be considered a 'small' effect size, 0.5 represents a 'moderate' effect size, and 0.8 a 'large' effect size. Thus, if the difference between two groups of students is less than 0.2 standard deviations, the difference can be considered as bearing little or no relevance for practice, even if it is statistically significant. There are also guidelines offered by other authors, for example Wolf (1986), based on observations of effect sizes typically obtained in behavioral studies, suggests that $d = 0.25$ or above can be considered as educationally significant (e.g., something was learnt), and $d = 0.50$ or above is practically and clinically significant (e.g., something substantially changed).

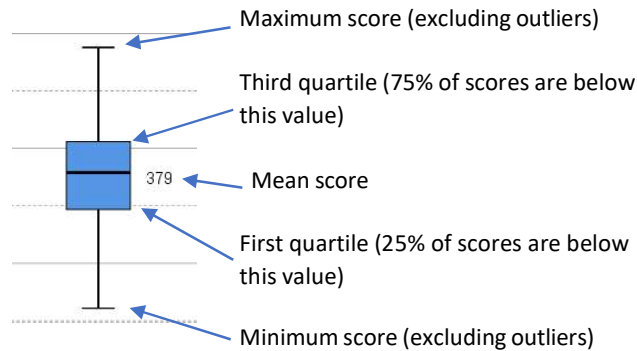
1.3 Guidelines for Reading Graphs

In this report readers will be facing three types of graphs, namely boxplots, bar charts, and stacked bar charts. In this section we briefly explain what kind of information these three types of graphs convey, how they were constructed, and what kind of conclusions readers can derive from them.

1.3.1 Boxplots

Boxplot is used to describe distribution of values in a continuous variable, most typically student scores on a test. It conveys information about the average score for a group of students, as well as the spread of scores around that average value. The middle horizontal line in a boxplot presents the location of median in the score distribution, and in this report, we added the number near the blue box presenting the mean score. The bottom edge of a box represents **first quartile**, a value below which fall 25% of student scores. The top edge of a box represents **third quartile**, a value below which fall 75% of student scores. Finally, the small top and bottom horizontal lines (whiskers) represent maximum and minimum value, respectively, in the distribution of scores. A reader can benefit from boxplots by understanding not only a group average but also how scores are distributed around that average.

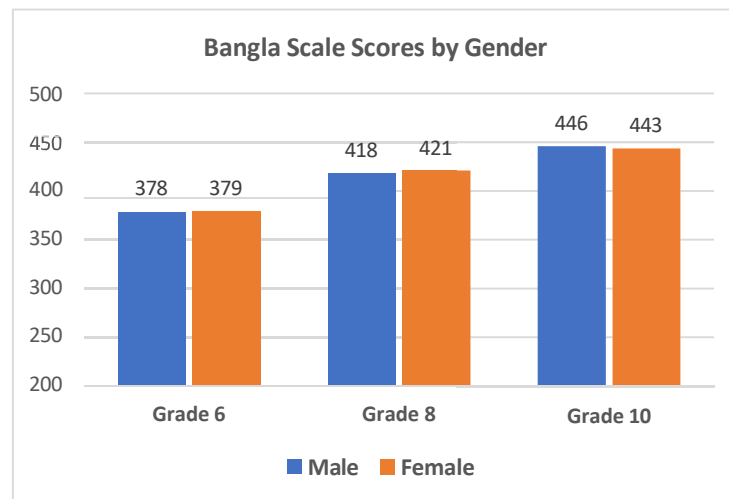
Figure 1 Example of a Boxplot



1.3.2 Bar Charts

Bar charts are commonly used when we want to present comparatively average scores for multiple groups of students. The height of a bar is defined by an average score for the group it represents. Bars can represent nominal categories (e.g., males and females), or ordinal categories (e.g., grade levels), and they can be grouped to facilitate understanding of groups they represent (see Figure 2). The advantage of bar charts is that they enable a quick comparison of characteristics of multiple groups of students.

Figure 2 Example of a Bar Chart

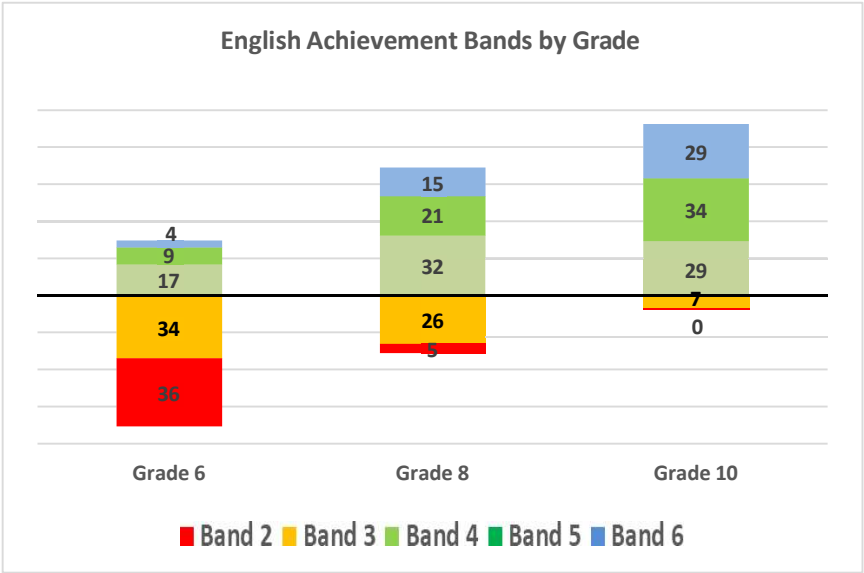


1.3.3 Stacked Bar Charts

Stacked bar chart is a special case of bar charts that enables understanding of distribution of students' scores across performance levels. They provide information about the percentage of students falling in different score intervals or achievement bands, where a sum of these percentages should equal 100%. To facilitate comparisons between different student groups, the bands of stacked bars are conventionally divided into two groups of bands and then presenting the upper bands above the horizontal reference line and bottom bands below that line. Figure 3 demonstrates an example where

the stacked bars were divided into two sections: one consists of three upper bands representing high student achievement levels relative to vertical scale that spans all three grade levels, and the second consists of two bottom categories representing low student performance relative to the same overall range. Thus, the height of a bar represents the percentage of students in the top three achievement bands and comparing the bar heights a reader can easily compare groups by their performance.

Figure 3 Example of a Stacked Bar Chart



2 Executive Summary

National Assessment of Secondary Students (NASS) 2023, formerly Learning Assessment of Secondary Institutions (LASI), continues to keep the same scope covering three grade levels (6, 8, and 10), although grade 6 was not assessed in NASS 2023. In addition to three key subjects (Bangla, English, and Mathematics), NASS 2023 includes Science at grade 8. NASS 2023 was administered on a larger sample targeting over 1000 schools and 30,000 students per grade. Additional deliberation of NASS program was to enhance quality of items by making them more competency based, and to emphasize the focus on using data for improving instruction and student learning.

2.1 Key Highlights

The observed results across three administration cycles of LASI 2015, LASI 2017, and NASS 2019 overall demonstrate a significant improvement in student performance.

- LASI 2017 results were mixed in terms of observed progress in relation to LASI 2015 showing educationally significant improvement only in Grade 8 Bangla and English.
- NASS 2019 results show more remarkable improvements in student learning outcomes compared to previous administration years in all subjects and grades showing an average effect size of 0.32, which is considered as educationally significant level.
- NASS 2023 results show substantial decline in all three subjects (Bangla, English, and math) and both grades (8 and 10). The steepest decline was observed in Bangla and math, whereas English scores dropped somewhat less.

The findings of NASS 2023 can be summarized as follows:

- Mean scale scores **across the grades** (from 8 to 10) show that the learning growth in all three subjects was small to moderate.
- Differences in student performance **among divisions** are substantial, with Khulna, Chattogram, and Rajshahi show as top performing divisions, whereas Sylhet is the lowest in most subjects and grades.
- **Gender:** girls tend to be slightly higher performing than boys in language skills, especially in upper grades, whereas there was no gender gap observed in mathematics and science.
- Student performance in **urban** locations is substantially higher than in **rural** locations in most subjects and grades, exhibiting small to moderate effect sizes.
- Students in **General education** institutions perform higher than students in **Madrasah** in all subjects, exhibiting small to moderate effect sizes.
- Differences between **Plain land** and **Other** geographical areas are practically significant in favor of students from Plain land areas, exhibiting small to moderate effect sizes.

2.2 Student Results on NASS 2023 by Subject and Grade

2.2.1 Average Scale Scores by Subject and Grade

Table 1 NASS 2023 Average scale scores

	Grade 8			Grade 10		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Bangla	404	61	26473	413	58	23957
Englissh	379	57	26864	402	55	23843
Mathematics	392	51	26318	425	47	23517
Science	304	54	26601			

2.2.2 Percentage of Students in Achievement Bands by Subject and Grade

Table 2 NASS 2023 Percentage of students in achievement bands

Subject	Grade	Band 2	Band 3	Band 4	Band 5	Band 6	Total
Bangla	G8	5	17	26	24	27	100%
	G10	3	13	23	29	32	100%
English	G8	6	21	28	23	23	100%
	G10	1	11	27	26	35	100%
Mathematics	G8	9	38	30	17	6	100%
	G10	0	17	41	29	13	100%
Science	G8	17	31	30	18	4	100%

2.3 Policy Recommendations

The following are draft recommendations to be discussed at the co-interpretation workshop with stakeholders, as an opportunity to develop an in-depth understanding of the results and finalize policy recommendations aiming to decrease identified gaps and improve student learning outcomes.

- Although the differences in mean scale scores across the grade levels demonstrate a significant growth from one grade to another, it is still not clear at which degree student performance meets on grade expectations. Thus, it is recommended to carry out **setting performance standards** study to define the competencies students are expected to demonstrate at each grade to reach on-grade proficiency levels (one-page briefing about concept of setting performance standards is presented in Appendix 9.1).
- Large variability in student performance across divisions suggests that further investigation of factors causing **divisional inequity** should be conducted, and action plans for decreasing the gaps between divisions should be developed.
- No **gender** gap in Mathematics and Science is commendable, but analysis of possible reasons for girls' higher performance in language skills, especially in upper grades, should be carried out, especially verifying that there is no gender-wise content bias in language assessments.
- The sizes of differences in student performance between **rural** and **urban** locations are substantial, especially in English language, indicating superior performance of students in urban areas. This suggests that further consideration of educationally relevant resources, both human and technical, should be placed in focus of policy makers and practitioners to alleviate a gap in student learning between rural and urban institutions.
- The differences in student performance between **education types** show that students in General Education institutions significantly outperform students in Madrasah, which calls for research on factors causing this inequity and possible ways to alleviate the gap.
- The differences between Plan land and Other **geographical areas** are small at the margin of educational relevance and calling for action to decrease the gap between these areas of the country.

One of the main milestones of NASS 2019 is that Public Report has two versions -- policy focused (this document) and practitioner focused in the format of District Report Cards. As the final recommendation at policy and program level it is strongly suggested to organize dissemination workshops at district level that will include local curriculum experts, instructional support teams, headteachers and teachers, to review and discuss student performance at specific district and formulate action plans for remedial and enrichment activities.

3 National Assessment of Secondary Students 2023

3.1 Assessment Frameworks

The NASS 2023 Bangla Language, English Language, and Mathematics assessment frameworks for Grades 8 and 10 were designed based on the *National Curriculum 2012, Classes VI to X – English, Bangla, and Mathematics*. The Science framework for Grade 8 was also based on the *National Curriculum 2012*. Assessment framework defines the organizing structure for the construction of tests. It defines the content to be assessed and guides the development of the assessment instrument. Frameworks capture a range of subject-specific and grade-specific content and cognitive skills that are defined by curriculum documents and professional best practice. The framework prescribes curriculum balance and the range and type of test items that are to be used.

Item development for NASS 2023 was led by Student Assessment Specialist (individual consultant of SEDP) in collaboration with MEW and team of national experts. The items created went through multiple rounds of reviews: peer-to-peer review during item writing, review by national content experts, and joint post-pilot review by MEW and Student Assessment Specialist in face-to-face workshop session. Items that met the requisite parameters defined in the assessment framework were selected; criteria for review included the validity of the item based on the curriculum, its appropriateness to the context, and its fairness to different segments of the population, and in post-pilot review, quality of item psychometric properties.

3.2 Bangla Assessment

As the mother tongue for most citizens of Bangladesh, competency in Bangla language should enable students to develop creative thinking, imagination, and artistic awareness. It is also the medium to understand other subjects in the curriculum, and to attain knowledge and progress in life. It is expected that Bangla teaching in grades 8 and 10 will consolidate learners' skills in using standard Bangla in making effective communications and in building a regular reading habit in those learners. It will enable learners to enjoy and explore the inherent aesthetic beauty of Bangla literature and the discipline and association of the language (MEW, 2023).

Bangla assessments for grades 8 and 10 are structured around the three main language domains: reading comprehension, vocabulary, and grammar. The backbone of Bangla assessments is a set of reading passages, followed by related comprehension, vocabulary, and grammar questions. The reading passages are selected following the NASS 2023 Assessment Frameworks covering different contexts (personal, local, and wider world), and text types (imaginative, informative, descriptive, persuasive, instructional, and transactional (MEW, 2023).

Reading comprehension questions are designed to capture student ability to understand text at three levels of cognitive processing:

- 1) Locate: knowledge, identifying explicitly stated ideas from text;
- 2) Interpret: understanding, capturing ideas present in text, but not explicitly stated; and
- 3) Reflect: evaluation or higher-order thinking skills, ability to relate information within the text to knowledge outside the text and apply it to new situations making inferences and evaluations (MEW, 2023).

The structure of Bangla assessments for grades 8 and 10, including the number and percentage of items by content domains and cognitive processing levels, is presented in Table 3, and by item type and text type in Table 4.

Table 3 Structure of Bangla Assessments by Content Domain and Cognitive Processing

Grade	Content Domain	Cognitive Processing Level			Total Items	Percentage
		Locate	Interpret	Reflect		
8	Comprehension	12	15	8	35	81.4%
	Vocabulary		3		3	7.0%
	Grammar		5		5	11.6%
	Percentage	27.9%	53.5%	18.6%	43	
10	Comprehension	16	16	8	40	85.1%
	Vocabulary		2		2	4.3%
	Grammar		5		5	10.6%
	Percentage	34.0%	48.9.0%	17.1%	47	

Note: Vocabulary and Grammar items have been categorized under the cognitive skill of understanding

Table 4 Structure of Bangla Assessments by Item Type and Text Type

Grade	Item Type	Text Type						Items	Percentage
		Imagi- native	Infor- mative	Instruc- tional	Persu- asive	Transac- tional	NA		
8	MC	11	12	5	5	4		37	86.0%
	CR	2	1	1	1	1		6	14.0%
	Percentage	30.2%	30.2%	14.0%	14.0%	11.6%		43	
10	MC	11	8	7	5	5	4	40	85.1%
	CR	2	2	1	1	1		7	14.9%
	Percentage	27.7%	21.3%	17.0%	12.8%	12.8%	8.5%	47	

3.3 English Assessment

Considering that English is a foreign language, the curriculum expects that at grades 8 and 10 learners should acquire the basic skills of English language for effective communications in different spheres, including contemporary workplaces and in higher education (MEW, 2023).

English assessments for grades 8 and 10 are structured in the same way as Bangla assessments: content domains (reading comprehension, vocabulary, and grammar), reading contexts (personal, local, and wider world), text types (imaginative, informative, descriptive, persuasive, instructional, and transactional), and cognitive processing levels (locate, interpret, and reflect). The structure of English assessments for grades 8 and 10, showing the number and percentage of items by content domains and cognitive levels, is presented in Table 5, and by item type and text type in Table 6.

Table 5 Structure of English Assessments by Content Domain and Cognitive Processing

Grade	Content Domain	Cognitive Processing Level			Total Items	Percentage
		Locate	Interpret	Reflect		
8	Comprehension	14	14	6	34	81%
	Vocabulary	1	3		4	9.5%
	Grammar	3	1		4	9.5%
	Percentage	42.9%	42.9%	14.2%	42	
10	Comprehension	11	15	8	34	74.0%
	Vocabulary	1	5		6	13.0%
	Grammar	1	4	1	6	13.0%
	Percentage	28.3%	52.2%	19.5%	46	

Note: Vocabulary and Grammar items have been categorized under the cognitive skill of understanding

Table 6 Structure of English Assessments by Item Type and Text Type

Grade	Item Type	Text Type						Total Items	Percentage
		Imagi- native	Infor- mative	Instruc- tional	Trans- actional	Persua- sive	Clause		
8	MC	13	11	3		5		32	76.2%
	CR	3	3	2		2		10	23.8%
	Percentage	38.1%	33.3%	11.9%		16.7%		42	
10	MC	8	10	5	5	4	3	35	76.1%
	CR		4	3	2	2		11	23.9%
	Percentage	17.4%	30.4%	17.4%	15.2%	13.0%	6.5%	46	

3.4 Mathematics Assessment

The objective of learning mathematics at secondary school level is to acquaint students with arithmetical logic, methods, and procedures, and to increase their ability to apply mathematical principles in problem solving tasks in day-to-day and global affairs (MEW, 2023).

Mathematics assessments for grades 8 and 10 are based on the NASS 2023 Assessment Frameworks, and they are structured around the five main content domains: Numbers and operations (including computation and understanding of number concepts), Measurement (use of scale and principles of measurement, metric system, application of processes and concepts of area and differentiate and do operations), Geometry (understand concepts and use instruments), Data (including graphical displays and central tendency of data), and Algebra (solve equations, graphical representations and relationships).

Mathematics questions are designed to capture student mathematical competencies at three levels of cognitive processing:

- 1) Formulate: knowledge and understanding, ability to translate a real-world situation to the domain of mathematics and formulate a mathematical structure for the setting.
- 2) Employ: application, employing mathematical tools such as concepts, facts, procedures, and reasoning, to provide a mathematical solution and solve a problem.
- 3) Interpret & review: evaluation or higher order thinking skills, ability to reflect upon the problem in order to interpret if the solution makes sense in reference to the contexts in which they were set (MEW 2023).

The structure of Mathematics assessments for grades 8 and 10 showing the number and percentage of items by content domains and cognitive processing levels is presented in Table 7, and by item type and cognitive processing levels in Table 8.

