

## RURAL-URBAN DISPARITY IN STUDENTS' ACADEMIC ACHIEVEMENT IN MATHEMATICS IN BTR, ASSAM IN THE 21<sup>ST</sup> CENTURY<sup>1</sup>

### *DISPARIDADE RURAL-URBANA NOS RESULTADOS ACADÊMICOS DOS ALUNOS EM MATEMÁTICA EM BTR, ASSAM, NO SÉCULO XXI*

---

**Mohammad Rezaul Karim**

Department of English Language and Literature, College of Science and Humanities, Prince Sattam Bin Abdulaziz University, KSA.

Corresponding Author

[karimrezaul318@gmail.com](mailto:karimrezaul318@gmail.com)

**Eusob Ali Ahmed**

Assistant Professor, Department of Mathematics, Sapatgram College, Dhubri, Assam, India.

[eusob1974@gmail.com](mailto:eusob1974@gmail.com)

**Munmun Banerjee**

Assistant Professor, Department of Education, Sapatgram College, Dhubri, Assam, India.

[mnmn.banerjee123@gmail.com](mailto:mnmn.banerjee123@gmail.com)

---

**ABSTRACT**

As a result of its practical value in routine tasks and transactions, mathematics is regarded as a subject of utmost importance in people's lives. The researcher used a non-experimental quantitative research design focusing on a survey design in this study. The primary objective of the investigation is to investigate the school location to indicate the rural-urban prediction regarding academic achievement in Mathematics of senior secondary level schools in Bodoland Territorial Region (BTR) of Assam State, India. The overall population of the study amounted to four thousand twenty eight (4028) Grades tenth and two thousand six hundred thirty three (2633) Grade twelfth learners sampled from upper secondary schools of BTR in Assam. Research hypotheses were developed and put to the test. The data was analysed by using the statistical technique like descriptive statistics and t-test to determine the nature of achievement. The findings of the result revealed that there is a substantial mean difference in academic achievement in mathematics between boys and girls, students from rural and urban schools, rural school boys and urban school boys, and rural school girls and urban school girls in the tenth grade as well as twelfth grade.

**Keywords:** Academic achievement in Mathematics, gender, locality, secondary and higher secondary, BTR, Assam.

---

<sup>1</sup> This study is supported via funding from Prince Sattam Bin Abdulaziz University project number (PSAU/2024/R/1445).

## RESUMO

Devido ao seu valor prático em tarefas e transações rotineiras, a matemática é considerada uma disciplina de extrema importância na vida das pessoas. Neste estudo, o investigador utilizou um modelo de investigação quantitativa não experimental, centrado num modelo de inquérito. O principal objetivo do inquérito é investigar a localização da escola para indicar a previsão rural-urbana relativamente ao desempenho académico em Matemática das escolas do ensino secundário na Região Territorial de Bodoland (BTR) do Estado de Assam, na Índia. A população total do estudo era constituída por quatro mil e vinte e oito (4028) alunos do 10.º ano e dois mil seiscentos e trinta e três (2633) alunos do 12.º ano, selecionados a partir de uma amostra de escolas secundárias de BTR em Assam. Foram desenvolvidas e testadas hipóteses de investigação. Os dados foram analisados recorrendo a técnicas estatísticas como a estatística descritiva e o teste t para determinar a natureza da realização. Os resultados revelaram que existe uma diferença média substancial no desempenho académico em matemática entre rapazes e raparigas, estudantes de escolas rurais e urbanas, rapazes de escolas rurais e rapazes de escolas urbanas, e raparigas de escolas rurais e raparigas de escolas urbanas, tanto no décimo ano como no décimo segundo ano.

**Palavras-chave:** Desempenho académico em Matemática, gênero, localidade, ensino secundário e superior, BTR, Assam.

## **Introduction**

Mathematics has become the backbone for prosperity in every aspect of human life in the twenty-first century. Because of its utility value in everyday operations and transactions, mathematics is seen as a very significant subject in people's lives. Although mathematics is not scientific in and of itself, it is usually considered to be the father of all sciences. It is impossible to consider any scientific topic without considering the mathematics. Every student should set important goals and objectives for himself in his daily life. Mathematics serves as a foundation for achieving these goals. It is regarded as a valuable instrument for worldwide communication and understanding. There is a widespread belief that urban schools are better than rural schools. This notion goes even farther, implying that there are variations in academic achievement levels between urban and rural pupils. There is a general understanding among people that mathematics is omnipotent (mathematical fallibilism) in today's world. However, the way it is taught has led some people to doubt this valuable role it plays. At worst, it has made other people have a negative attitude towards it. Investigators in the Bodoland Territorial Region (BTR) of Assam wanted to see if there was a disparity in academic achievement in

mathematics between students from rural and urban schools, as well as their sex, when it came to studying.