Table 7 Structure of Mathematics Assessments by Content Domain and Cognitive Processing

Grade	Content Domain / Item Type	Cognitive Processing Level			& Total Items	Percentage
		Formulate	Employ	Interpret Review		
8	Algebra	4	8	3	15	31.3%
	Data	1	4		5	10.4%
	Measurement	2	4		6	12.5%
	Number Properties and Operations	3	7	2	12	25.0%
	Space and Geometry	3	5	2	10	20.8%
	Percentage	27.1%	58.3%	14.6%	48	

Grade	Content Domain / Item Type	Cognitive Processing Level			& Total Items	Percentage
		Formulate	Employ	Interpret Review		
10	Algebra	5	5	3	13	27.7%
	Data	2	2	2	6	12.8%
	Geometry	4	3	2	9	19.2%
	Measurement	3	6	3	12	25.5%
	Number Properties and Operations	1	4	2	7	14.9%
	Percentage	31.9%	42.6%	25.5%	47	

Table 8 Structure of Mathematics Assessments by Item Type and Cognitive Processing

Grade	Content Domain / Item Type	Cognitive Processing Level			& Total Items	Percentage
		Formulate	Employ	Interpret Review		
8	MC	11	21	5	37	77.1%
	CR	2	7	2	11	22.9%
	Percentage	27.1%	58.3%	14.6%	48	
	MC	11	15	9	35	74.5%
10	CR	4	5	3	12	25.5%
	Percentage	31.9%	42.6%	25.5%	47	

3.5 Science Assessment

Scientific literacy is developed through science education that is both broad and applied. Thus, the science framework, the concept of scientific literacy refers both to a knowledge of science and of science-based technology. However, science and technology differ in their purposes, processes and products. Technology seeks the optimal solution to a human problem and there may be more than one optimal solution. In contrast, science seeks the answer to a specific question about the natural material world.

Scientific literacy also requires not just knowledge of the concepts and theories of science but also knowledge of the common procedures and practices associated with scientific enquiry and how these enable science to advance. Therefore, individuals who are scientifically literate understand the major conceptions and ideas that form the foundation of scientific and technological thought; how such knowledge has been derived; and the degree to which such knowledge is justified by evidence or theoretical explanations.

It is expected that Science teaching in Grades 8 will consolidate learners' skills in using standard Science in making effective communications and in building a regular reading habit in those learners. It will enable learners to enjoy and explore the inherent aesthetic beauty of scientific literature and discipline.

Science assessment for grade 8 is based on the NASS 2023 Assessment Frameworks, and they are structured around the four main content domains:

Physics including structure of matter, properties of matter, chemical changes of matter, motion and forces, action at a distance, energy & its transformation, interactions between energy and matter etc. **Biology** including cells, concept of an organism, population, eco systems, biosphere etc. **Earth Sciences** including structures of the earth, energy in the earth, change in the earth, earth in space,

history and scale of the universe and its history etc. **Chemistry** specializations, Soil ecology, aquatic/marine biology, earth systems, environmental and biological conservation, energy and climate change, water resource management, pollution prevention and remediation etc.

Science questions are designed to capture student scientific competencies at three levels of cognitive processing:

1. **Knowing (Knowledge with Understanding):** Items in this domain assess students' knowledge of facts, relationships, processes, concepts, and equipment. Accurate and broad-based factual knowledge enables students to successfully engage in the more complex cognitive activities essential to scientific enterprise.
2. **Applying (Application):** Items in this domain require students to engage in applying knowledge of facts, relationships, processes, concepts, equipment, and methods in contexts likely to be familiar in the teaching and learning of science.
3. **Reasoning (Higher Order):** Items in this domain require students to engage in reasoning to analyze data and other information, draw conclusions, and extend their understandings to new situations. In contrast to the more direct applications of science facts and concepts exemplified in the applying domain, items in the reasoning domain involve unfamiliar or more complicated contexts. Answering such items can involve more than one approach or strategy. Scientific reasoning also encompasses developing hypotheses and designing scientific investigations (MEW 2023).

The structure of Science assessment for grade 8 showing the number and percentage of items by content domains and cognitive processing levels is presented in Table 9, and by item type and cognitive processing levels in Table 10.

Table 9 Structure of Science Assessments by Content Domain and Cognitive Processing

Grade	Content Domain / Item Type	Cognitive Processing Level			Total Items	Percentage
		Knowing with Understanding	Applying	Reasoning		
8	Biology	9	4	6	19	43.2%
	Chemistry	4	5	2	11	25.0%
	Earth Science	2	1	1	4	9.1%
	Physics	6	2	2	10	22.7%
	Percentage	47.7%	27.3%	25.0%	44	

Table 10 Structure of Science Assessments by Item Type and Cognitive Processing

Grade	Content Domain / Item Type	Cognitive Processing Level			Total Items	Percentage
		Knowing with Understanding	Applying	Reasoning		
8	MC	18	8	7	33	75.0%
	CR	3	4	4	11	25.0%
	Percentage	47.7%	27.7%	25.0%	44	

3.6 NASS 2023 Sample

The NASS target population includes all students of Grade 8 and 10 studying in all Secondary Institutions in Bangladesh. The national consultant selected the sample of the schools with the help

of MEW/SEDP of DSHE. The sampling procedure included disproportionate allocations of schools across divisions to allow for reliable estimates at this level. This was followed by a random selection of upazilas within the district. Distribution of Institutions at division level was as per the stratification. Probability proportionate to size (PPS) sampling was used for the selection of schools within upazilas. The following stratification was taken into consideration:

- Division
- Districts
- Geographical Area
- Type of Institution (School, Madrasah)
- Location of the institution (rural areas, urban areas)
- Level of Education
- Management of Institution

A total of 1000 Institutions (by type Schools 815 and Madrasahs 185; and by location Rural 720 and Urban 280) were selected to represent the target NASS population. The details of the sample schools by division and students are presented in Table 11.

Table 11 Sampling Plan for NASS 2023

		Barisal	Chittagong	Dhaka	Khulna	Mymensingh	Rajshahi	Rangpur	Sylhet	Bangladesh
No. of Institutions in Population		2894	5043	5232	4056	2306	4540	4737	1524	30332
No. of Institutions in Sample		70	211	220	107	75	130	125	62	1000
Target Sample Students per Grade		2100	6330	6600	3210	2250	3900	3750	1860	30000
% Sample Students per Grade		10.5	15.9	15.1	12.4	10.4	12.6	13.0	10.1	100%
Grade 8	Enrolment	168172	498811	517643	256970	180571	316413	315580	143347	2397507
	Enrolment %	7.0	20.8	21.6	10.7	7.5	13.2	13.2	6.0	100%
	Participation	1934	5792	5769	2818	1975	3528	3497	1627	26940
	Participation %	92.1	91.5	87.4	87.8	87.8	90.5	93.3	87.5	89.8
Grade 10	Enrolment	140217	436541	458021	215661	149052	257476	242362	131265	2030595
	Enrolment %	6.9	21.5	22.6	10.6	7.3	12.7	11.9	6.5	100%
	Participation	1730	5253	5150	2515	1821	3115	3228	1365	24177
	Participation %	82.4	83.0	78.0	78.3	80.9	79.9	86.1	73.4	80.6

3.7 Test Administration

Monitoring and Evaluation Wing was responsible for the administration of NASS 2023. The date of the administration of the main survey was on 12 July 2024 for grades 8 and 10. An external joint venture, composed of local firms FREPD, BITI, and RSDCS, was appointed by SEDP to undertake the printing of the instruments, field administration, and data collection. The 88 upazilas were divided into 3 groups to counterbalance the test booklets for administration. Students from Institutions of Group 1 attempted Bangla test first followed by English, Mathematics and then Science (only for grade 8).

Students from Institutions that were part of Group 2 attempted Bangla first followed by Mathematics, English (for grade 10) & Science (for grade 8) and then English for grade 8. While students from Institutions of Group 3 participated first in Bangla test followed by Mathematics for grade 10 and Science for 8, English and Mathematics for grade 8. This (counterbalance) process was followed to ensure a fair distribution of student responses for each subject and to minimize the fatigue effect on student responses. FREPD and its consortium selected 190 field supervisors to supervise the assessment, 2 or 3 from each upazila. Two days training program was conducted for the supervisors by MEW and SEDP. 2000 test administrators, 2 test administrators per institution (for grades 8 and 10) were appointed to conduct the assessment, the test administrators were from local colleges. A one-day training program was organized for the test administrators, and each was provided with a survey guide with guidelines on the procedures to be followed during test administration. This training was organized by upazila secondary education officer (USEO) at upazila level of the selected sample upazilas and training conducted by the representatives of SEDP, MEW and DSHE. The answer scripts were collected by FREPD and its consortium field supervisors and were evaluated by the students of IER, Dhaka University. Data entry was undertaken by BITI as per the data entry format provided by national consultant of SEDP/MEW. Final data sets were cleaned by national consultants and provided by MEW to the international consultant (Psychometrician) hired by the FREPD and its consortium.

3.8 Data Analysis

3.8.1 Evaluation of item and test quality

Prior to conducting the statistical analysis, the assessment tools undergone a routine analysis of psychometric quality. The evaluation of the quality of achievement instruments at the item and test level was carried out using the following Classical Test Theory (CTT) and Item Response Theory (IRT) indices:

- Item difficulty: to evaluate the spread of difficulties of test questions.
- Item discrimination: to check if questions can effectively distinguish student performance.
- Options analysis: to verify that MC items have well balanced options (distractors).
- Differential Item Functioning (DIF): to check that questions are not gender biased.
- Test reliability: to evaluate how accurately tests measure student knowledge and skills.
- Test validity: to check the alignment between content of items and curriculum objectives.

3.8.2 Scaling and Equating with Historical Overview

In the 2015 cycle of national student assessments in Bangladesh, AIR carried out the Vertical Scaling study that spans both primary and secondary grades (3, 5, 6, and 8), and the results of this study were used to define a reporting scale for both National Student Assessment (NSA) in grades 3 and 5, and LASI in grades 6 and 8. It was agreed that the scale will originate from the value 300 and have a standard deviation of 50. This origin was centered at the mean score of Grade 3, and the scale was vertically built up through grades 5, 6, and 8. Grade 10 was not assessed in 2015, so the vertical scale for Grade 10 in LASI 2017 was set by means extrapolation based on the values of grades 6 and 8.

LASI 2017 utilized scaling approach based on Item Response Theory (IRT) using the same model that was implemented in previous cycles 2015 and 2013. The advantages of IRT are not only in the provision of a meaningful reporting framework, but also in providing a foundation for establishing comparability between the results obtained in different administration years. The most valuable feature of the IRT models is providing a fruitful framework that can be effectively utilized for monitoring and promoting quality of education.

The IRT model originally chosen for the LASI program at its inception was 1-parameter Rasch model, mirroring the Program for International Student Assessment (PISA), an assessment program that provided leading edge standards in educational assessment that were followed by many national programs across the world. In 2015 PISA eventually converted from 1-parameter to 2-parameter model, which enables more accurate estimation of student knowledge and competencies because it utilizes the two item properties that are most pertinent for assessing educational achievement (item difficulty and item discrimination). For the same reason, the 2017 administration year of LASI is the point where the IRT model was upgraded to 2-parameter model. The LASI 2017 data were analyzed by both models, utilizing the 1-parameter Rasch model to ensure full comparability backwards with LASI 2015, and converting to 2-parameter model for forward comparability with NASS 2019 and NASS 2023. For comparability across the administration years, NASS 2023 utilized a common item equating design, which is consistently being implemented from the beginning of the LASI/NASS program.

Student scores in all administration years of the LASI/NASS program were computed by means of the IRT ‘pattern-scoring’ approach, where a pattern of student responses to items is used to estimate the latent ability (i.e., knowledge and competencies) underlying students’ test performance. The technique used for ability estimation was based on the Weighted Maximum Likelihood (WML) method, which is widely supported in research literature. More details of the procedures used for IRT scaling and equating are presented in the Technical Report.

3.8.3 Sampling weights

Sampling weights were determined using an industry standard definition of sampling weight as an inverse of the probability of being selected into the sample. School/student weights reflect the sample design by considering the approach to cluster-based sampling and included adjustments for the different probability of a student being selected from schools of different sizes. NASS 2023 follows the weighting approach that is consistent with the one used in previous NASS 2019, LASI 2017, and LASI 2015 administrations.

Weights were also determined for each district and division based on the ratio of the respective population and sample distributions. The final weights were determined as a product of the school base weight, district weight, and state weight. The creation of sampling weights relied on the sampling frame containing information about the schools in population and schools selected in the sample. Details of the procedure for creating sampling weights are presented in the Technical Report.

3.8.4 Data Analysis of Student Performance

Based on the achievement bands and the IRT based reporting scale, a comprehensive set of the analyses of student performance were carried out. The statistical analyses were guided by research questions relevant for the MEW/DSHE. The following is an outline of major research questions.

1. How do students in Bangladesh perform in Bangla Language, English Language, and Mathematics in Classes 8 and 10, and Science in Class 8, as measured by NASS 2023? What is the performance at National level and by Divisions expressed by Scale Scores and Achievement Bands? For **each subject** and **grade** produce the following information:

- a) Compute means of Scale Scores (SS) at national and division levels. Create a table for each subject containing division SS means with reference to the national mean.
- b) Test statistical significance for differences in student performance among divisions.
- c) Compute and report tables and graphs of percentages of students reaching different achievement bands at national level and by divisions.

2. Is there a difference between boys and girls in performance on Bangla, English, and Mathematics in Classes 8 and 10, and Science in Class 8, as measured by NASS 2023?

- a) Compute means of Scale Scores for boys and girls for each subject and grade.
- b) Test statistical significance of differences between boys and girls and compute effect size (Cohen's D) for each statistically significant difference.

3. Is there a difference in achievement between students from rural and urban schools in Bangla, English, and Mathematics in Classes 8 and 10, and Science in Class 8, as measured by NASS 2023?

- a) Compute means of Scale Scores for urban and rural schools for each subject and grade.
- b) Test statistical significance of difference between urban and rural schools and compute effect size (Cohen's D) for each statistically significant difference.

4. Is there a difference in achievement between students from different school types (general education and Madrasah education) in Bangla, English, and Mathematics in Classes 8 and 10, and Science in Class 8, as measured by NASS 2023?

- a) Compute means of Scale Scores for general education and Madrasah education institutions for each subject and grade.
- b) Test statistical significance of differences between general education schools and Madrasah education institutions, and compute effect size (Cohen's D) for each statistically significant difference.

5. Is there a difference in achievement between students from different geographic areas (Plain land and Others) in Bangla, English, and Mathematics in Classes 8 and 10, and Science in Class 8, as measured by NASS 2023?

- a) Compute means of Scale Scores for students in Plain land and Other geographic areas for each subject and grade.
- b) Test statistical significance of differences between students in Plain land and Other geographic areas, and compute effect size (Cohen's D) for each statistically significant difference.

4 Student Performance in Bangla Language

4.1 Benchmarking of Bangla Language Tests

Performance bands are categories that are developed to facilitate interpretation of student performance; thus, they represent the framework for describing what students know and can do at different levels of performance. These bands are intended to describe and distinguish student performance across grade levels, and they do not evaluate student performance referring to the prescribed curriculum expectations in respective grades, rather, they are derived from the content strands and cognitive levels of test items that characterize performance of students achieving at these bands (MEW/ACER, 2015).

Table 12 Description of Achievement Bands for Bangla Assessments

Performance Band	Scale Scores	Band Descriptors
Band 6	436 and above	At this level students can synthesize information to arrive at conclusions, compare opinions of two authors in long persuasive texts, and make moderately complex inferences for instance about a character's motivation in a narrative text.
Band 5	396-435	At this level students retrieve or interpret and write information from explicitly stated details that are not prominent and are in the presence of competing information in difficult texts, identify the mood in narrative texts, understand the author's emotions, identify stated opinions, make simple inferences in simple texts, and use difficult tenses correctly in context.
Band 4	356-395	At this level students retrieve and interpret explicitly stated information in the presence of competing information in a range of moderately difficult texts, understand the purpose of a written text of moderate difficult, identify the sequence of events, understand the emotion and motivation of behavior for characters in narrative texts, link and compare information in persuasive and non-continuous texts, show a higher command of vocabulary, use moderately difficult tenses correctly in context, identify the appropriate use of punctuation marks in more complex context, and identify the spelling of less frequent words.
Band 3	316-355	At this level students retrieve and interpret explicitly stated information that is not prominent in a range of moderately difficult texts, understand the purpose of simple texts and identify the sequence of events in biographical or procedural texts, identify the appropriate use of punctuation marks like commas in simple contexts, and identify the spelling of moderately frequent words.
Band 2	315 and below	At this level students retrieve explicitly stated prominent information in a range of simple texts including transactional, descriptive, and persuasive texts, understand simple phrases, use simple tenses correctly in context, and identify the spelling of high frequency words.

4.2 Student Performance in Bangla Language by Grade

The results of student performance on NASS 2023 assessments are presented in two different reporting modes, namely, scale score and achievement bands. As described in the first chapter of this report, scale scores represent a continuum of student achievement that spans multiple grades, originating from grade 3 where the scale was defined with mean of 300 and standard deviations of 50, and then vertically built up from grade 3 across grade levels 5, 6, 8, and 10. Achievement bands, on the other hand, represent a categorical measure of student level of knowledge and skills, dividing their performance in 5 discrete bands and providing ample descriptions of what students know and are able to do at each of these ordinally sequenced categories.

Throughout this report, group performance is described in terms of both types of metrics, using an arithmetic mean of the group for the scale scores, and using percentage of students whose performance falls within each of the predefined achievement bands.

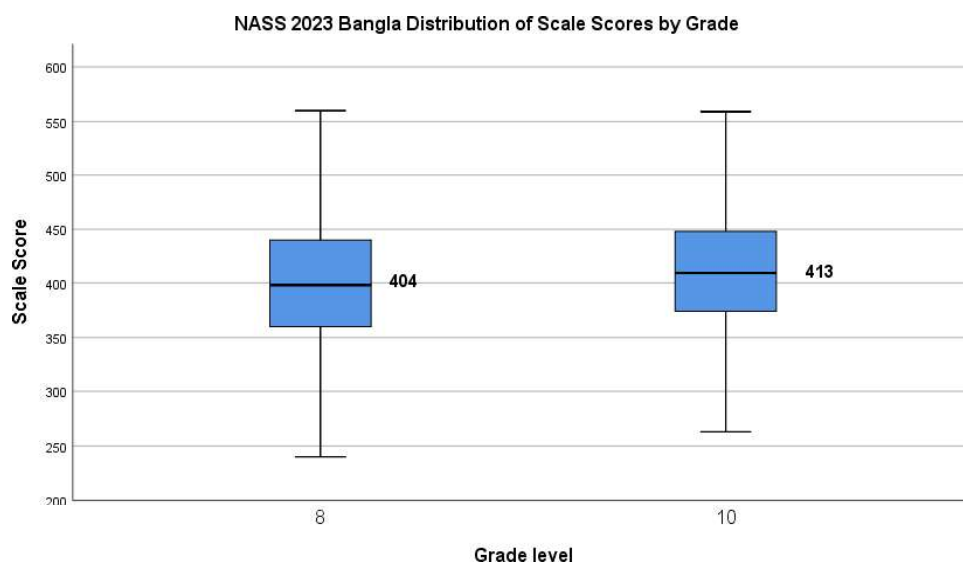
4.2.1 Average Scale Scores by Grade

Student average performance on Bangla assessment in grades 8 and 10 at overall national level is presented in Table 13 and Figure 4, showing the mean scores and their associated variation. As can be seen, the mean scores characterizing student performance in grades 8 and 10 are increasing from 404 in grade 8 to 413 in grade 10, which difference is statistically significant, but its effect size (Cohen's $d = 0.15$) is considered rather small or negligible. These results suggest that the learning growth in Bangla language between the observed grade levels, as measured by the Bangla vertical scale, does not demonstrate practical significance, which may be due to the nature of the Bangla language curriculum that cannot be captured by a vertical scaling methodology. From that perspective, it is recommended to established on-grade national performance standards, which can be a more meaningful framework for tracking student performance across grade levels.

Table 13 Bangla Average Scale Scores by Grade

Grade	Mean	Std. Deviation	N	Effect Size
Grade 8	404	61	26473	-0.15
Grade 10	413	58	23957	

Figure 4 Distribution of Scale Scores in Bangla Language by Grade



4.2.2 Percentage of Students in Achievement Bands by Grade

One meaningful way to report NASS scores is to present results in terms of percentages of students attaining specific achievement bands or levels. For reporting student achievement in bands, it is essential to have clear descriptions of what students know and can do at each band, which is

presented at the beginning of this section. The national results NASS 2023 for Bangla language by grade are presented in Table 14 and

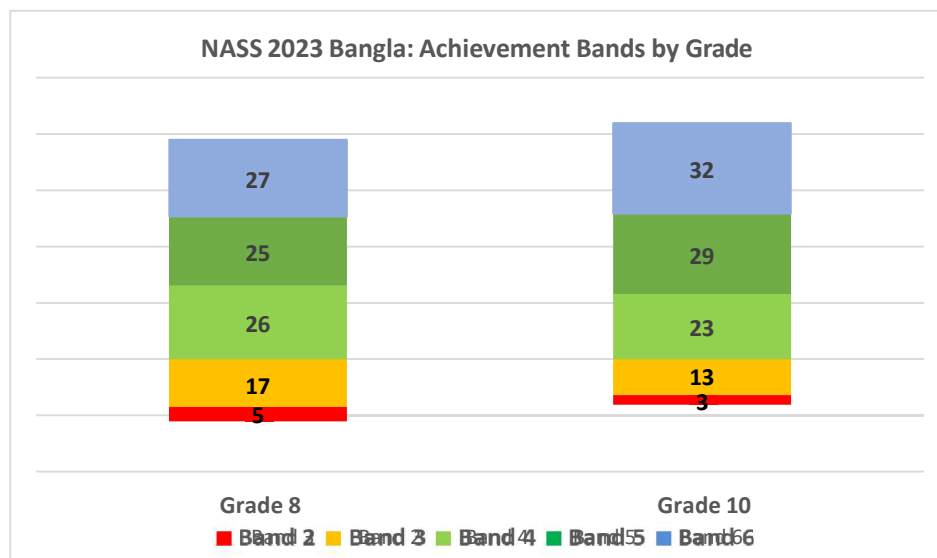
Figure 5.

It can be observed that the percentage of students in higher achievement bands (5 and 6) grows over grade levels (52% to 61%), whereas the percentage in lower achievement bands (bands 2 and 3) decreases as moving to upper grades (22% to 16%). It should be noted that this does not mean that higher grade students perform better in relation to their grade objectives, rather, it means that student performance is growing in relation to overall performance criteria designed for cross-grade comparability. The question of how good student performance in relation to the on-grade curriculum objectives is still unanswered and calls for setting of on-grade performance standards designed to evaluate how well students mastered curriculum at each of the targeted grades.

Table 14 Bangla Percentage of Students in Achievement Bands by Grade

Band	Grade		
	Grade 8	Grade 10	Total
Level 2	4.9%	3.3%	4.1%
Level 3	17.1%	12.8%	15.1%
Level 4	26.2%	23.3%	24.8%
Level 5	24.5%	28.5%	26.4%
Level 6	27.3%	32.2%	29.6%

Figure 5 Bangla - Percentage of Students in Achievement Bands by Grade



4.3 Student Performance in Bangla Language by Division

4.3.1 Average Scale Scores by Division

One of the important questions for educational policy and planning is to evaluate the performance of students across different administrative and geographical areas of the country. Division average scale

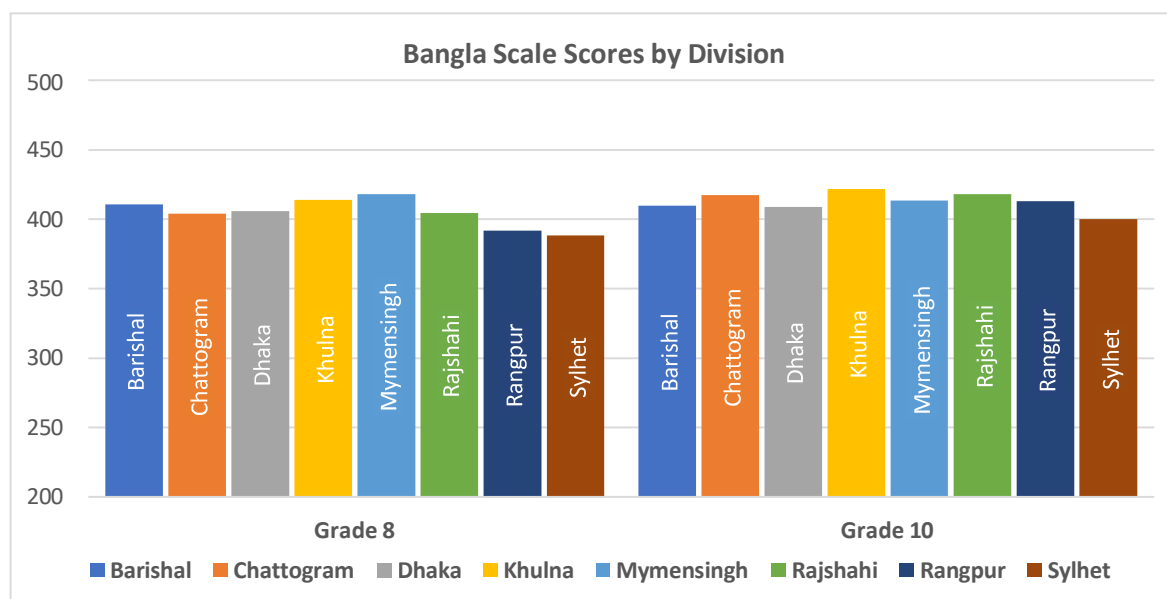
scores in Bangla for each grade are presented in Table 15 (divisions ordered by overall performance) and

Figure 6 (divisions ordered alphabetically). Based on the overall division mean across two grades, it can be observed that the three highest performing divisions standing above the national average are Khulna, Mymensingh, and Rajshahi. The lowest performing division, standing far below national average at both grades, is Sylhet. The effect size relative to the difference between the highest and lowest performing divisions (Khulna and Sylhet) is 0.40, which is the level that calls for attention of policy and practice.

Table 15 Bangla Scale Scores Descriptive Statistics by Division

Division	Grade 8			Grade 10			Overall Mean	High-Low Effect Size
	Mean	Std. Dev.	N	Mean	Std. Dev.	N		
Khulna	414	61	2543	421	62	2475	418	0.40
Mymensingh	418	65	1948	413	56	1512	416	
Rajshahi	404	59	3115	418	56	2552	411	
Chattogram	404	61	6419	417	57	5519	411	
Barishal	411	63	1228	410	57	1180	410	
Dhaka	406	59	6955	409	60	6778	407	
Rangpur	392	60	3309	413	56	1932	402	
Sylhet	388	57	1798	400	54	1807	394	
Bangladesh	404	61	27315	413	58	23755	409	

Figure 6 Mean Scale Scores in Bangla Language by Division



The three tables below illuminate how the division mean scores in Bangla relate to each other showing whether differences between them were statistically significant. The way to interpret the data in Table 16 (and next table) is that divisions that fall under the same homogeneous group do not have mean score differences that are statistically significant. For example, the differences in mean scores between all three divisions in group 3 (Chattogram, Rajshahi, and Dhaka) are not statistically

significant. On the other hand, the mean scores for Mymensingh and Khulna (418 and 414, respectively) are significantly different, as they belong to different homogeneous groups. Also, the mean scores for Sylhet and Rangpur (388 and 392, respectively) are significantly different from any other division, as they form separate homogeneous groups.

Table 16 Bangla Grade 8 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups				
		1	2	3	4	5
Sylhet	1798	388				
Rangpur	3309		392			
Chattogram	6419			404		
Rajshahi	3115			404		
Dhaka	6955			406		
Barishal	1228				411	
Khulna	2543				414	
Mymensingh	1948					418

Table 17 Bangla Grade 10 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups				
		1	2	3	4	5
Sylhet	1807	400				
Dhaka	6778		409			
Barishal	1180		410	410		
Rangpur	1932			413		
Mymensingh	1512			413		
Chattogram	5519				417	
Rajshahi	2552				418	418
Khulna	2475					421

4.3.2 Percentage of Students in Achievement Bands by Division

Student performance in Bangla language across 8 Divisions is also expressed by percentages of students achieving in each of the bands and presented in Figure 7 and Figure 8. As shown by scale scores, there are noticeable differences in Bangla scores among divisions shown by percentages of students reaching top two achievement bands. For example, in Bangla grade 9, there are 60% of students reaching the top two achievement bands in Khulna, compared to 39% students reaching these proficiency levels in Sylhet. Differences decrease somewhat in grade 10, for example, there are 66% of students reaching the top two bands in Khulna compared to 52% of students reaching these bands in Sylhet.

It can be also observed that the achievement bands become a less sensitive measure of student performance in higher grades, where majority of students in grade 10 got classified in top three bands. This suggests there is a need to set on-grade performance standards that will inform the assessment users about student performance relative to the curriculum expectations within each grade.

Figure 7 Bangla Grade 8 Percentage of Students in Achievement Bands by Division

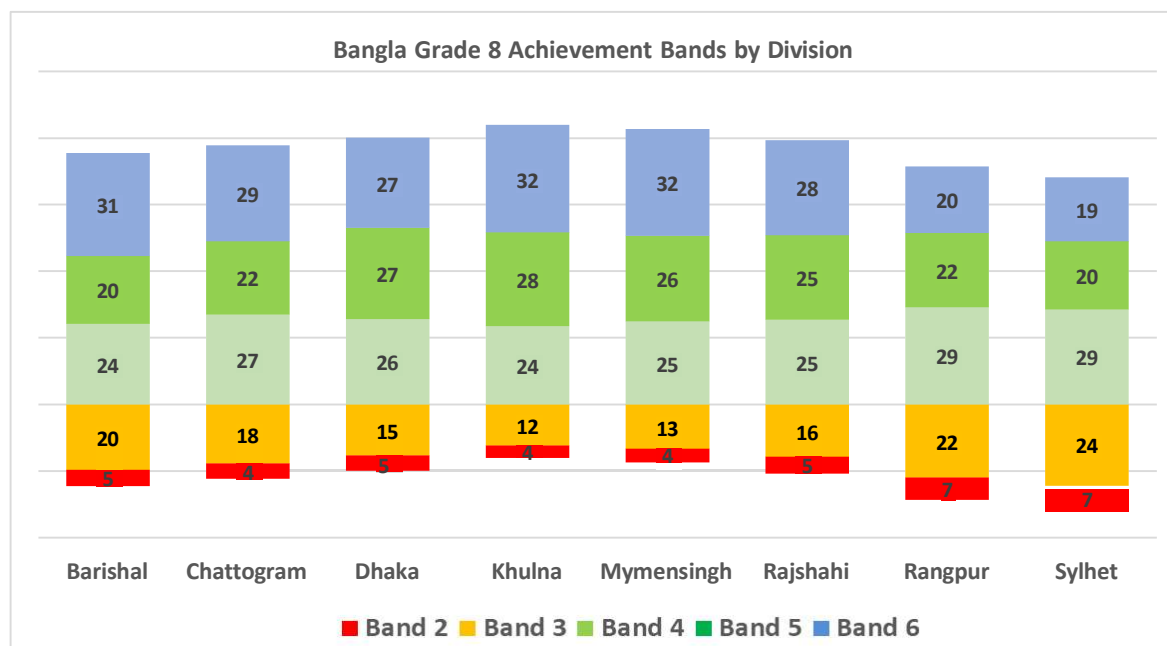
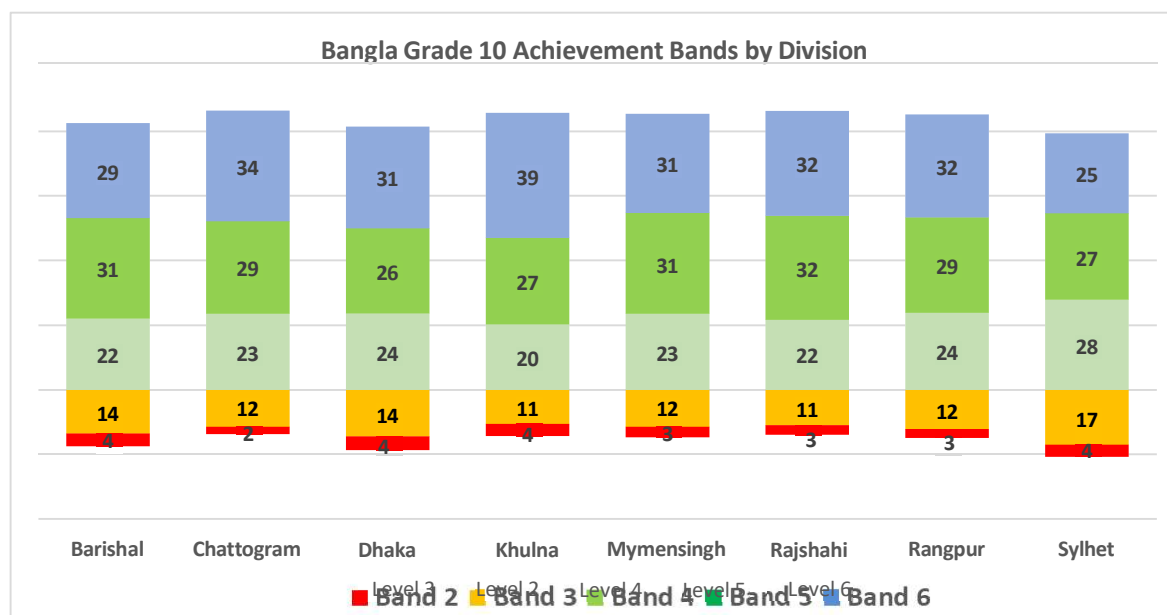


Figure 8 Bangla Grade 10 Percentage of Students in Achievement Bands by Division



4.4 Student Performance in Bangla Language by Gender

Gender equity represents a highly important issue in national education systems, thus, evaluating gender differences in student performance is routinely performed on educational assessments such as NASS. The mean scale scores for boys and girls on Bangla Language assessments in grades 8 and 10 in NASS 2023 cycle are presented in Table 18 and Figure 9.

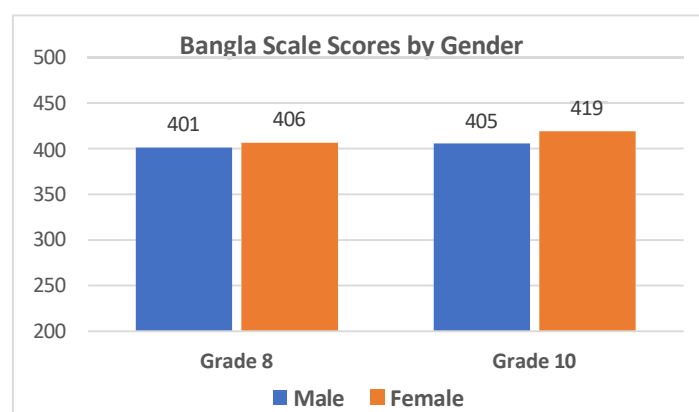
The analysis of mean scale scores for boys and girls in Bangla assessments indicated that the gender differences in both grades were statistically significant in favor of girls. In grade 8 the effect size is

negligible (Cohen's d 0.09), however, in grade 10 the difference of 14 scale score points in favor of girls reaches the level considered as practically relevant (Cohen's d 0.23). Thus, it can be concluded that girls outperform boys on Bangla language assessments in secondary grades 8 and 10, as measured by NASS 2023, though the sizes of these differences are negligible or small.

Table 18 Bangla Mean Scores by Gender

Gender	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Male	401	60	11233	405	59	10142
Female	406	61	16082	419	57	13613
Effect Size	-0.09			-0.23		

Figure 9 Bangla Mean Scale Scores by Gender



4.5 Student Performance in Bangla Language by Urban/Rural Location

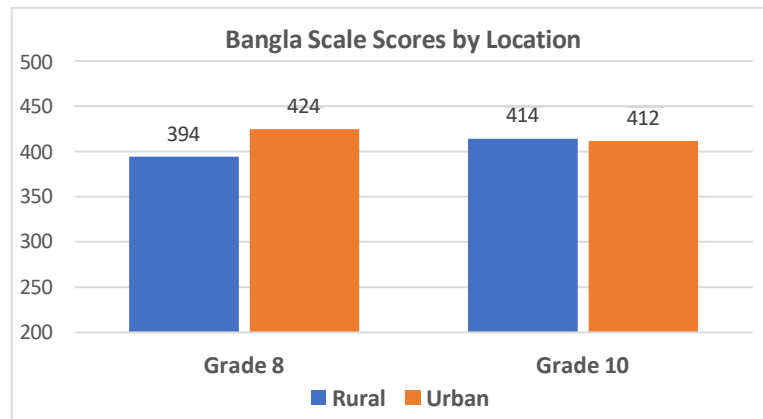
Evaluating student learning performance in different types of settings, particularly rural vs. urban locations, has been always of high interest for education policy and planning. The mean scale scores on NASS 2023 Bangla tests for students in rural and urban schools is presented in Table 19 and Figure 10.

The obtained results indicate that there is a statistically significant difference between rural and urban students performing on Bangla language tests in grade 8 favoring those from urban schools. This difference of 30 scale score points is at moderate level (Cohen's d at 0.51), showing that students in urban locations demonstrate much higher Bangla performance than students in rural areas. It is interesting to note that the difference in grade 10, although statistically significant in opposite direction, is practically negligible (Cohen's d at 0.04).