### ***Literature Review***

A variety of studies have been conducted to shed light on the differences between rural and urban pupils in a variety of characteristics, and the studies that are relevant to them are included below.

According to Fan and Chen (1999), students in rural areas receive a lower-quality education than their urban counterparts, which can be regarded as a “deficient model” of rural society and lifestyle. A few variables could be to blame for the reported academic achievement disparities between rural and urban pupils. These factors include family traits, access to resources and technology, socio-economic level inequalities, and teacher quality. Hu (2003) found that rural schools run into problems that can result in poor educational outcomes for their pupils in his research. Srinivas (2004) did a study to determine the competence level of rural and urban pupils in mathematical skills and found that there is no substantial difference in mathematical skills mastery between rural and urban children.

Ma’Moon (2005) investigated the impact of locality on mathematical achievement. There were three portions to the location: rural, suburban, and urban. Generalization, Induction, Use of Symbols, Logical Thinking, Mathematical Thinking (total), and Mathematical Achievement were the four scales that revealed significant differences. Students from the suburban outperformed those from the urban and rural in terms of generalizations and logical reasoning. Both urban and rural students scored higher on the Use of Symbols than suburban students. In both Mathematical Thinking (total) and Mathematical Achievement, both rural and urban students achieved higher mean scores. Students from the suburban received the greatest marks, while those from the urban and rural had the lowest.

Numerous academics have studied the rural-urban dichotomy in terms of school location, and a considerable disparity in academic achievement has been noted between students attending rural and urban secondary schools (Bratte, 2000;

Prakash, 2000; Sing et al., 2003; Owoeye, 2000; Mehera, 2004; Onoyase, 2015, Datt Pandey, 2017; Mir, 2018).

In Howie's (2003) research on the performance of South African learners in the 1995 Third International Mathematics and Science Study (TIMSS), learner competency in English was found to be a major predictor of mathematical achievement. Recent data, contrary to Howie's findings, show that poor Mathematics performance cannot be attributed exclusively to pupils' limited English proficiency, as well as pedagogical concerns about Mathematics, as well as broader social, cultural, and political factors that influence schooling (Setati et al, 2009).

Provasnik et al. (2007) looked examined how rural and urban pupils fared on the National Assessment of Educational Progress in math, science, and reading across the United States. In comparison to urban pupils, a higher percentage of rural fourth grade students scored at or above the Proficient level. Science scores showed the most disparities, with 32% of rural pupils scoring at or above Proficient, compared to only 19% of urban pupils. In eighth grade, they found the same pattern, with rural children outperforming urban pupils in all three categories. The biggest disparity was in science, where 30% of rural children scored at or above Proficient, compared to only 19% of urban pupils. However, by twelfth grade, the disparities had disappeared. Although rural pupils continued to outperform urban students, the most significant difference in scores was only 5%.

Bohlmann and Pretorius (2008) identified two characteristics that have a significant impact on learner achievement in mathematics: the language of learning and instruction (LoLT) and instructor competency. Learners who do not have well-developed reading and language abilities will be unable to develop mathematical thinking skills like generalizing, explaining, describing, observing, inferring, special, constructing, justifying, representing, disputing, and forecasting, according to Bohlmann and Pretorius (2008).

There is a wide-spread perception that rural pupils are behind their urban counterparts in terms of education and preparedness for college. We need to look at the contrasts between urban and rural schools to see this. Vernon-Feagans et al. (2008) compiled a list of traits that are common in rural areas and how they affect

rural education. They pointed out that rural high schools are typically smaller, whereas urban high schools are larger. Furthermore, smaller schools often offer fewer classes, notably in science and mathematics, than larger institutions.

Owoeye and Yara (2011) observed a considerable disparity between rural and urban students. Students in urban areas outperform their rural counterparts in mathematics, reading, and science, according to their findings. This finding is consistent with Chianson (2012), and Ijenkeli et al. (2012).

According to Ajay and Imoko (2013), games and simulations can be employed to facilitate meaningful learning in rural schools while teaching mathematics subjects. Their findings also pointed out that rural pupils performed much better in mean performance and interest scores after treatment than urban pupils, suggesting that rural pupils are disadvantaged not because they attend rural schools, but because they do not use effective teaching methods.

Nematullah et al. (2015) observed that urban male students have a better mathematical approach to understanding subjects than urban female students, and in comparison, urban males have a better mathematical approach than rural females. Furthermore, rural males outperform rural females proportionally. However, there is no strong correlation between the performance of rural males and urban females. Finally, male students were considered to perform better in math and related sciences in general than female students.

Roy Chowdhury (2016) found a substantial disparity in the attitudes toward mathematics of male and female pupils in private institutions. In terms of their average overall appraisal of attitudes toward mathematics, the same was observed in male and female students in urban schools. In schools for rural, English, and vernacular media, however, there was no such gender disparity.

One of the most crucial parts of effective mathematics curriculum implementation, according to Rudhumbu (2014) and Posamentier (2017) is encouraging mathematics students to desire to learn mathematics. "Profound mastery of language skills and reading proficiency is crucial for pupils who are studying Mathematics," say Stoffelsma and Spooren (2019). The Carnegie Council on Advancing Adolescent Literacy (Stoffelsma & Spooren, 2019) produced

persuasive evidence of a beneficial association between literacy skills like reading competency and academic performance in Mathematics education in 2010. Stoffelsma and Spooren (2019) go on to say that disciplinary literacy, or content-area specific literacy, is made up of knowledge that aids learners' comprehension of concepts as well as literacy abilities relevant to the subject of study, in this case, Mathematics.

According to Oyeromi et al. (2018), rural students outperformed their urban counterparts in mathematics achievement. Patel, on the other hand, discovered no significant differences between boys and girls in metropolitan areas (2012). He also discovered that while there is no significant difference in mathematics skill between rural and urban males, there is a considerable gap between rural and urban girls. According to various researchers, there are no significant differences in academic achievement between rural and urban secondary school students (Ajayi, 1998; Ajayi & Ayodele, 2001).

Datt Pandey (2017) found that male students outperformed female students in mathematics in his study, which supports the findings of (Thomas, 1991; Wajiha, 2000; Patel, 2002; Olof and Sriraman, 2003; Patel, 2012; and Li, 2007) that male students outperform female students in mathematics. This, however, contradicts Roach's (1979) claim that girls outperformed boys on a mathematical achievement test. Mehera (2004), on the other hand, discovered no sex-based differences in student performance in mathematics. Naqvi and Khan (2018) discovered no gender differences in educational aspiration; however, they did discover a positive and substantial association between their level of educational aspiration and academic performance.

A study design by Hooda and Devi (2017) on mathematical achievement among secondary school students in relation to type of school together with demography and gender and they found the following:

- The major effect of type of school (public vs. private), location (rural vs. urban), and gender (male vs. female) on mathematical achievement among secondary school students differs significantly.
- There is a substantial difference in mathematical achievement among

secondary school students when the double interaction effect of locality (rural and urban) and gender (male and female), type of school (public and private) and locality (rural and urban), and type of school (public and private) and gender (male and female) is considered.

- The triple interaction impact of type of school (public vs. private), location (rural vs. urban), and gender (male vs. female) on mathematical achievement among secondary school students had no statistical significance.

In a study conducted in the Dhubri District of Assam, India, Ahmed et al. (2020) discovered a significant difference in academic performance in mathematics between male and female, students from rural and urban schools, and their gender in the tenth grade, but the results are not comparable in the twelfth grade.

Kaur and Kaur (2021) investigated the impact of cooperative learning practices on mathematical performance and problem-solving skills. They discovered that in mathematics, the cooperative learning approach group outscored the standard teaching strategy group by a large margin. In addition, students with various levels of problem-solving abilities performed significantly worse in mathematics. Furthermore, instructional strategies and problem-solving skills had a significant interaction effect on mathematics performance.

A study design by Karim et al. (2020) on academic performance of students in English between tribal and non-tribal of Upper Secondary Schools in Assam, India, and found substantial differences in most of the factors assessed. Similar types of results were also seen in relation to sex, location and type of school at the twelfth grade level (Ahmed et al. 2022).

Ahmed et al. (2022) compared the performance of English together with that of other 10<sup>th</sup> grade level subjects by using Mahalanobis distance, and no considerable difference was observed by them for the variable under consideration. Such types of outcomes were also seen by them at the H.S level students (Ahmed et al. 2021).

After reviewing the literature in India and elsewhere, researchers uncovered no study focusing on academic achievement in mathematics among students from rural and urban secondary and higher secondary schools in Assam's BTR. As a result,

the current research examines the comparison of mathematical academic achievement among senior secondary school students in relation to location and gender.

### ***Importance of the Present Study***

Being as investigators, the present study was to compare the mathematical performance among students belonging to rural and urban schools towards studies in BTR of Assam, India due to difference in the environment of rural and urban areas in respect to their economic status, geographical location, schools infrastructure, number of teaching staff, extra coaching classes etc. Academic performance in mathematics is the aggregate of marks obtained in mathematics by senior secondary level students in their examination for the session 2018-19 conducted by the State Board of Assam. The present study tried to investigate whether rural and urban dichotomy predicts the academic performance in mathematics of senior secondary level students. In the study of extensive reviewed literature, investigators have not found any study focusing on academic performance in mathematics of senior secondary level students conducted in BTR of Assam. This has promoted investigators to choose an unbeaten area at senior secondary school level. To strengthen the academic performance in mathematics for students, it is expected that present study will be helpful to all education stakeholders in designing the favourable school environment and removing the rural and urban disparity.