Table 19 Bangla Mean Scores by Location

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Rural	394	55	18323	414	58	15533
Urban	424	67	8992	412	59	8222
Effect Size	-0.51			0.04		

Figure 10 Bangla Mean Scale Scores by Location



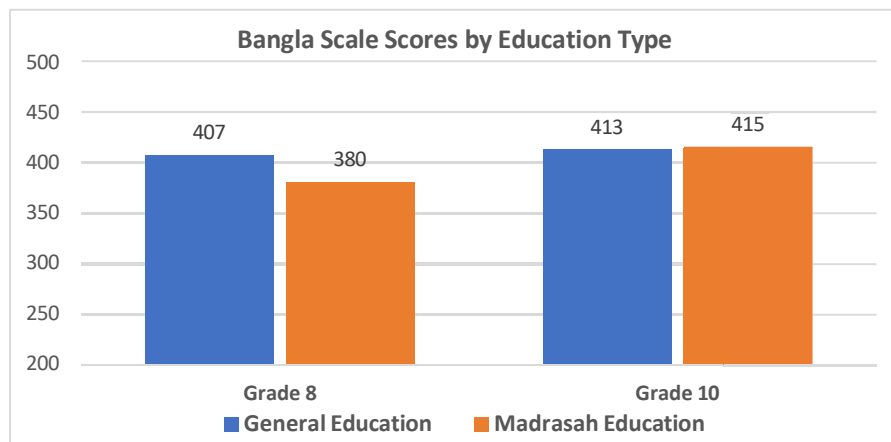
4.6 Student Performance in Bangla Language by Education Type

The average scale scores on Bangla language assessments for General Education schools and Madrasah schools are presented in Table 20 and Figure 11. Comparison of student performance in Bangla language between these two institution types shows similar patterns as the differences between urban and rural institutions. The difference on Bangla test in Grade 8 between students from General and Madrasah institutions was statistically significant, and its size is moderate in favor of students from General Education institutions (Cohen's d of 0.46), whereas the difference in Grade 10 was not statistically significant. This finding trigger further investigation of factors contributing to a substantial difference at one grade level and no difference at the two levels higher grade.

Table 20 Bangla Mean Scores by Education Type

Education Type	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
General Education	407	61	24086	413	58	22044
Madrasah Education	380	50	3229	415	60	1711
Effect Size	0.46			n/a		

Figure 11 Bangla Mean Scale Scores by Education Type



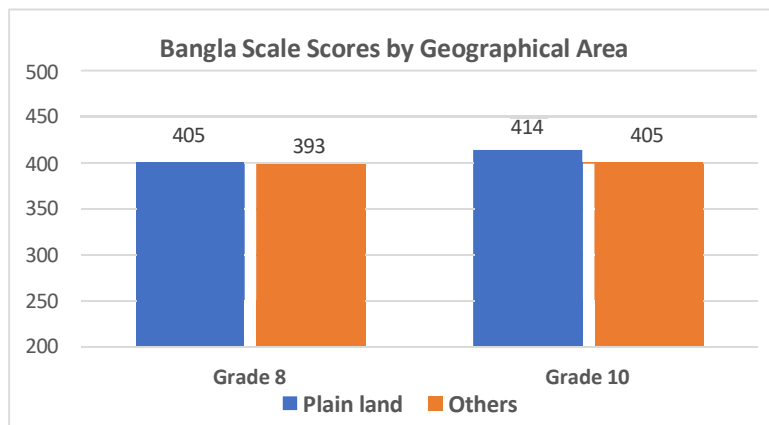
4.7 Student Performance in Bangla Language by Geographic Area

It is also important for policy and practice to compare student learning performance in different geographical areas of the country. The mean scale scores on Bangla assessments in Plain Land on other geographical areas are presented in Table 21 and Figure 12. The analysis indicates that in both grades the difference in Bangla performance is statistically significant in favor of Plain Lands, with effect sizes that are small at the level below practical significance.

Table 21 Bangla Mean Scores by Geographic Area

Geographic Area	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Plain Land	405	61	24996	414	58	21683
Others	393	59	2319	405	56	2072
Effect Size	0.19			0.14		

Figure 12 Bangla Mean Scale Scores by Geographic Area



5 Student Performance in English Language

5.1 Benchmarking of English Language Tests

The achievement bands described in Table 22 are intended to aid interpretation of student competencies applicable comparatively across the covered grades. They are indirectly linked to the curriculum in corresponding subjects and grades as they are based on the content of respective assessments that are purportedly aligned with the curriculum. These descriptions were derived from the content strands and cognitive levels of the items that characterize performance of students at different achievement levels (MEW/ACER, 2015).

Table 22 Description of Achievement Bands for English Assessments

Band	Scale Scores	Band Descriptors
Band 6	421 and above	Students at this level draw conclusions and write information by linking across sections in complex or unfamiliar texts, deduce the meaning of a familiar word in a different context than usual.
Band 5	381-420	Students at this level identify the main point and interpret the purpose of a statement, make inferences by linking information in more complex texts, interpret explicit information and write details from the text, use the correct degree of comparison in context and identify correct usage of infinitives.
Band 4	341-380	Students at this level interpret reason for a particular action in unfamiliar texts, interpret details and identify commonalities across different sections of texts, know simple language conventions and retrieve information in denser texts.
Band 3	301-340	At this level students relate the title of the text to its main idea, link information across sentences in a variety of simple texts, use appropriate adverbs in context, and identify correct usage of various punctuation symbols
Band 2	300 and below	At this level students retrieve explicitly stated detail from simple informative texts, short narratives and short transactional texts, know basic vocabulary, use appropriate pronouns and identify correct usage of common verbs.

5.2 Student Performance in English Language by Grade

As mentioned in the Bangla section, throughout this report, group performance is described in terms of both scale scores by arithmetic means of the groups, and achievement bands by percentage of students whose scores are falling in these predefined performance levels.

5.2.1 Average Scale Scores

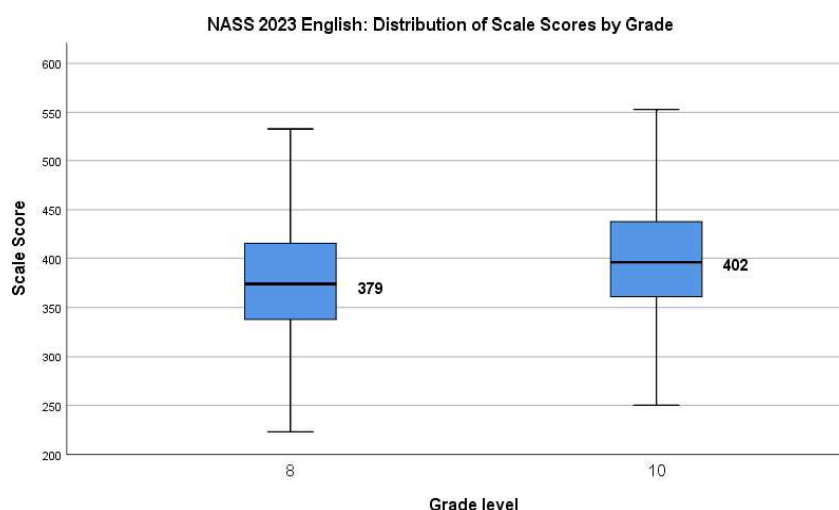
Student performance on English language assessments in grades 8 and 10 at overall national level is presented in Table 23 and Figure 13 showing the mean scale scores, their associated variation, and sample sizes.

As it can be observed, the mean scale scores characterizing student English performance are increasing from 379 in grade 8 to 402 in grade 10, reaching the difference that is considered a moderate effect size (Cohen's $d = 0.41$). These results demonstrate that the learning growth in English language between grade levels is statistically and practically significant.

Table 23 English Average Scale Scores by Grade

Grade	Mean	Std. Deviation	N	Effect Size
Grade 8	379	57	26864	-0.41
Grade 10	402	55	23843	

Figure 13 Distribution of Scale Scores in English Language by Grade



5.2.2 Percentage of Students in Achievement Bands by Grade

The national results showing percentage of students reaching achievement bands for English language by grade are presented in Table 24 and Figure 14.

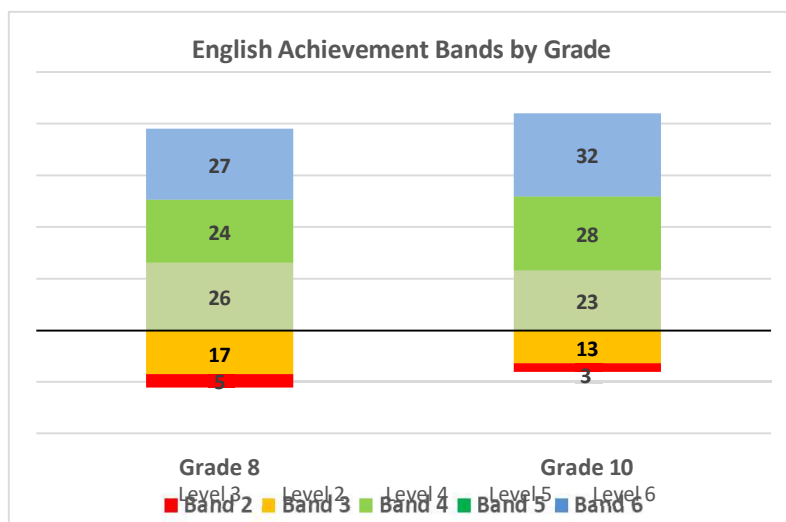
It can be observed that the percentage of students in the top 2 achievement bands (5 and 6) increases over grade levels (51% at grade 8 to 60% at grade 10), whereas percentage of students in the lowest bands (2 and 3) decreases as grade level increases (22% at grade 8 to 16% at grade 10). Although this indicates learning progress over grade levels, this does not mean that higher grade students' performance is better in relation to their on-grade objectives, rather, it just means that student overall knowledge and skills are growing as they progress to upper grades.

Since these achievement bands do not show how good student performance is in relation to the on-grade curriculum objectives, it is difficult to evaluate the meaning of percentages of students in the achievement bands. For example, when looking at 4.9% of students that are performing in the lowest Band 2 in grade 8, does it mean that they are unsatisfactory regarding the curriculum in grade 8? How about 17.1% of students reaching Band 3 in grade 8, did they achieve minimum curriculum expectations at grade 8? What about the meaning of Band 3 in other grades? These questions cannot be answered without the on-grade performance standards designed to evaluate how well students mastered curriculum at each of the targeted grades.

Table 24 English Percentage of Students in Achievement Bands by Grade

Band	Grade		Total
	Grade 8	Grade 10	
Band 2	4.9%	3.3%	4.1%
Band 3	17.1%	12.8%	15.1%
Band 4	26.2%	23.3%	24.8%
Band 5	24.5%	28.5%	26.4%
Band 6	27.3%	32.2%	29.6%
Total	100%	100%	100%

Figure 14 English Language Percent of Students in Achievement Bands by Grade



5.3 Student Performance in English Language by Division

5.3.1 Average Scale Scores by Division

Division average scale scores in English at each grade are presented in Table 25 (ordered by overall performance) and in Figure 15 (ordered alphabetically).

Considering aggregated scores over two grades, the results show that ranking of divisions based on English language performance is somewhat different than for Bangla performance – the highest performing division standing significantly above the others is Chattogram, and the lowest performing position is shared by three divisions, Mymensingh, Rangpur, and Sylhet. The effect size of the difference between the highest and lowest performing division (Chattogram and Rangpur) is 0.25, which is considered a small effect size, which suggests a small variation in English test performance between divisions.

Table 25 English Scale Score Means by Division and Grade

Division	Grade 8			Grade 10			Overall Mean	High-Low Effect Size
	Mean	Std. Dev.	N	Mean	Std. Dev.	N		
Chattogram	382	55	6785	410	55	5522	396	0.25
Dhaka	380	60	6992	405	59	6688	392	
Khulna	382	58	2526	401	51	2447	392	
Rajshahi	379	54	3167	405	53	2518	392	
Barishal	384	57	1208	398	50	1232	391	
Sylhet	374	59	1805	395	55	1827	384	
Mymensingh	375	55	2013	392	54	1514	384	
Rangpur	369	54	3187	396	47	1937	383	
Bangladesh	379	57	27683	403	55	23685	391	

Figure 15 Mean Scale Scores in English Language by Division

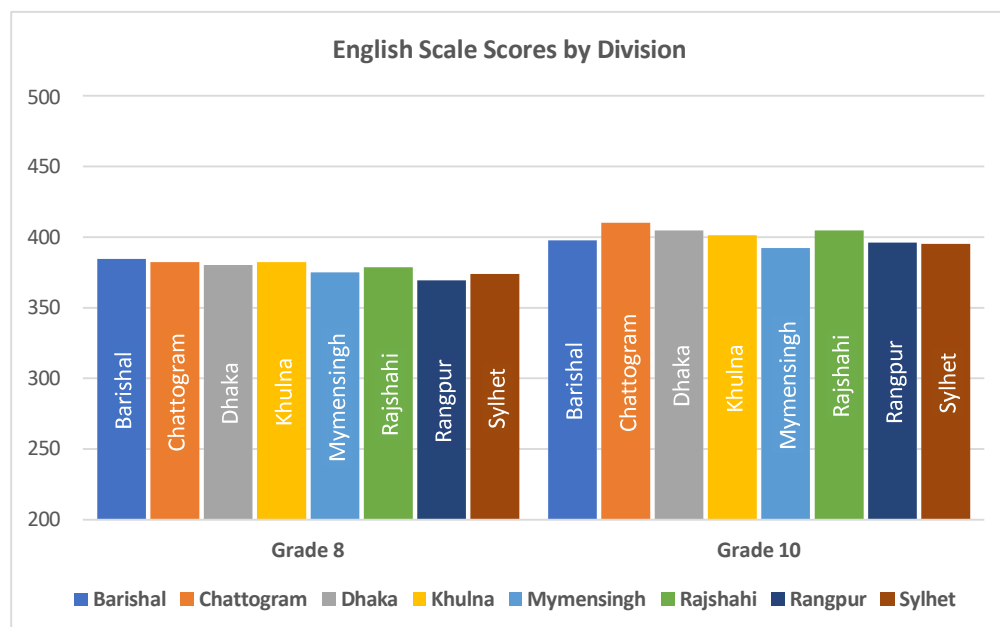


Table 26 below illuminates how the division mean scores for English grade 8 relate to each other based on statistical significance of differences between the individual divisions. The way to interpret the data in this table (and the following table below) is that divisions that fall within the same homogeneous group do not exhibit statistically significant difference. For example, the differences between the divisions in group 4 (Chattogram, Khulna, and Barishal) are not statistically significant as they constitute a homogeneous group. The mean scores for Rangpur and Sylhet (369 and 374, respectively) are significantly different as they belong to different homogeneous groups. By comparison, the difference between mean scores for Chattogram and Sylhet (382 and 374, respectively) is also statistically significant as they are in different homogeneous groups, but the size of the difference is much larger.

Table 26 English Grade 8 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups			
		1	2	3	4
Rangpur	3187	369			
Sylhet			374		
Mymensingh	2013		375		
Rajshahi	3167			379	
Dhaka	6992			380	
Chattogram	6785			382	382
Khulna	2526			382	382
Barishal	1208				384

To provide more help in interpretation of differences between student performance in different divisions, the following examples are based on the results in Table 27 related to division means in English grade 10:

- Is there a significant difference between mean scores for Dhaka and Khulna? No, because they belong to the same homogeneous group #3.
- Is there a significant difference between mean scores for Barisal and Rajshahi? Yes, because they belong to the different homogeneous groups #2 and #3, respectively.
- Is there a significant difference between mean scores for Rajshahi and Chattogram? Yes, because they are found within different homogeneous groups #3 and #4, respectively.

Table 27 English Grade 10 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups			
		1	2	3	4
Mymensingh	1514	392			
Sylhet	1827	395	395		
Rangpur	1937	396	396		
Barishal	1232		398		
Khulna	2447			401	
Dhaka	6688			405	
Rajshahi	2518			405	
Chattogram	5522				410

5.3.2 Percentage of Students in Achievement Bands by Division

Additional insights into divisions' results in English language can be gained through percentages of students reaching the achievement bands, as presented in Figure 16 and

Figure 17.

It can be observed that there are noticeable differences in student English performance among divisions as demonstrated by percentages of students in top two achievement bands. For example, in English grade 8, there are 49% of students reaching top two achievement bands in Barishal, compared to only 36% students reaching these two proficiency levels in Rangpur. The differences become even larger in grade 10, for example, 67% of students are reaching Bands 5 and 6 in Chattogram compared to 48% of students reaching Band 5 and 6 in Mymensingh.

Figure 16 English Grade 8 Percent of Students in Achievement Bands by Division

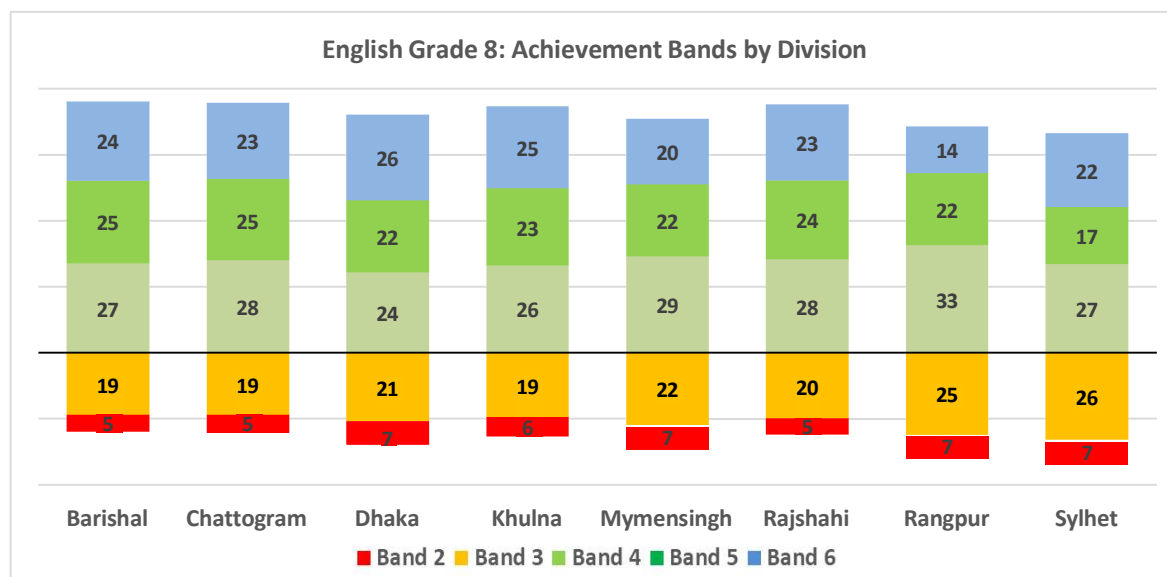
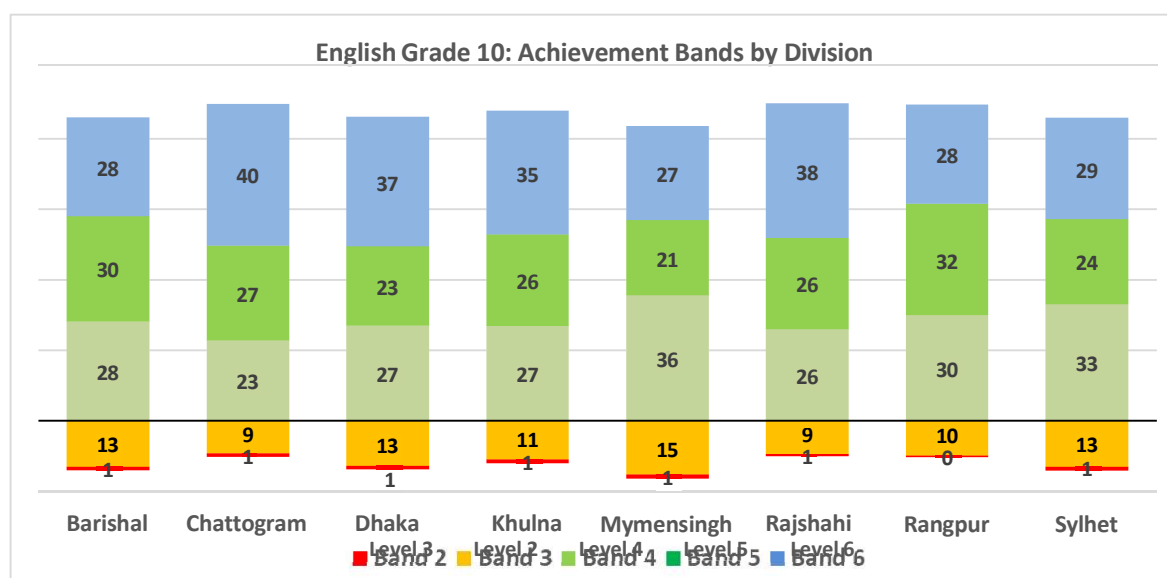


Figure 17 English Grade 10 Percent of Students in Achievement Bands by Division



5.4 Student Performance in English by Gender

Evaluation of gender equity in student performance on NASS 2023 assessments was conducted by testing differences between mean scores for boys and girls. The mean scale scores for boys and girls on English Language assessments in grades 8 and 10 are presented in Table 28 and Figure 18.

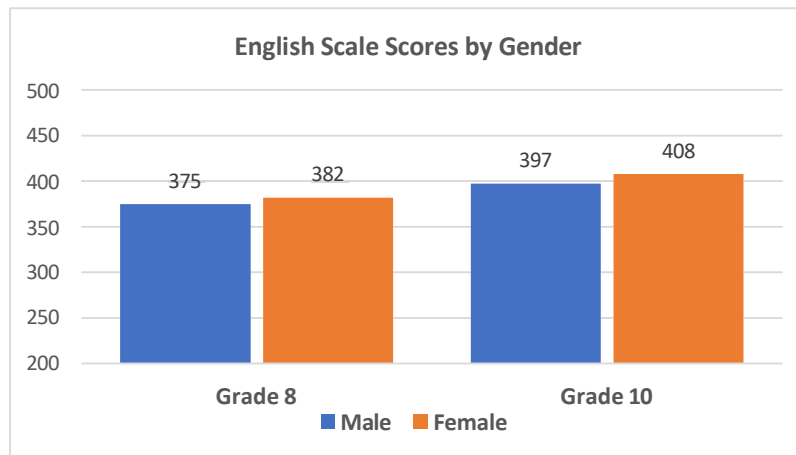
The analysis of scale scores for boys and girls in English assessments indicated that the gender difference in grade 10 is significant statistically but of marginal practical significance, showing that girls outperformed boys only for 11 scale score points (effect size 0.19). In grade 8 the difference is also in favor of girls, but although statistically significant, it corresponds to negligible effect sizes (Cohen's *d*

= 0.12) and does not bear a practical relevance. Thus, it can be concluded that gender equity in student performance on English language assessments is observed in grade 8, but in grade 10 there is evidence that girls perform better than boys with a difference at marginal practical relevance.

Table 28 English Mean Scores by Gender

Gender	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Male	375	57	11314	397	56	10397
Female	382	57	16349	408	54	13288
Effect Size	-0.12			-0.19		

Figure 18 English Mean Scale Scores by Gender



5.5 Student Performance in English Language by Urban/Rural Location

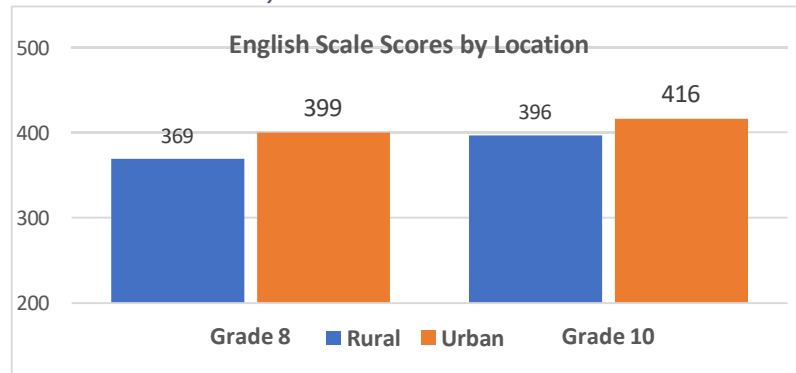
Student learning performance in English Language across urban and rural settings has been analyzed and the mean scale scores on English Language tests in grades 8 and 10 for students from rural and urban institutions are presented in Table 29 and Figure 19 below.

The results clearly demonstrate there are statistically significant differences between rural and urban students in performing on English language tests in both grades in favor of students in urban locations. Sizes of these differences are practically significant, at the level that requires attention of policy and practice officials as students in urban locations demonstrate 20-30 score points higher English performance than students in rural areas. The associated Cohen's *d* in grade 8 is at moderate level (0.56), which is considered as a substantial educational effect size, and in grade 10 the difference is also remarkable approaching moderate effect size (Cohen's *d* = 0.37).

Table 29 English Mean Scores by Location

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Rural	369	51	18595	396	49	15477
Urban	399	63	9088	416	63	8208
Effect Size	-0.56			-0.37		

Figure 19 English Mean Scale Scores by Location



5.6 Student Performance in English by Education Type

Differences in student performance on English assessments between institutions of different type (General education vs. Madrasah) show that students in General education schools perform significantly better compared to students in Madrasah institutions. The average scale scores on English language assessments for General Education schools and Madrasah are presented in Table 30 and

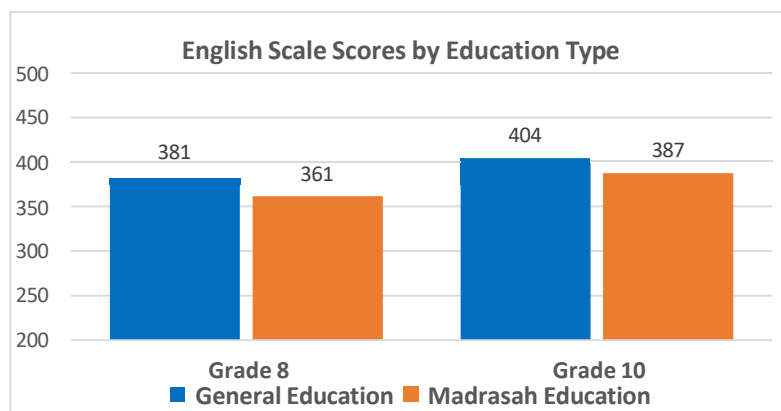
Figure 20.

It can be observed that differences between General Education and Madrasah institutions in student performance on English tests are statistically significant in both grades 8 and 10. Regarding the size of the differences, they are both at educationally significant level, showing that students' English performance in General Education institutions is higher than in Madrasah (Cohen's *d* of 0.35 and 0.31, respectively).

Table 30 English Mean Scores by Education Type

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
General Education	381	57	24471	404	56	22000
Madrasah Education	361	50	3212	387	48	1685
Effect Size	0.35			0.31		

Figure 20 English Mean Scale Scores by Education Type



5.7 Student Performance in English by Geographic Area

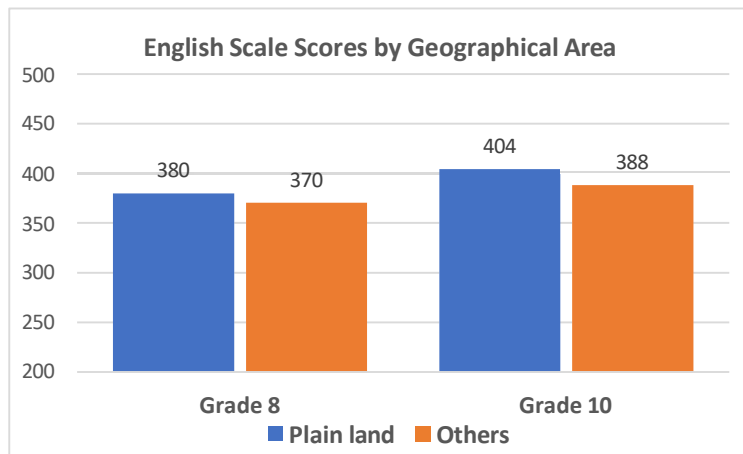
As stated earlier, comparison of student learning performance in different geographical areas of the country is of interest for policy and planning. The mean scale scores on NASS 2023 English assessments in Plain Land and Other geographical areas are presented in Table 31 and Figure 21.

The analysis shows that differences in English performance between geographical areas are statistically significant at both grade levels in favor of students in Plain Lands. The sizes of these differences are relatively small, but in grade 10 the difference reaches the level of practical relevance (Cohen's $d = 0.30$), however, in grade 8 the difference in English performance between students in Plain Lands and Other areas is below practical significance (Cohen's $d = 0.16$).

Table 31 English Mean Scores by Geographic Area

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Plain land	380	57	25249	404	56	21625
Others	370	52	2434	388	43	2060
Effect Size	0.16			0.30		

Figure 21 English Mean Scale Scores by Geographic Area



6 Student Performance in Mathematics

6.1 Benchmarking of Mathematics Tests

The mathematics achievement bands described in Table 32 are intended to aid interpretation and understanding of student performance comparatively across the observed grades. They are only indirectly linked to the Mathematics curriculum in corresponding grades as they are based on the content of Mathematics assessments that are purportedly aligned with the curriculum. These descriptions were derived from the content strands and cognitive levels of the items that characterize students' work at different achievement levels (MEW/ACER, 2015).

Table 32 Description of Achievement Bands for Mathematics Assessments

Band	Scale Scores	Band Descriptors
Band 6	481 and above	Students at this level justify and provide explanation for a mathematical solution to a problem less likely to be encountered, combine geometrical facts and algebraic properties to solve problems, solve problems involving graphs in unfamiliar contexts and provide justification, use measurement ideas in numbers to find a feasible solution for a complex problem. Work out the surface areas of familiar 3D shapes and relate sectoral area of a pie-chart with number concepts.
Band 5	431-480	Students at this level model linear expression involving proportional reasoning, perform a series of calculations based on given instructions, relate data presented in a two-way table and number concepts, make connections between geometrical properties and related mathematical ideas, use area measures of familiar shapes in context. solve non routine problems on percentages involving profit or loss and simple interest or presented through simple Venn diagrams.
Band 4	381-430	Students at this level work with fractions in familiar contexts, calculate factors and multiples of given numbers in context, use estimation, percentages, ratios to solve problems in real life contexts, convert between smaller units to larger units and work with them in context, work out the perimeters of familiar shapes, work with averages, use information available in different representations of data to find the unknown or missing data. simplify algebraic expressions involving addition and subtraction, factorise simple algebraic expressions, setup and solve linear equations in two variables. identify parallel lines and use angle properties on a line, use distinguishing features of quadrilaterals to classify quadrilaterals, use Pythagoras Theorem in routine geometrical contexts.
Band 3	331-380	Students at this level model real life familiar situations involving numerical operations, work with integers, place value, fractions and decimals interchangeably, use ratio, proportions and percentages in known situations, identify and generate patterns, model and solve simple linear equations, apply routine procedures on polynomials up to degree two, convert between different units of measures in context. classify triangles, work with angles on a pair of lines, use angle properties of a quadrilateral and use direction sense in map reading. identify different representations of data presented in tabular form.
Band 2	330 and below	At this level students carry out routine algorithmic procedures involving operations with whole numbers in simple contexts, show basic understanding of fractions, relate familiar situations with algebraic expressions, identify the distinguishing features of familiar 2D figures and 3D shapes, draw simple conclusions from small data presented in different familiar formats.

6.2 Student Performance in Mathematics by Grade

In this and following sections, student performance in Mathematics is described in terms of scale scores (using arithmetic means of the groups) and achievement bands (using percentage of students whose scores are falling in the predefined performance levels).

6.2.1 Average Scale Scores

Student results on Mathematics assessments in grades 8 and 10 at overall national level are presented in Table 33 and Figure 22, showing the mean scores, their associated variation, and sample sizes.

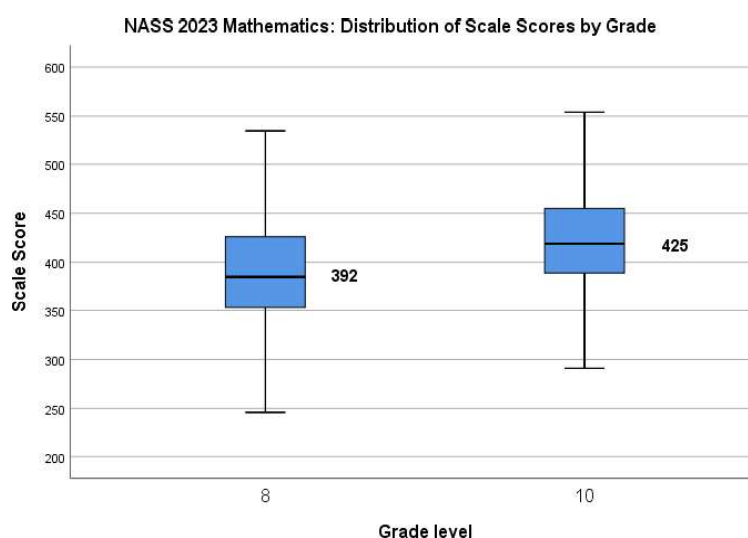
It can be observed that the mean scores characterizing student Mathematics performance across grades 8 and 10 are increasing, from 392 in grade 8 to 425 in grade 10. The increase from grade 8 to 10 is considered a moderate to strong effect size (Cohen's $d = 0.68$), which demonstrates that the learning growth in Mathematics between grade levels 8 and 10 is statistically and practically significant, pointing to substantial educational gains from one grade to another.

It is important to note that, although the gains from grade 8 to 10 in NASS 2023 Bangla and English language assessments are smaller in terms of vertical scale scores (effect sizes 0.15 and 0.40), we should not conclude that students learned less in language than in mathematics across these grade levels. It is because the nature of the curriculum is more cumulative in mathematics than in language, and the vertical scale scores in many national assessment programs typically show steeper gains for mathematics than for language vertical scales (McBride & Wise, 2001; Vukmirovic. 2005, 2006).

Table 33 Mathematics Average Scale Scores by Grade

Grade	Mean	Std. Deviation	N	Effect Size
Grade 8	392	51	26318	-0.68
Grade 10	425	47	23517	

Figure 22 Distribution of Scale Scores in Mathematics by Grade



6.2.2 Percentage of Students in Achievement Bands

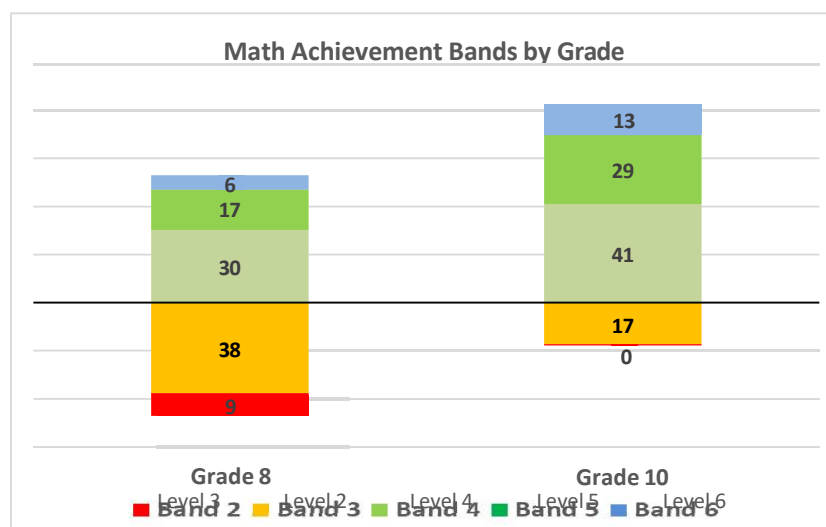
The national results in Mathematics NASS 2023 showing the percentage of students reaching achievement bands by grade are presented in Table 34 and Figure 23. Consistently with the results expressed by scale scores, it can be observed that the percentage of students in the top 2 achievement bands (5 and 6) substantially increases over grade levels, and vice versa, percentage of students in the lowest bands (2 and 3) is decreasing as students move to upper grades. It is important to note that this finding does not indicate that higher grade students perform better in relation to their on-grade objectives, rather, it means that student overall knowledge and skills are growing as they progress to

upper grades. Currently used achievement bands do not enable evaluation of students' performance in relation to their on-grade curriculum objectives, which suggests there is a need for setting on-grade performance standards designed to evaluate how well students mastered curriculum at each of the targeted grades.

Table 34 Mathematics Percentage of Students in Achievement Bands by Grade

Band	Grade		Total
	Grade 8	Grade 10	
Band 2	9.2%	0.3%	5.0%
Band 3	37.8%	17.4%	28.2%
Band 4	30.3%	41.1%	35.4%
Band 5	16.8%	28.5%	22.4%
Band 6	5.8%	12.6%	9.0%

Figure 23 Mathematics Percentage of Students in Achievement Bands by Grade



6.3 Student Performance in Mathematics by Division

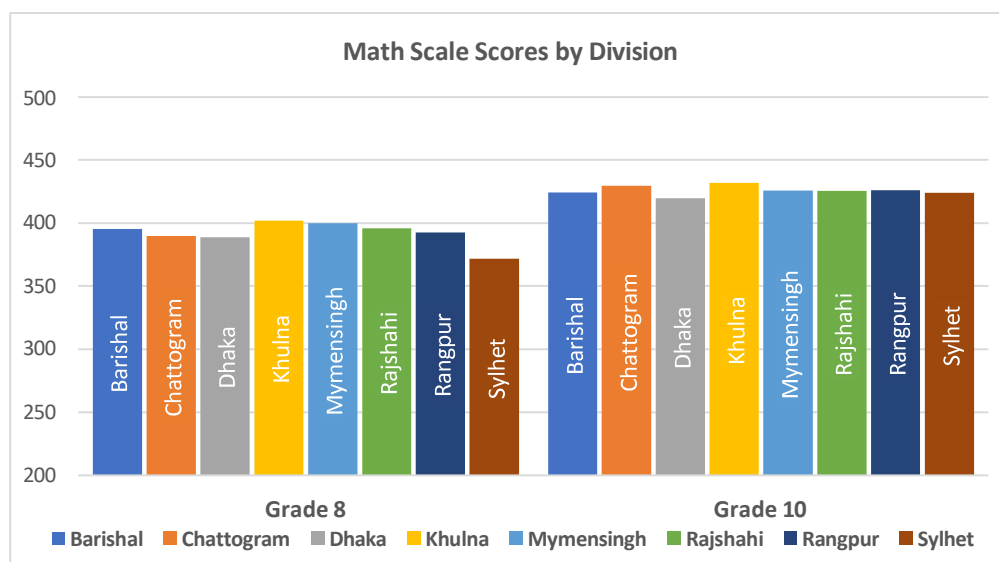
6.3.1 Average Scale Scores by Division

In this section we comparatively present the results for NASS 2023 Mathematics disaggregated by divisions and grades. Division average scale scores at each grade are presented in Table 35 (ordered by overall performance across two grades) and Figure 24 (divisions ordered alphabetically). Based on the overall division means, it can be observed that the highest performing division standing above the national average is Khulna. The lowest performing division falling substantially below the national average is Sylhet. The effect size relative to the difference between the overall mean score for the highest and lowest performing divisions (Khulna and Sylhet) equals 0.40, which represents a highly relevant finding for policy makers and educational practitioners.