### ***Objectives of the Study***

The study was designed with the following research objectives in mind:

1. To investigate and compare the level regarding mathematical achievement between boys and girls students of the tenth and twelfth grades.
2. To investigate and compare the level regarding mathematical achievement of students from rural and urban schools in the tenth and twelfth grades.
3. To investigate and compare the level regarding mathematical achievement between students from rural and urban schools in the tenth and twelfth grades based on their gender.



### **Research Hypotheses**

The following null hypotheses were explored in the current study.

**H01:** In tenth grade, there is no significant mean difference in academic achievement scores in mathematics between boys and girls.

**H02:** In twelfth grade, there is no significant mean difference in academic achievement scores in mathematics between boys and girls.

**H03:** In tenth grade, there is no significant mean difference in academic achievement scores in mathematics between students from rural and urban schools.

**H04:** In twelfth grade, there is no significant mean difference in academic achievement scores in mathematics between students from rural and urban schools.

**H05:** In tenth grade, there is no significant mean difference in academic achievement scores in mathematics between rural and urban school boys.

**H06:** In twelfth grade, there is no significant mean difference in academic achievement scores in mathematics between rural and urban school boys.

**H07:** In tenth grade, there is no significant mean difference in academic achievement scores in mathematics between rural and urban school girls.

**H08:** In twelfth grade, there is no significant mean difference in academic achievement scores in mathematics between rural and urban school girls.

### **Methodology**

The following methods are used for the present study.

### **Population**

All the students studying in the class tenth and twelfth of secondary and higher secondary schools, junior colleges, and colleges (rural and urban) of government and private management in Bodoland Territorial Region (BTR) of Assam, who are connected with the State Board of Assam, form the population.

### Sample

A sample of 6661 students (4028 of tenth grade and 2633 of twelfth grade) of mathematics stream who passed in two consecutive years 2019 and 2020 were randomly selected for the study in the Bodoland Territorial Region (BTR), which consists of four districts in Assam viz- Kokrajhar, Baksa, Udalguri, and Chirang. Secondary and higher secondary examination in mathematics marks were collected. However, 122 secondary and higher secondary schools (72 rural and 50 urban) were chosen at random for tenth grade students. Furthermore, 21 senior secondary schools, junior colleges, and colleges (10 rural and 11 urban) were chosen at random for the study of twelfth-grade students. The distribution of the sample was depicted in the table below.

Table 1 – Sample frame of the population

Grade		N=4028	%
<b>Tenth Grade</b>	Rural Boys Students	1123	27.88
	Rural Girls Students	1158	28.75
	Urban Boys Students	879	21.82
	Urban Girls Students	868	21.55
<b>Twelfth Grade</b>		<b>N=2633</b>	<b>%</b>
	Rural Boys Students	710	26.97
	Rural Girls Students	339	12.88
	Urban Boys Students	927	35.21
	Urban Girls Students	657	24.95

### Statistics Used

Data were analysed in terms of Mean and Standard Deviation (SD) in order to obtain the objectives of the study. To ascertain if any considerable mean difference was there between achievement scores and student groups within the variable quantity under consideration a 't-test' was adopted.

### **Information Schedule**

Researchers created an information schedule to determine the location of the institutions and the academic achievement scores of secondary and higher secondary schools, junior colleges, and colleges students in grades tenth and twelve. Some academic score of the sample topic was gathered from official records, some from individual respondents, and some from a reliable website, and was measured by aggregate marks achieved by the State Board Examination of Assam.

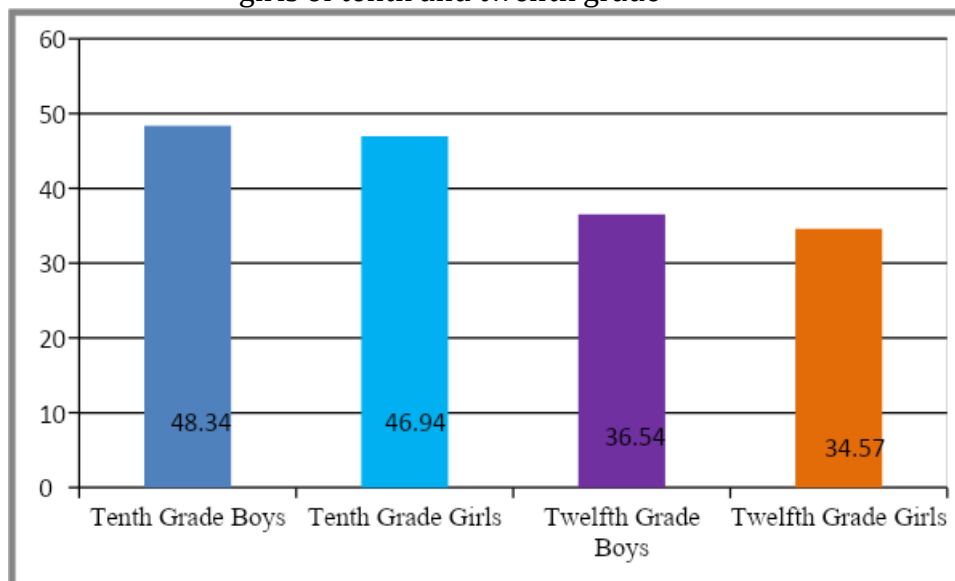
### **Results**

The results have been presented in a methodical and hypothesis-by-hypothesis manner in the tables that follow.

Table 2 – Group statistics regarding academic achievement in mathematics in terms of sex

<b>Grade Value</b>	<b>Gender</b>	<b>Total (N)</b>	<b>Mean (M)</b>	<b>Std. Deviation (SD)</b>	<b>Std. Error (SE)</b>	<b>df</b>	<b>t-</b>
Tenth Grade	Boys	2002	48.34	17.409	.389	4026	2.569
	Girls	2026	46.94	17.181	.382		
Twelfth Grade	Boys	1637	36.54	13.519	.334	2631	3.745
	Girls	996	34.57	12.335	.391		

Figure 1 – Representing differences of achievement in Mathematics of boys and girls of tenth and twelfth grade

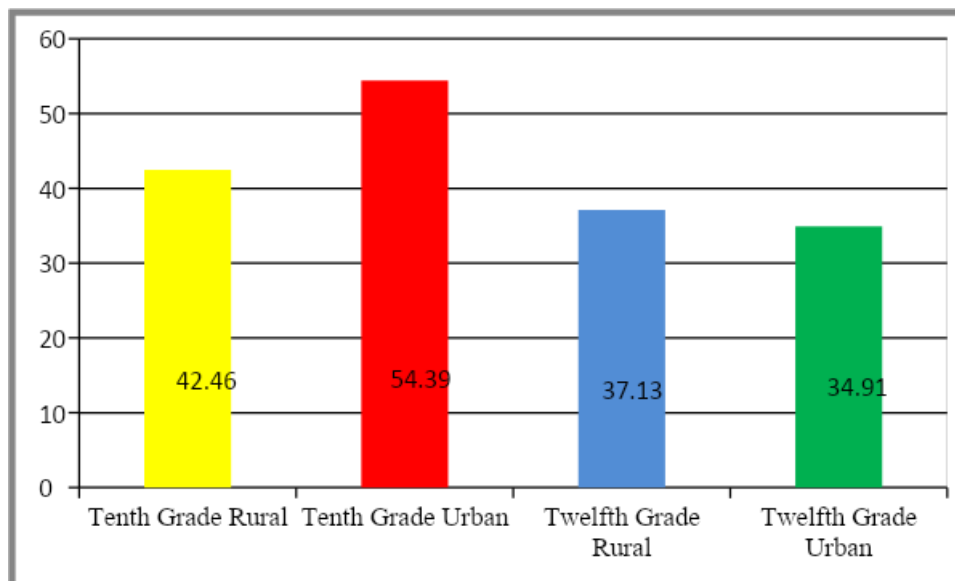


According to Table 2 and Figure 1, the resulting t-value for both tenth and twelfth grades is greater than the table value at the 0.05 and 0.01 level of significance respectively. As a result, the mathematical achievement levels of both sets of students in the corresponding grades differ significantly. This suggests that there is a significant difference in academic achievement in mathematics between boys and girls in tenth and twelfth grades. So, the null hypotheses Ho1 and Ho2 are completely rejected.

Table 3 – Group statistics regarding academic achievement in mathematics in terms of locality

Grade	Locality	Total (N)	Mean (M)	Std. Deviation (SD)	Std. Error (SE)	df	t-Value
Tenth Grade	Rural	2281	42.46	13.153	.275	4026	23.076
	Urban	1747	54.39	19.601	.469		
Twelfth Grade	Rural	1049	37.13	12.216	.377	2631	4.264
	Urban	1584	34.91	13.612	.342		

Figure 2 – Representing differences of achievement in Mathematics in terms of locality of tenth and twelfth grade