Table 35 Mathematics Scale Score Means by Division and Grade

Division	Grade 8			Grade 10			Overall Mean	High-Low Effect Size
	Mean	Std. Dev.	N	Mean	Std. Dev.	N		
Khulna	402	49	2444	432	50	2408	417	0.40
Mymensingh	400	57	2097	426	46	1428	413	
Rajshahi	396	49	3076	425	42	2483	411	
Barishal	395	47	1232	424	45	1204	410	
Chattogram	390	51	6378	429	48	5515	410	
Rangpur	392	49	3218	426	44	1843	409	
Dhaka	388	52	6973	420	48	6698	404	
Sylhet	372	46	1768	424	45	1776	398	
Bangladesh	391	51	27186	425	47	23355	408	

Figure 24 Mean Scale Scores in Mathematics by Division and Grade



Next three tables illuminate how division mean scores relate to each other in terms of whether their differences were statistically significant. The divisions that fall under the same homogeneous group are similar and they do not differ significantly from each other. For example, in grade 8, the difference in Mathematics mean scores between the divisions in group 3 (Chattogram and Rangpur) is not statistically significant as they are located within the same homogeneous group. The difference between the mean scores for Rajshahi and Khulna (396 and 402, respectively) is statistically significant as they belong to different homogeneous groups, but the size of difference is very small (6 scale score points yielding effect size 0.12). By comparison, the difference between mean scores for Sylhet and Barishal (372 and 395, respectively) is also statistically significant, but the effect size is at moderate level bearing a high practical relevance (difference of 23 scale score points yielding the effect size 0.51).

The variation among divisions in grade 10 was smaller, indicating that divisions performed more uniformly, yielding a smaller number of significant differences among divisions placing them in just three homogeneous groups.

Table 36 Mathematics Grade 8 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups				
		1	2	3	4	5
Sylhet	1768	372				
Dhaka	6973		388			
Chattogram	6378		390	390		
Rangpur	3218			392	392	
Barishal	1232				395	
Rajshahi	3076				396	
Mymensingh	2097					400
Khulna	2444					402

Table 37 Mathematics Grade 10 – Mean Division Scores Grouped by Statistical Significance

Division	N	Homogeneous Groups		
		1	2	3
Dhaka	6698	420		
Sylhet	1776		424	
Barishal	1204		424	
Rajshahi	2483		425	
Mymensingh	1428		426	
Rangpur	1843		426	
Chattogram	5515			429
Khulna	2408			432

6.3.2 Percentage of Students in Achievement Bands by Division

Student performance in Mathematics across 8 divisions, expressed by percentages of students achieving in each of the bands, is presented in Figure 25 and Figure 26. Like the results demonstrated by scale scores, there are noticeable differences in Mathematics performance among divisions, especially when looking at percentages of students reaching the top two achievement bands. For example, in grade 8, there are 27% of students reaching the top two achievement bands in Khulna, compared to only 15% of students reaching these proficiency levels in Sylhet. Differences are somewhat smaller in grade 10, where 42% of students reached the top two bands in Khulna compared to 38% of students that reached the same band levels in Sylhet.

It can be also observed that the achievement bands are less sensitive to measuring student performance in grade 10 where majority of students got classified in top three bands, with 0% of students in the bottom band, compared to grade 8 where student performance was distributed over all 5 bands. This observation also suggests there is a need to set on-grade performance standards that will inform the assessment users about student performance relative to the curriculum expectations within each grade.

Figure 25 Mathematics Grade 8 Percentage of Students in Achievement Bands by Division

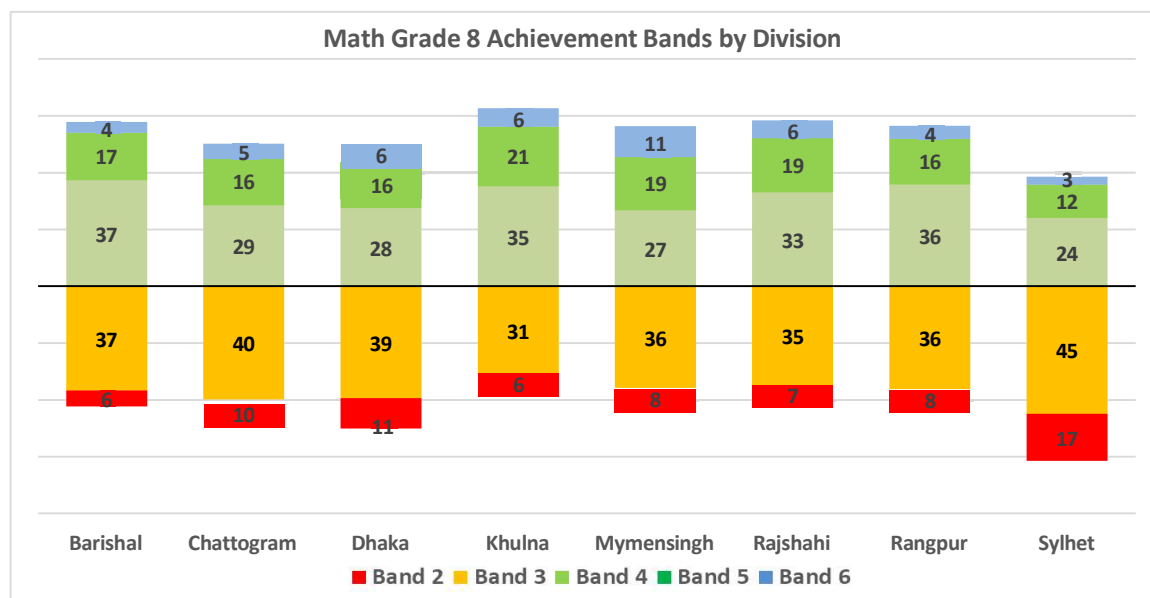
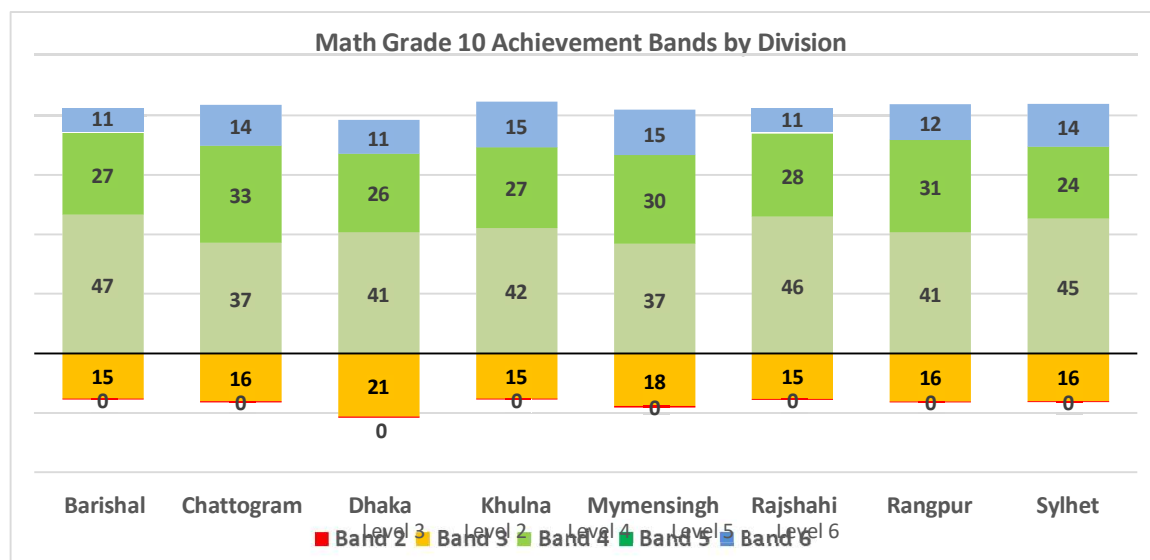


Figure 26 Mathematics Grade 10 Percentage of Students in Achievement Bands by Division



6.4 Student Performance in Mathematics by Gender

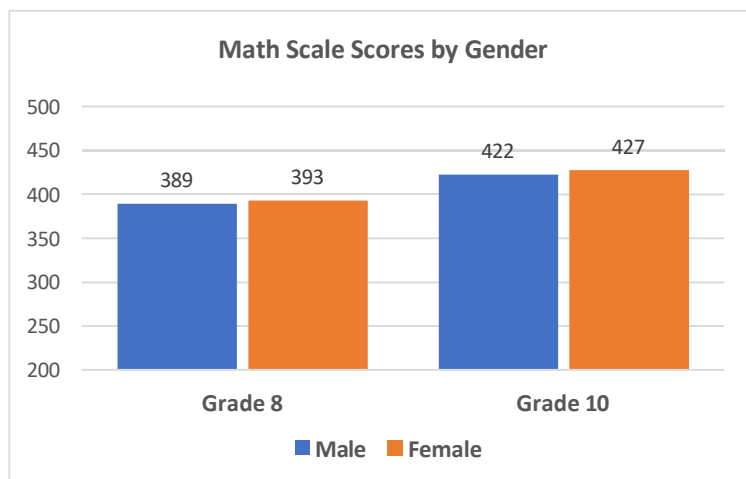
The mean scale scores for boys and girls obtained on the NASS 2023 Mathematics assessments in grades 8 and 10 are presented in Table 38 and Figure 27.

The analysis of mean scale scores for boys and girls in Math assessments indicated that the gender differences, although statistically significant at both grade levels, are too small to bear any practical relevance (corresponding to effect sizes 0.07 at grade 8 and 0.11 at grade 10). Overall, it can be concluded that gender differences in student performance on Mathematics assessments in secondary grades in Bangladesh are negligible suggesting that there is a gender equity regarding the mathematics education outcomes in secondary institutions.

Table 38 Mathematics Mean Scores by Gender

Gender	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Male	389	51	11239	422	47	9947
Female	393	51	15947	427	47	13408
Effect Size	-0.07			-0.11		

Figure 27 Mathematics Mean Scale Scores by Gender



6.5 Student Performance in Mathematics by Location

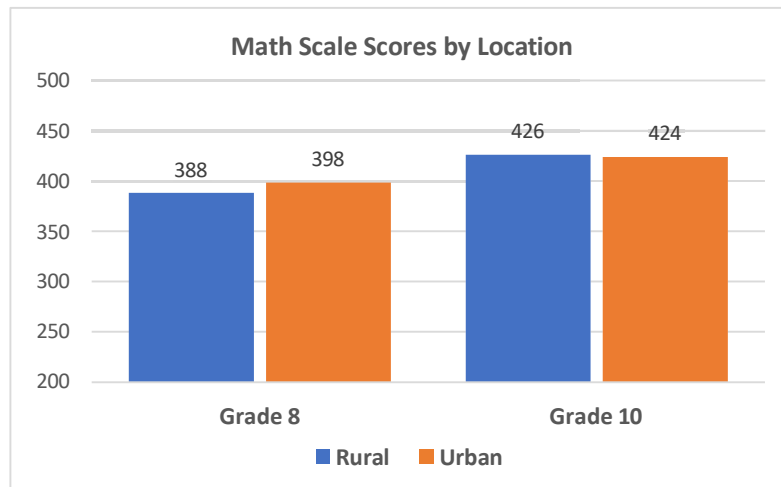
Evaluation of student learning performance in rural vs. urban setting has been always of high interest for education policy and planning. The mean scale scores on NASS 2023 Mathematics tests for students in rural and urban institutions are presented in Table 39 and Figure 28.

The obtained results indicate that there is a statistically significant difference between rural and urban students in performing on Mathematics tests in both grades. In grade 8 urban students outperformed students in rural areas yielding the effect size at the margin of educational significance (0.20), whereas the difference in grade 10 was too small to bear any practical significance.

Table 39 Mathematics Mean Scores by Location

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Rural	388	49	18101	426	47	15235
Urban	398	54	9085	424	46	8120
Effect Size	-0.20			0.04		

Figure 28 Mathematics Mean Scale Scores by Location



6.6 Student Performance in Mathematics by Education Type

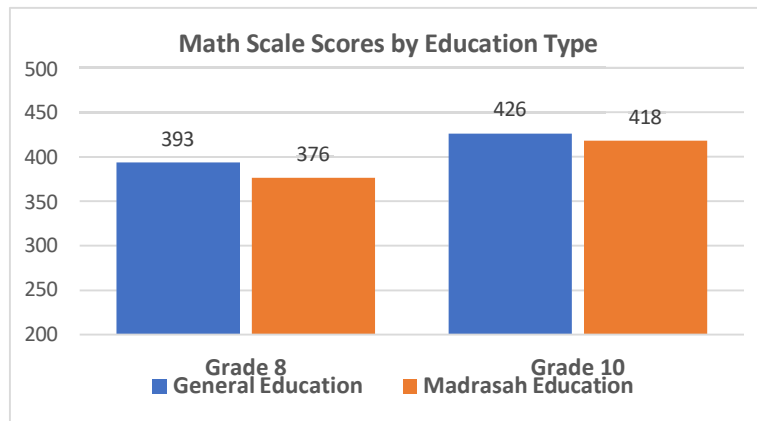
Comparison of student performance in Mathematics between institutions of different types shows that differences between General Education institutions and Madrasah are statistically significant, with practical significance reached only in grade 8, demonstrating higher student performance in General Education institutions. The average scale scores on Mathematics assessments for General Education institutions and Madrasah are presented in Table 40 and Figure 29.

It can be observed that differences between General Education and Madrasah institutions in student performance on Mathematics tests do not have the same size across grade levels. In grade 8 the difference is at educational relevance level (Cohen's d 0.34), whereas in grade 10 students in General Education demonstrated a smaller advantage over the students in Madrasah, the difference being just below practical significance, with effect size at 0.17.

Table 40 Mathematics Mean Scores by Education Type

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
General Education	393	51	24090	426	47	21619
Madrasah Education	376	49	3096	418	43	1736
Effect Size	0.34			0.17		

Figure 29 Mathematics Mean Scale Scores by Education Type



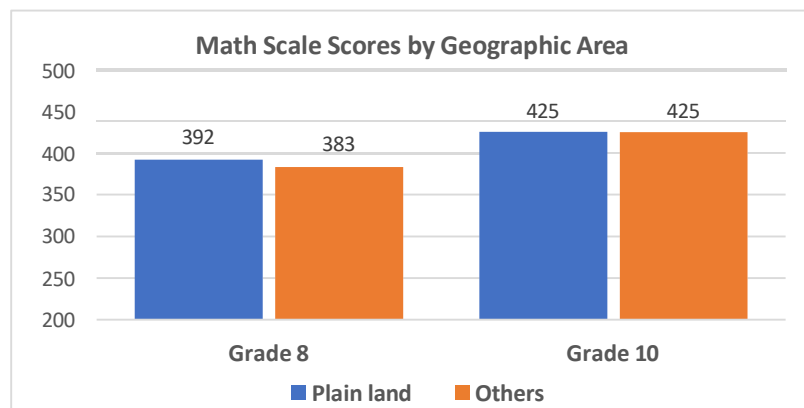
6.7 Student Performance in Mathematics by Geographic Area

The mean scale scores on Mathematics assessments in Plain Land and Other geographical areas are presented in Table 41 and Figure 30. The comparison of student performance in Mathematics between Plain Land and Other geographical areas indicates that the difference was statistically significant at grade 10 favoring students from Plain Land, but the size of the difference is below practical relevance (Cohen's $d = 0.18$). In grade 10, however, the difference was not statistically significant.

Table 41 Mathematics Mean Scores by Geographic Area

Location	Grade 8			Grade 10		
	Mean	Std. Deviation	N	Mean	Std. Deviation	N
Plain Land	392	51	24831	425	47	21376
Others	383	50	2355	425	45	1979
Effect Size	0.18			0.01		

Figure 30 Mathematics Mean Scale Scores by Geographic Area



7 Student Performance in Science

7.1 Benchmarking of Science Tests

The benchmarks for NASS 2023 Science assessment at grade 8 were provisional, and the descriptors for achievement bands are to be developed, thus, Table 42 serves as a placeholder. The descriptors will aid interpretation and understanding of student performance in grade 8. They will be only indirectly linked to the Science curriculum in corresponding grades as they are based on the provisional benchmarks, whereas a full setting of performance standards for Science, and other NASS subjects is planned for the next cycle of NASS in 2026.

Table 42 Description of Achievement Bands for Science Assessments

Band	Scale Scores	Band Descriptors
Band 6	401 and above	Tbd
Band 5	351-400	Tbd
Band 4	301-350	Tbd
Band 3	251-300	Tbd
Band 2	250 and below	Tbd

7.2 Student Performance in Science by Grade

In this and following sections, student performance in grade 8 Science assessment is described in terms of scale scores (means for groups of students) and achievement bands (percentages of students performing within the predefined levels). Since the benchmarks for Science are provisional, they do not convey enough information about how much of curriculum students mastered, thus, to facilitate understanding of students' overall performance we provided the average percent-correct score at national level to serve as an orientational reference point.