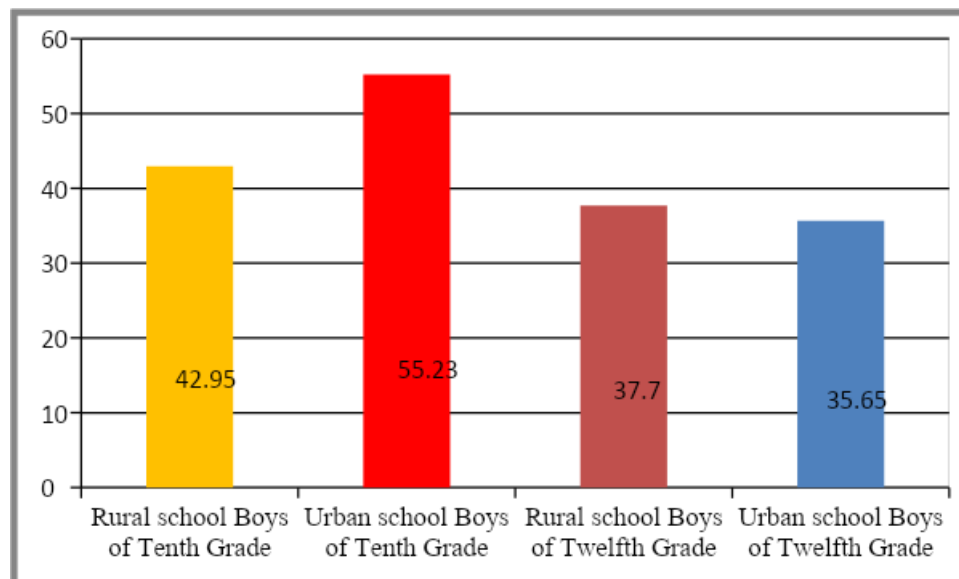


It is observed from Table 3 and Figure 2 that at the 0.01 level of significance, the obtained t-value for tenth and twelfth grade between rural and urban students are greater than the table value. The t-value indicating that there is a significant difference in academic achievement in mathematics between students from rural and urban schools in grades tenth and twelfth. So, the null hypotheses  $H_{03}$  and  $H_{04}$  are completely rejected.

Table 4 – Group statistics regarding academic achievement in mathematics in terms of male in relation to locality

Grade	Locality	Total (N)	Mean (M)	Std. Deviation (SD)	Std. Error (SE)	df	t-Value
Tenth Grade	Rural Boys	1123	42.95	13.324	.398	2000	16.72
	Urban Boys	879	55.23	19.472	.657		
Twelfth Grade	Rural Boys	710	37.70	12.211	.458	1635	3.05
	Urban Boys	927	35.65	14.384	.472		

Figure 3 – Representing differences in achievement in Mathematics of rural school boys and urban school boys of tenth and twelfth grade



Looking at it (Table 4 and Figure 3), it can be seen that the mean scores of boys students from rural and urban schools on achievement in mathematics of 10<sup>th</sup> grade students are 42.95 and 55.23 respectively and the 12<sup>th</sup> grade students are 37.7 and 35.65 respectively. Here the calculated t-value indicates that there is a significant difference in academic achievement in mathematics between rural and urban school boys in tenth and twelfth grade. As a result, the null hypotheses  $H_{05}$  and  $H_{06}$  are rejected.

Table 5 – Group statistics regarding academic achievement in mathematics in terms of female in relation to locality

Grade	Locality	Total (N)	Mean (M)	Std. Deviation (SD)	Std. Error (SE)	df	t-Value
Tenth Grade	Rural Girls	1158	41.99	12.973	.381	2024	15.895
	Urban Girls	868	53.55	19.707	.669		
Twelfth Grade	Rural Girls	339	35.94	12.158	.660	994	2.511
	Urban Girls	657	33.87	12.377	.483		

Figure 4 – Representing differences in achievement in Mathematics of rural school girls and urban school girls of tenth and twelfth grade

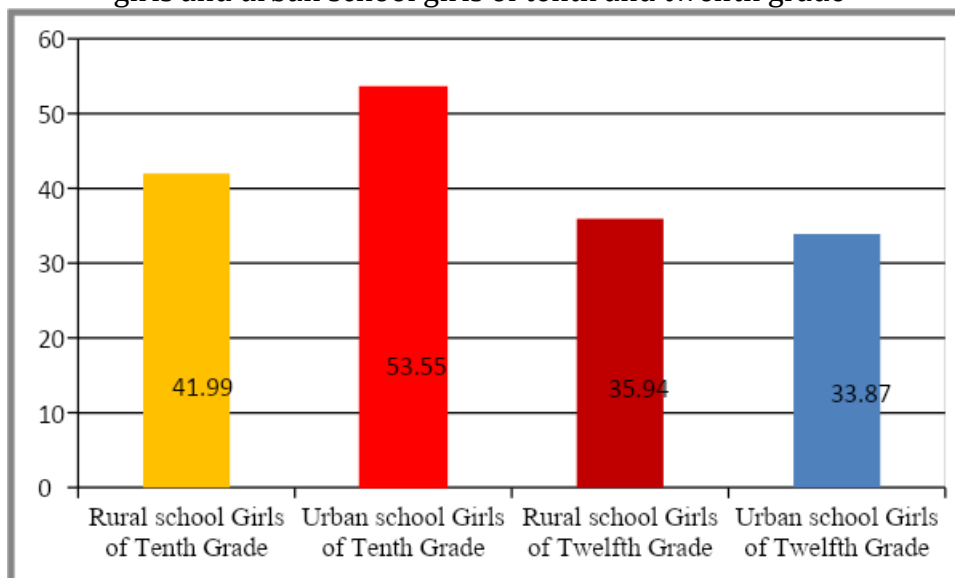


Table 5 and Figure 4 also revealed that the mean scores of 10<sup>th</sup> and 12<sup>th</sup> grade students on achievement in mathematics on their rural school girls and urban school girls are 41.99 with SD 12.973, 53.55 with SD 19.707, 35.94 with SD 12.158 and 33.87 with SD 12.377 respectively. Here the t-value indicates that there is a substantial difference in academic achievement in mathematics between rural and urban school girls in tenth and twelfth grade. So, the null hypotheses **H<sub>07</sub>** and **H<sub>08</sub>** are completely rejected.

### Findings of the Study

Using descriptive and inferential statistics to analyze the data, the following results were obtained:

- i. In secondary and higher secondary schools, there was a large discrepancy in academic achievement in mathematics between boys and girls.
- ii. Academic achievement in mathematics differed significantly between students from rural secondary and higher secondary schools and those from urban secondary and higher secondary schools.
- iii. There was a large disparity in academic achievement in mathematics

- between boys in rural and urban secondary and higher secondary schools.
- iv. Academic achievement in mathematics differed significantly between rural secondary and higher secondary school girls and urban secondary and higher secondary school girls.

## Discussion

The conclusion of the study established that gender disparity affects the academic performance in mathematics, and boys were performed better in academic achievement in mathematical than their girl's counterparts of secondary and higher secondary levels. The findings are supported by the findings of Datt Pandey (2017), Thomas (1991), Wajiha (2000), Patel (2002), Olof and Sriraman (2003), Patel (2012), and Li (2007).

Another conclusion of the study established that the location of the school in terms of rural-urban affects the academic achievement in mathematics, and urban secondary and higher secondary school students showed more advantage to their rural counterparts in setting the proper level of academic achievement in mathematics. These results are similar to the findings of Bratte (2000); Prakash (2000); Sing et al. (2003); Owoeye (2000); Mehera (2004); Onoyase (2015); Datt Pandey (2017); and Mir (2018) in academic achievement.

Furthermore, the findings revealed that the rural-urban gender gap affects academic performance in mathematics, with urban secondary and higher secondary school boys outperforming rural secondary and higher secondary school boys. This result contradicts Patel's findings (2012). In secondary and higher secondary school, urban girls outperformed rural girls in terms of mathematical academic achievement, supporting Patel's findings (2012).

## Conclusion

The present study recommends that parents, teachers, administrators, and educational policymakers should create awareness about the importance of



mathematics in the present era to improve the academic achievement in mathematics of female students as well as students from rural schools. Government and other concern stakeholders should appoint qualified teachers in rural schools and mathematics laboratory should be provided where necessary. Also, mobile teachers may be appointed for the schools belonging to the rural areas. Thus, every student should have a clear goal in mind, and genuine guidance and counseling should be provided to tell him or her about improvements in academic achievement in mathematics as well as overall academic success. If balanced success is to be expected, it is absolutely required and essential to raise the academic achievement of female students, as well as rural students, in relation to their gender.

### ***Delimitations of the Study***

The following limitations of this study were done:

- i. This study was confined only to the Government and Private secondary and higher secondary schools. Secondary schools were affiliated to Board of Secondary Education Assam (SEBA) and higher secondary schools were affiliated to Assam Higher Secondary Education Council (AHSEC) of the state of Assam. This refrain the researcher in generalizing results of this study to all the secondary and higher secondary level schools of BTR of Assam.
- ii. Mathematics achievement is a broad concept and it may be affected by numerous factors but only two independent factors viz. gender and locality were investigated.

### ***Recommendations of the study***

The following initiative, in the opinion of the researchers, should be implemented for the probable future development regarding achievement in mathematics for rural students as well as girls' students.

- i. Mathematical awareness programme should be organized for Guardians and Students to solve the negative trend toward learning mathematics at secondary and higher secondary level especially in rural areas.
- ii. Teachers should adopt the new and technologically enhanced method of

teaching mathematics. Moreover, teachers must reconsider traditional teaching approaches, which frequently do not match the learning styles of pupils or the teaching abilities required to be effective in society. Lessons should be delivered in a variety of formats. Play-acting, cooperative groups, visual aids, and computer-aided instruction (CAI) should all be used to teach mathematical ideas.