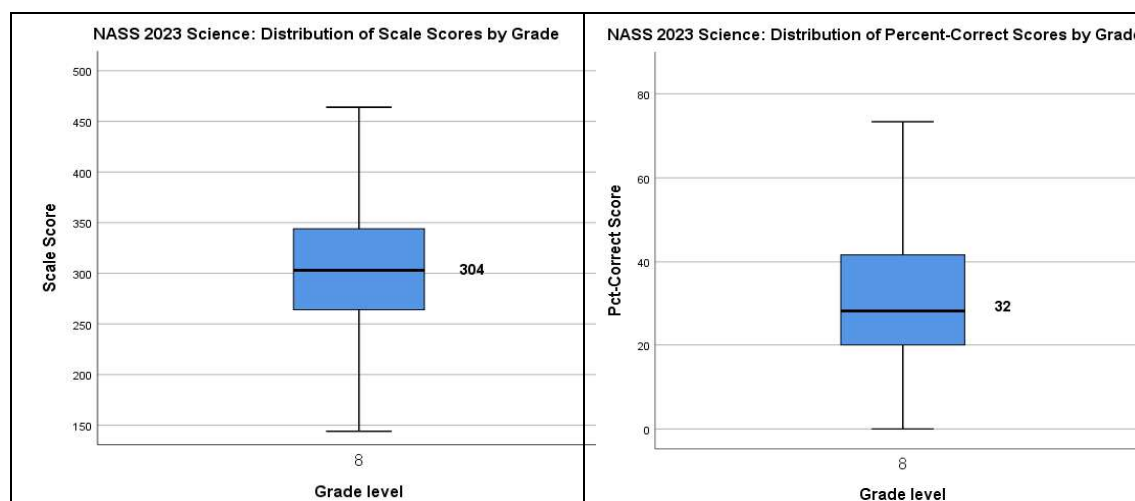
7.2.1 Average Scale Scores

Student results on Science assessments in grade 8 at national level are presented in Table 43 and Figure 31, showing the means for both scale scores and percent-correct scores, their associated variation, and sample sizes. It can be observed that the mean percent-correct score characterizing student Science performance in grade 8 equals 32, which means that students earned 32% of maximum possible points on the test. Assuming that the test was designed to cover the curriculum in grade 8, it can be concluded that students mastered approximately one third of the curriculum. This finding suggests that science in grade 8 may pose challenges to students and the test was rather difficult for them.

Table 43 Science Average Scale Scores and Percent-Correct Scores in Grade 8

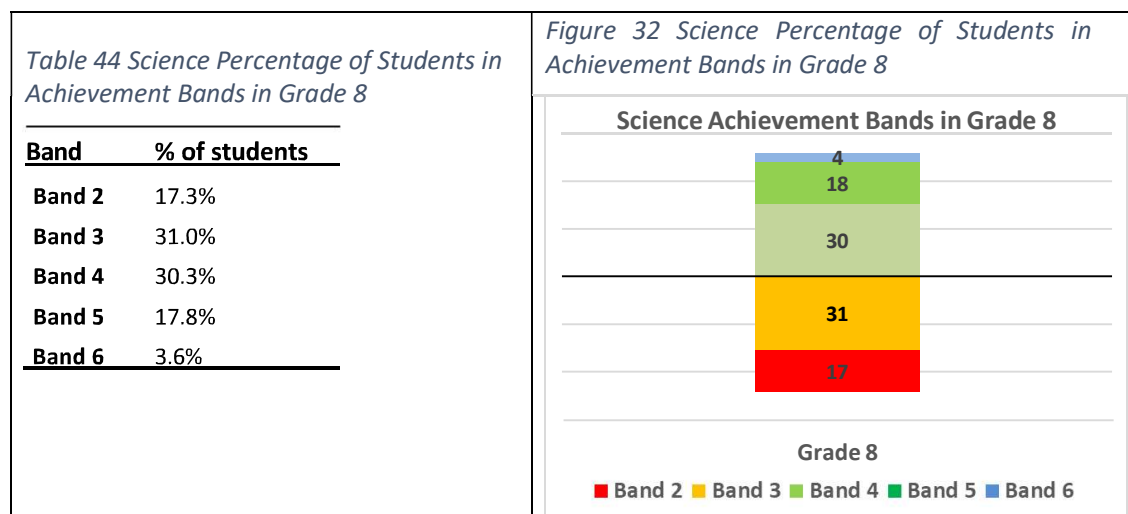
Grade	Mean	Std. Deviation	N
Grade 8 Scale Score	304	54	26601
Grade 8 Pct-Correct Score	32	15	26601

Figure 31 Distribution of Scale Scores and Percent-Correct Scores in Science by Grade



7.2.2 Percentage of Students in Achievement Bands

The national results on Science Grade 8 assessment, showing the percentage of students reaching achievement bands, are presented in Table 44 and Figure 32. It can be observed that the percentage of students in the top 2 achievement bands (5 and 6) equals 22%, which suggests that relatively small number of students are reaching the higher performance levels. Likewise, in the lowest bands (2 and 3) there are 48% performing at these two bottom levels. It is important to note that this finding should be interpreted considering that the benchmarks are still provisional. Currently used achievement bands do not enable evaluation of students' performance in relation to their on-grade curriculum objectives, which suggests there is a need for setting of national on-grade performance standards designed to evaluate how well students mastered curriculum at each of the targeted grades.



7.3 Student Performance in Science by Division

7.3.1 Average Scale Scores by Division

In this section we comparatively present the results for NASS 2023 Science disaggregated by divisions and grades. Division average scale scores at each grade are presented in Table 45 (ordered by overall performance across three grades) and Figure 33 (divisions ordered alphabetically). Based on the

division means, it can be observed that the highest performing division standing above the national average is Rajshahi, whereas the lowest performing division falling substantially below the national average is Sylhet. The effect size relative to difference between the means for these two divisions equals 0.63, which represents a moderate to strong effect size, and calls for attention of policy makers and educational practitioners.

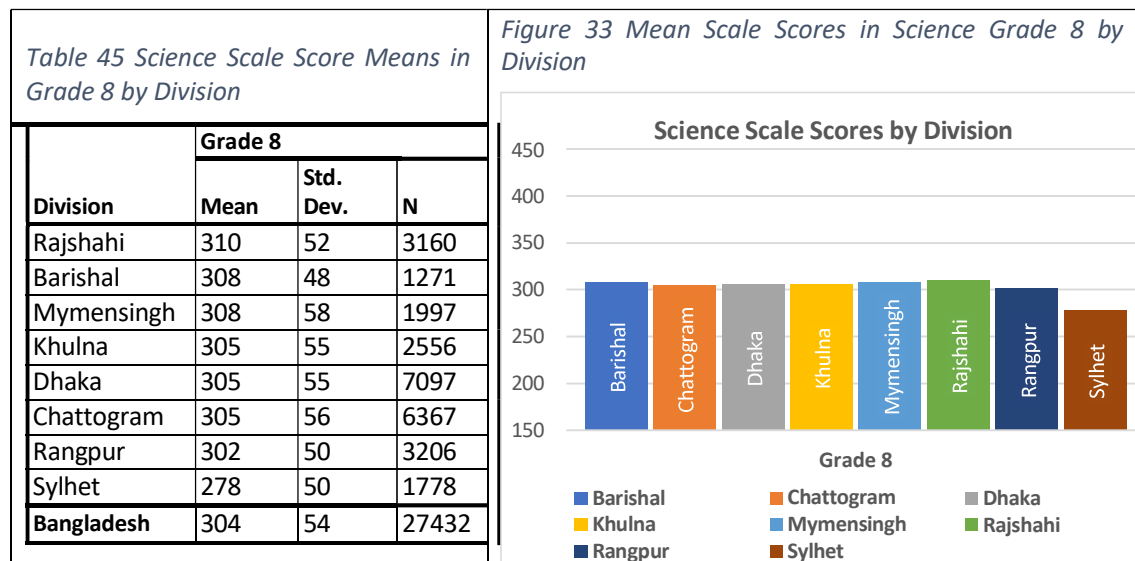


Table 46 illuminates how division mean scores relate to each other in terms of whether their differences were statistically significant. The divisions that fall under the same homogeneous group are similar and their performance in Science does not differ significantly. For example, the differences in Science mean scores between the divisions in homogeneous group 4 (Mymensingh, Barishal, and Rajshahi) are not statistically significant as they are located within the same homogeneous group. The difference between mean scores for Rangpur and Mymensingh (302 and 308, respectively) is statistically significant, as they belong to different homogeneous groups, but the size of the difference is very small (6 scale score points yielding effect size 0.12). By comparison, the difference between mean scores for Sylhet and Chattogram (278 and 305, respectively) is also statistically significant, but the effect size moderate bearing a high practical relevance (27 scale score points with Cohen's *d* equaling 0.49).

Table 46 Science Grade 8 – Mean Division Scores Grouped by Statistical Significance

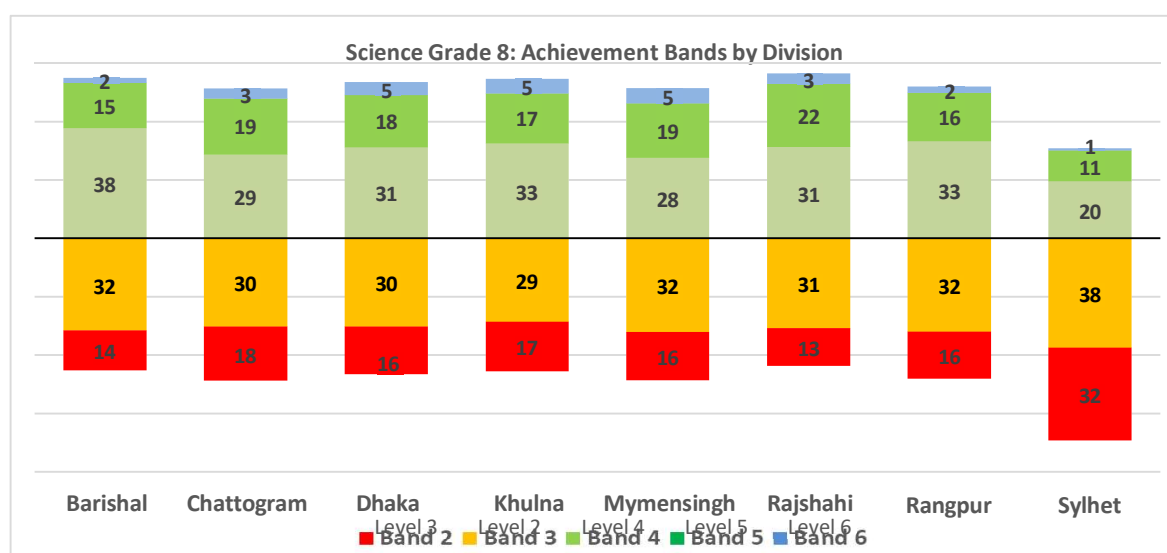
Division	N	Homogeneous Groups			
		1	2	3	4
Sylhet	1778	278			
Rangpur	3206		302		
Chattogram	6367		305	305	
Dhaka	7097		305	305	
Khulna			305	305	
Mymensingh	1997			308	308
Barishal	1271			308	308
Rajshahi	3160				310

7.3.2 Percentage of Students in Achievement Bands by Division

Student performance in Science across 8 divisions, expressed by percentages of students achieving in each of the bands, is presented in Figure 34. Similarly to the results demonstrated by scale scores, there are noticeable differences in Science performance among divisions, especially when looking at percentages of students reaching top two achievement bands. For example, there are 25% of students reaching top two achievement bands in Rajshahi, compared to only 12% of students reaching these proficiency levels in Sylhet.

Again, it should be noted that these bands are provisional and not based on actual setting of performance standards, thus, there is a need to set on-grade performance standards with conceptual (narrative descriptions) and operational (cut scores) definitions of proficiency bands that will inform the assessment users about student performance relative to the curriculum expectations within each grade.

Figure 34 Science Grade 8 Percentage of Students in Achievement Bands by Division



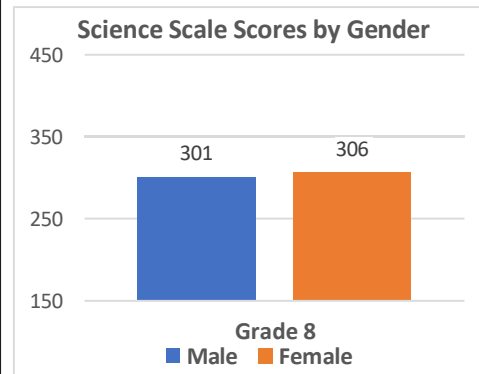
7.4 Student Performance in Science by Gender

The mean scale scores for boys and girls obtained on the NASS 2023 Science assessment in grade 8 are presented in Table 47 and Figure 35. The analysis of mean scale scores for boys and girls in Science assessments indicated that the gender difference, although statistically significant, is too small to bear any practical relevance (corresponding effect size is 0.10). Overall, it can be concluded that gender differences in student performance on Science assessments in grade 8 in Bangladesh are negligible suggesting that there is a gender equity regarding the Science education outcomes in secondary institutions.

Table 47 Science Grade 8 Mean Scores by Gender

Gender	Grade 8		
	Mean	Std. Deviation	N
Male	301	53	11322
Female	306	55	16110
Effect Size	-0.10		

Figure 35 Science Grade 8 Mean Scale Scores by Gender



7.5 Student Performance in Science by Location

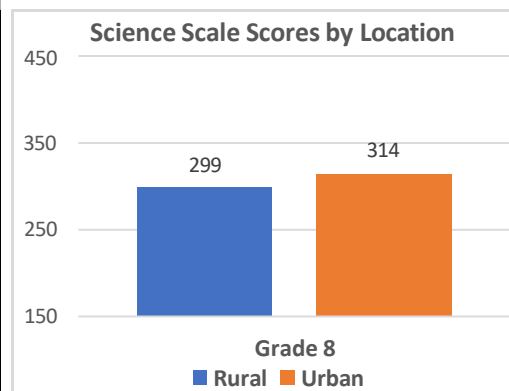
Evaluation of student learning performance in rural vs. urban setting has been always of high interest for education policy and planning. The mean scale scores on NASS 2023 Science tests for students in rural and urban institutions are presented in Table 48 and Figure 36.

The results indicate that there is a statistically significant difference between rural and urban students in performing on Science Grade 8 test, showing that students in urban locations performed higher than students in rural areas. The effect size is educationally significant with Cohen's d at 0.27.

Table 48 Science Mean Scores by Location

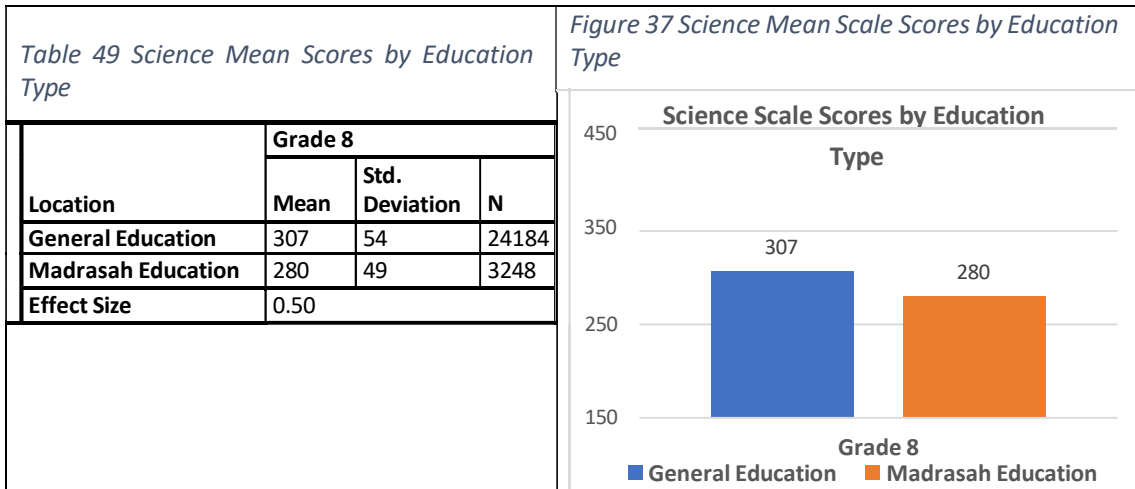
Location	Grade 8		
	Mean	Std. Deviation	N
Rural	299	52	18396
Urban	314	58	9036
Effect Size	-0.27		

Figure 36 Science Mean Scale Scores by Location



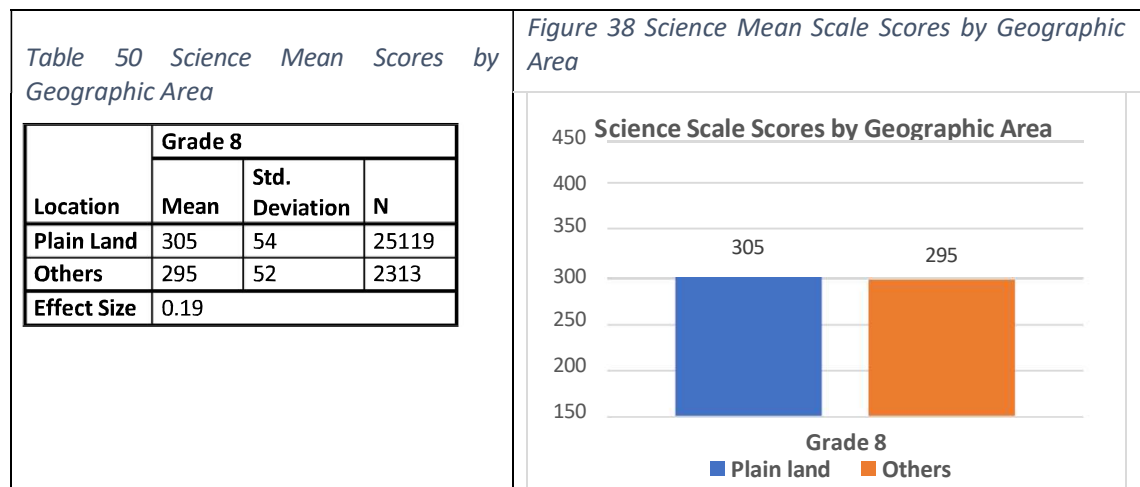
7.6 Student Performance in Science by Education Type

The average scale scores on Science Grade 8 assessment for General Education institutions and Madrasah are presented in Table 49 and Figure 37. It can be observed that differences between General Education and Madrasah institutions in student performance on Science Grade 8 test equals 27 scale score points, demonstrating that students in General Education perform much higher than students in Madrasah, the difference being of a moderate effect size (Cohen's d 0.50).



7.7 Student Performance in Science by Geographic Area

The mean scale scores on Science assessments in Plain Land and Other geographical areas are presented in Table 50 and Figure 38. The comparison of student performance in Science Grade 8 between Plain Land and Other geographical areas indicates that the difference is statistically and practically significant in favor of students from Plain Land. The effect size associated with this difference is relatively small at the edge of educational significance (Cohen's $d = 0.19$).



8 Summary, Implications, Recommendations

NASS 2023 was administered nationally in grades 8 and 10 on a sample that targeted 1000 schools and 30000 students per grade from 64 districts. Actual participation was 89.8% and 80.6% at grade 10, which yielded a total of 51117 students that were assessed in key subjects Bangla, English, Mathematics, and Science.

The objective of LASI/NASS program was to evaluate the level of student educational outcomes and to monitor their progress in learning. LASI 2017 was administered two years after the baseline that was set by LASI 2015, which was further followed by NASS 2019 and NASS 2023 administrations.

8.1 Summary of Student Performance Across Administration Years

Since the LASI/NASS program was designed to enable comparisons of results between the cycles to evaluate the learning growth across administration years, it is highly informative to review the results through longitudinal comparisons. The results of student performance on LASI/NASS across three administration cycles are presented in Table 51 and Figure 39.

The results for LASI 2017 generally show that a noticeable improvement of student performance compared to LASI 2015 was demonstrated only in Grade 8 for Bangla and English, and the corresponding size of the difference bears educational significance. In Mathematics Grade 8, the improvement was small and at the edge of practical relevance. On the other hand, student scores in Grade 6 either remained the same or slightly decreased, with the differences that are small not reaching the level considered as educationally significant. Overall, it can be concluded that LASI 2017 brought some evidence of improved student learning compared to the 2015 testing cycle, especially in Bangla and English at grade and 8, whereas at grade 6 there was a stagnation of student performance in all subjects. It should be noted that in LASI 2017 there was no backwards comparison for grade 10 because it was not assessed in 2015.

While LASI 2017 results are mixed in terms of observed progress, the results of NASS 2019 showed more remarkable improvements in student learning outcomes compared to previous administration years. Statistically and practically significant differences were observed in all subjects and grades showing that student performance increased in 2019 compared to 2017 for an average of 18 scale score points. The size of this difference corresponds to the average effect size of 0.32, which represents the level considered as educationally significant.

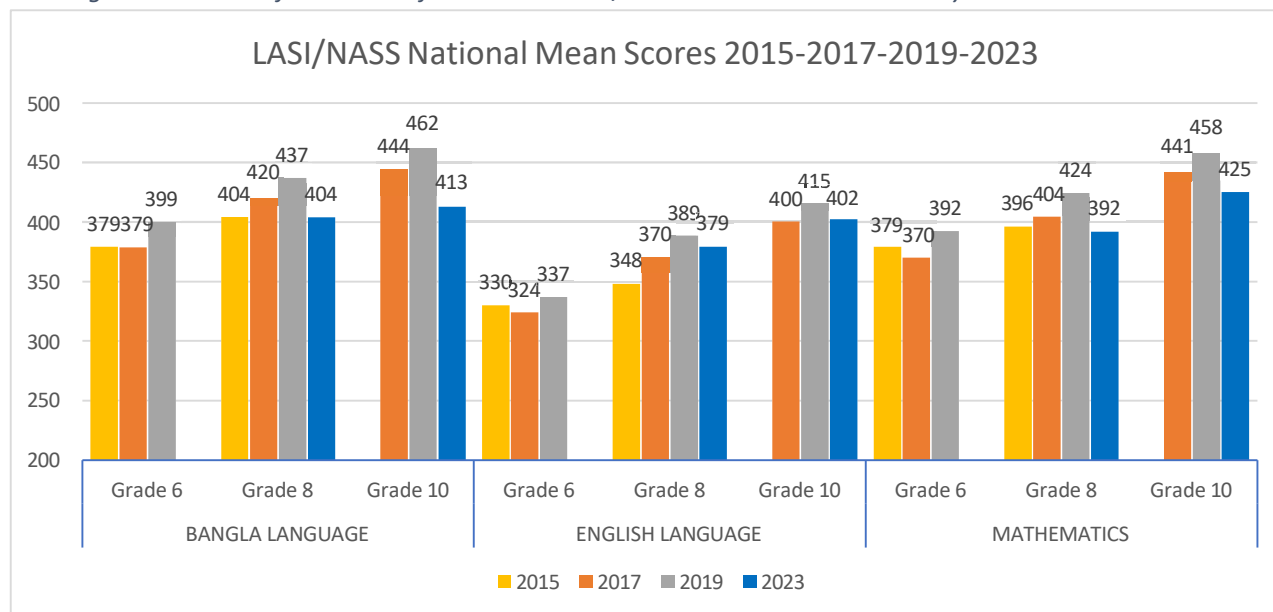
Table 51 Comparative Results for LASI 2015, LASI 2017, NAS 2019, and NASS 2023

Grade	Bangla Language				English Language				Mathematics			
	2015	2017	2019	2023	2015	2017	2019	2023	2015	2017	2019	2023
6	379	379	399		330	324	337		379	370	392	
8	404	420	437	404	348	370	389	379	396	404	424	392
10		444	462	413		400	415	402		441	458	425

Contrary to the improvements observed in LASI 2017 and NASS 2019, student performance on NASS 2023 assessments substantially dropped compared to previous administration years. The steepest decline in student results was observed in Bangla Language and Mathematics in both assessed grades. The NASS 2023 results in grade 8 Bangla and Math dropped back to the score levels observed in LASI 2015, and in grade 10 Bangla and Math to levels lower than achieved in NASS 2019. The results in NASS 2023 English also declined in both assessed grades (8 and 10), dropping below the NASS 2019 level, but remaining above the LASI 2017 average score levels.

The reasons for NASS 2023 score decline will be thoroughly explored considering factors such as instructional loss due to COVID 19, natural disasters, social unrest, and possibly delayed administration time much beyond the end of academic year. Most importantly, it will be necessary to develop and implement a strong national remedial program, where the information acquired by learning assessments will play a significant role, as they are not only tools for monitoring student learning but more significantly, they can be effectively used as drivers of student learning.

Figure 39 Results of Student Performance on LASI/NASS Across Administration Cycles



8.2 Summary of NASS 2023 Student Performance, Implications, and Recommendations

In quests for the information that can be valuable for policy and practice, the analyses were carried out to compare student performance in focused subjects across grade levels, divisions, gender groups, types of educational institutions, and geographical areas. The findings of NASS 2023 can be summarized as follows:

- Grade levels:** Differences between vertical scale scores in grades 8 and 10 were statistically significant, but the associated effect sizes show that learning growth was not equal across three assessed subjects. In Bangla language the increase from grade 8 to 10 was below educational significance, whereas in English and Math it was moderate to strong. Percentages of students in achievement bands systematically vary across grade levels, moving the percentage of students from low to high achievement bands, demonstrating a learning growth across grades. However, this growth was much stronger in NASS 2019 than in NASS 2023, which is consistent with the observation of decreased learning throughout recent years.
- Divisions:** Student performance among divisions exhibits a substantial variation, where differences between the highest and lowest performing divisions reach moderate to large effect sizes. Khulna division stands out as the best performing in Bangla language and math, Chattogram excelled as the best in English Language performance, and Rajshahi division stands out by its high performance in science. On the other side of distribution stands Sylhet as the lowest performing division in most subjects and grades. This finding suggests that

further investigation of factors causing divisional inequity should be conducted, and action plans for decreasing the gaps between divisions should be developed.

- **Gender:** Differences in performance of boys and girls on Bangla and English assessments are statistically significant in favor of girls in both grades 8 and 10. However, in grade 8 the sizes of differences are small not bearing practical relevance, whereas at grade 10 girls outperformed boys in Bangla and English for the effect size at the margin of educational significance. On the other hand, the gender differences in Mathematics and Science assessments are negligible. To conclude, NASS 2019 showed that girls tend to be performing higher than boys in language skills, especially in upper grades, whereas there was no gender gap observed in Mathematics and Science.
- **Rural/urban location:** NASS 2019 results show that student performance in urban locations is generally higher than in rural locations in all subjects and grades, exhibiting small to moderate effect sizes. The differences between urban and rural areas tend to be larger for language assessments, especially in English, whereas in mathematics and science the urban-rural difference tends to be below practical significance. Special attention should be raised when the sizes of differences become as substantial as in English language, where the effect sizes range between small to moderate, indicating superior performance of students in urban areas. This suggests that further consideration of educationally relevant resources, both human and technical, should be placed in focus of policy makers and practitioners to alleviate a gap in student learning between rural and urban institutions.
- **General Education/Madrasah:** Differences between General Education and Madrasah are statistically and practically significant for most subject-grade combinations, showing that students in General education institutions perform higher than students in Madrasah, exhibiting small to moderate effect sizes. The differences are somewhat larger in grade 8 than in grade 10, reaching the moderate level showing that students in General Education institutions outperform students in Madrasah.
- **Geographical area:** There were statistically and practically significant differences on NASS 2023 between Plain Land and Other geographical areas in favor of students from Plain land areas. The effect sizes are in small range bearing educational relevance and calling for action to decrease the gap between these geographical areas of the country.

8.3 Implications and Policy Recommendations

To conclude, NASS 2023 provides lots of valuable diagnostic information that can be used by policy makers and education practitioners (e.g., teachers) to develop action plans and improve teaching with ultimate goal to increase student learning outcomes. In many aspects NASS 2023 provided encouraging information demonstrating significant educational achievements, and in some areas, it identifies the gaps that need to be addressed by further research and actions.

Below are listed the initial recommendations, although further discussions about the results of NASS 2023 are planned at the co-interpretational workshop with stakeholders, which will be another opportunity to develop in-depth understanding of the results, extract implications, formulate policy recommendations and develop action plans aiming to decrease gaps and improve weak areas of student learning.

- Although the differences in mean scale scores across the grade levels demonstrate a significant growth from one grade to another, it is still not clear at which degree student performance meets on grade expectations. Current achievement bands are broadly applicable across multipole grades, but there are no on-grade standards linked to curriculum at each grade. Thus, it is recommended to carry out **setting performance standards** study to define

the competencies students are expected to demonstrate at each grade to reach on-grade proficiency levels (one-page briefing about concept of setting performance standards is presented in Appendix 9.1).

- Large variability in student performance across divisions suggests that further investigation of factors causing **divisional inequity** should be conducted, and action plans for decreasing the gaps between divisions should be developed.
- Finding that there is **no gender gap** in Mathematics and Science is encouraging and highly commendable, however it is recommended to conduct analysis of possible reasons for gender gap in language skills. It is evident that girls outperform boys in both assessed languages, Bangla and English, especially in upper grades, which calls for further analysis verifying that there is no gender-wise content bias in language assessments.
- The sizes of differences in student performance between **rural** and **urban** locations are substantial, especially in English language, demonstrating superior performance of students in urban areas. This suggests that further consideration of educationally relevant resources, both human and technical that define conditions for learning, should be placed in focus of policy makers and practitioners to alleviate a gap in student achievement between rural and urban institutions.
- The differences in student performance between **education types** show that students in General Education institutions significantly outperform students in Madrasah, which calls for research on factors causing this inequity and possible ways to alleviate the gap.
- The differences between Plan land and Other **geographical areas** are bearing educational relevance and calling for action to decrease the gap between these areas of the country.

One of the most significant milestones of NASS 2023 is that Public Report has two versions -- policy focused (this document) and practitioner focused score reports in the format of District Report Cards. As the final recommendation at policy and program level, it is strongly suggested to organize dissemination workshops at district level that will include local curriculum experts, instructional support teams, headteachers and teachers, in order to review and discuss student performance at specific districts and formulate action plans for remedial and enrichment activities.

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10 Appendices

10.1 Concept of Setting Performance Standards

Setting Performance Standards (SPS) is a process of developing **conceptual** and **operational** definitions of knowledge and skills that students should manifest in order to be considered as achieving at a specific mastery level. Traditional content standards are specifications of “what” are students learning in a given subject and grade (curricula, syllabi), whereas performance standards are referring to “how much” students are expected to know and be able to do to be placed in certain performance level (e.g., Basic, Proficient, and Advanced).

Conceptual and operational definitions of Performance Standards represent a necessary component of standards-based assessment system that is used for evaluation of student performance in regard to the specified learning criteria. Performance Standard are used in national assessment systems as descriptions of national learning targets, they substantially improve interpretability of assessment results, as well as provide a meaningful framework for monitoring educational progress at institutional, regional, and national plans. There are **two stages** of Setting Performance Standards: Setting Performance Levels and Setting Cut Scores.

Setting Performance Levels (SPL) is a procedure for conceptualizing performance levels to be used for evaluation of learning outcomes: deciding about the number and purpose of performance levels, choosing their labels, and developing general and specific Performance Level Descriptors (PLDs, e.g., what should student know and be able to do in Mathematics grade 5 to be considered as "proficient"). This procedure is based on the information drawn from official documentation on national learning standards and curricula. The SPL procedure typically employs focus groups method to solicit the opinions and judgments of field experts (teachers, supervisors, curriculum experts).

Setting Cut Scores (SCS) is a procedure for establishing cut scores on operational tests to be used for classification of student learning achievement into predefined levels. The nature of all the methods for Setting Cut Scores is solicitation of experts’ judgments that leads towards mapping of conceptual definitions of performance levels into score ranges on actual assessment instruments. Those score ranges represent **operational definitions of performance levels** and their meaning is maintained across different test forms (sets) by means of test equating procedures.

Procedures SPL and SCS are typically carried out in separate sessions using similar groups of experts. Developing conceptual definitions of performance levels (SPS) usually requires discussions at multiple policy levels and involves official approval process. After a sufficient interval of time (up to 1-2 months) setting cut scores (SCS) sessions are convened, the results of which are also being submitted to the process of official approvals before launching them into practice.

Once conceptual and operational specifications of performance standards are developed, they have a sustainable value and represent an important part of the national system for monitoring and promoting educational progress, as well as the overall system of educational accountability.

Table 52- Sampling Upazila for NASS- 2023:

DIVISION	DISTRICT	THANA/UPAZILLA	Schools	Madrasah	Total Institutes	Mobile No
Barishal	Barguna	Amtali	6	2	8	01712198696
	Barishal	Babuganj	6	2	8	01716569113
	Barishal	Barisal Sadar (Kotwali)	9	2	11	01755199003
	Bhola	Bhola Sadar	9	6	15	01712276155
	Jhalokati	Nalchity	4	2	6	01306475530
	Patuakhali	Mirzaganj Upazila	9	4	13	01718166975
	Pirojpur	Bhandaria	6	3	9	01761713355
Barishal Total		7	49	21	70	
Chattogram	Bandarban	Bandarban Sadar	4	0	4	01751917313
	B. Baria	Nabinagar	13	3	16	01728798438
	Chandpur	Faridganj	7	3	10	01812176060
	Chandpur	Kachua	7	2	9	01716092765
	Chattogram	Kotwali	10	2	12	01927374860
	Chattogram	Panchlaish	10	1	11	01710176513
	Chattogram	Raozan	15	3	18	01744641843
	Chattogram	Satkania	14	3	17	01815111117
	Coxs Bazar	Cox'S Bazar Sadar	12	4	16	01813123360
	Cumilla	Chandina	10	3	13	01719580649
	Cumilla	Comilla Sadar Dakshin	12	3	15	01712144993
	Cumilla	Laksam	10	4	14	01924163466
	Feni	Sonagazi	9	3	12	01819-147317
	Khagrachhari	Khagrachhari Sadar	4	0	4	01711469124
	Lakshmipur	Lakshmipur Sadar	8	5	13	01783-140434
	Noakhali	Chatkhil	8	3	11	01819991254
	Noakhali	Companiganj	9	3	12	01816826811
	Rangamati	Langadu Upazila	4	0	4	01571779413
Chattogram Total		18	166	45	211	
Dhaka	Dhaka	Dhamrai	16	1	17	01712-562212
	Dhaka	Dhanmondi	12	0	12	01921-167384
	Dhaka	Keraniganj	16	0	16	01989147144
	Dhaka	Mirpur	13	2	15	01720-580970
	Faridpur	Madhukhali	11	1	12	01716-114836
	Gazipur	Gazipur Sadar	12	1	13	01740-800789
	Gazipur	Sreepur	9	2	11	01712284294
	Gopalganj	Kotalipara	7	1	8	01715-025461
	Kishoreganj	Kishoreganj Sadar	15	3	18	01978245013
	Madaripur	Rajoir	7	1	8	01712-541151
	Manikganj	Saturia	8	1	9	01711-379212
	Munshiganj	Serajdikhan	8	1	9	01837-459172
	Narayanganj	Bandar	14	2	16	01748-781442
	Narsingdi	Manohardi	12	2	14	01712-222939
	Rajbari	Pangsha	7	1	8	01715-789879
	Shariatpur	Bhedarganj	6	2	8	01761-506666
	Tangail	Mirzapur	10	2	12	01712293058
	Tangail	Tangail Sadar	12	2	14	01712383175
Dhaka Total		18	195	25	220	
Khulna	Bagerhat	Mongla	8	3	11	01745012359
	Chuadanga	Alamdanga	6	1	7	01887176575

DIVISION	DISTRICT	THANA/UPAZILLA	Schools	Madrasah	Total Institutes	Mobile No
	Jashore	Chaugachha	7	2	9	01718553966
	Jashore	Keshabpur	8	2	10	01711488470
	Jhenaidah	Jhenaidah Sadar	10	2	12	01716260657
	Khulna	Dumuria	12	3	15	01712135432
	Kushtia	Mirpur	13	1	14	01714603030
	Magura	Magura Sadar	5	1	6	01712155965
	Meherpur	Mujib Nagar	5	0	5	01813062318
	Norail	Lohagara	4	1	5	01712-996775
	Satkhira	Debhata	10	3	13	01911-648960
Khulna Total		11	88	19	107	
Mymensingh	Jamalpur	Islampur	8	2	10	01712021575
	Jamalpur	Melandaha	7	2	9	01717189658
	Mymensingh	Bhaluka	11	5	16	01712115459
	Mymensingh	Mymensingh Sadar	14	3	17	01712041733
	Netrakona	Durgapur	11	2	13	01712005247
	Sherpur	Nakla	8	2	10	01715114485
Mymensingh Total		6	59	16	75	
Rajshahi	Bogura	Dhupchanchia	8	2	10	01712-237563
	Bogura	Sherpur	10	3	13	01716915361
	Joypurhat	Joypurhat Sadar	5	2	7	01716456048
	Naogaon	Manda	13	4	17	01712140400
	Natore	Gurudaspur	9	2	11	0171821964
	Nawabganj	Gomastapur	9	2	11	01712094333
	Pabna	Bera	7	1	8	01719-365727
	Pabna	Pabna Sadar	9	2	11	01711111838
	Rajshahi	Paba	8	2	10	01712218147
	Rajshahi	Puthia	8	2	10	01712278418
	Sirajganj	Royganj	9	1	10	01715140411
	Sirajganj	Shahjadpur	10	2	12	01711-238316
Rajshahi Total		12	105	25	130	
Rangpur	Dinajpur	Dinajpur Sadar	10	3	13	01726103781
	Dinajpur	Parbatipur	9	2	11	017171369824
	Gaibandha	Palashbari	7	2	9	01794208983
	Gaibandha	Sundarganj	8	1	9	01712015672
	Kurigram	Rajarhat	12	4	16	01712637044
	Lalmonirhat	Kaliganj	8	1	9	01716301606
	Nilphamari	Saidpur Upazila	12	3	15	01716118102
	Panchagarh	Panchagarh Sadar	8	1	9	01712569384
	Rangpur	Mitha Pukur	8	2	10	01712274995
	Rangpur	Rangpur Sadar	9	2	11	01717325268
	Thakurgaon	Thakurgaon Sadar	11	2	13	01710607352
Rangpur Total		11	102	23	125	
Sylhet	Habiganj	Madhabpur	10	2	12	01718590717
	Maulvibazar	Kulaura	11	2	13	01712100928
	Sunamganj	Sunamganj Sadar	11	3	14	01912105441
	Sylhet	Dakshin Surma	9	2	11	01818296710
	Sylhet	Sylhet Sadar	10	2	12	01712254202
Sylhet Total		5	51	11	62	
Grand Total	64	88	815	185	1000	