- iii. Teachers, Mathematicians, and Psychologists who work in the subject of mathematics must put together for orientation programmes and remedial packages for students who are falling behind. In this field, a variety of enrichment activities must be developed. Teachers must be trained in how to connect their preferred teaching tactics with learning preferences and capacities of students.
- iv. Mathematics teachers should give female students equal opportunities in the classroom so that their confidence in the subject will be high. In schools, more emphasis should be placed on continuous assessment.
- v. The curriculum must be updated on a regular basis. As a result, NEP: 2020 must continue to update its secondary and senior secondary school curricula in order to make them much more excellent, encouraging, and satisfying in order to keep up with the needs and demands of modern creative trends.

### **Acknowledgements**

This study is supported via funding from Prince Sattam Bin Abdulaziz University project number (PSAU/2024/R/1445).

### **REFERENCES**

Ahmed, E. A., Banerjee, M., Sen, S. and Chatterjee. P. (2020). Academic achievement in mathematics among rural and urban students: A study on secondary and higher secondary level. *International Journal of Multidisciplinary Research and Development*, 7(8), 178-182.

Ahmed, E.A., Banerjee, M., Sen, S. & Chatterjee, P. (2021). Comparison of achievement of higher secondary subjects among tribal and non-tribal students of Bodoland Territorial Region, Assam, India using Mahalanobis Distance", *Journal of the Calcutta Mathematical Society*, 17(1), 61-66.

Ahmed, E.A., Karim, M.R., Banerjee, M., Sen, S., Chatterjee, P. & Mandal, G. (2022). A comparative study on academic achievement of Mathematics and English with other subjects of secondary level in BTR of Assam, India using Mahalanobis Distance. *Education Research International*, Vol. 2022, 10 pages.  
<https://doi.org/10.1155/2022/3669065>

Ahmed, E.A., Karim, M.R., Banerjee, M., & Hussain, A. (2022). An Analysis of Higher Secondary School Students' Academic Performance in English in Relation to Specific Demographic Factors. *Journal of Educators, Teachers and Trainers*, 2022, 13(6), 729-739. DOI: 10.47750/jett.2022.13.072

Ajai, J. T., and Imoko, B. I. (2013). Urban and rural students' academic achievement and interest in geometry: A case-study with games and simulations method. *Taraba State University Journal of Education Research and Production*, 1 (2), 56-63.

Ajayi, I.A. (1998). Unit cost of secondary education and students' academic achievement in Ondo state (1991-1995). A Ph.D. seminar paper presented at the Faculty of Education, University of Ibadan, Nigeria.

Ajayi, I.A. (2001). Ayodele JB. An introduction to educational planning: Administration and supervision. Ado-Ekiti: Yemi Prints Publishing Services.

Bohlmann, C., & Pretorius, E. (2008). Relationships between Mathematics and literacy: Exploring some underlying factors. *Pythagoras*, 2008(1), 42-55.

Bratte, E.O. (2000). Sex and schools location as they affect student's academic performance (Unpublished master's dissertation). Delta State University Abraka, Nigeria.

Chianson, M. M. (2012). School location as a correlate of mathematics students' achievement in a cooperative learning class. *Journal of Education and Leadership Development*, 4, 42-46. Retrieved on 23/04/2013 from <http://www.cenresinpub.org>.

Datt Pandey, B. (2017). A study of Mathematical Achievement of Secondary School Students. *International Journal of Advanced Research*, 5(12), 1951-1954.

Fan, X. and Chen, M. J. (1999). Academic achievement of rural school students: A multi-year comparison with their peers in suburban and urban schools. *Journal of Research in Rural Education*, 15 (1), 31-46.

Hooda, M. and Devi, R. (2017). Type of school, locality and gender as determinant of achievement in mathematics among secondary school students. *International Journal of Advanced Research in Management and Social Sciences*, 6 (11), 79-91.

Howie, S.J. (2003). Language and other background factors affecting secondary pupils' performance in Mathematics in South Africa. *African Journal of Research in Mathematics, Science and Technology Education*, 7(1), 1-20.

Hu, S. (2003). Educational aspirations and post-secondary access and choice of students in urban, sub-urban and rural schools compared. *Education Policy Analysis Archives*, 11(14), 10-16.

Ijenkeli, O. E., Paul, A.I. & Vershima, A. M. (2012). Impact of Career-Related Instruction on Mathematics Achievement of Rural and Urban Students in Benue State, Nigeria. *Research Journal of Mathematics and Statistics*, 4 (2), 39-41.

Joppke, C. & Morawska, E. (2003). *Toward assimilation and citizenship: Immigrants in liberal nation-states*. New York: Palgrave Macmillan.

Karim, M.R., Ahmed, E.A., & Koppada, V. (2020). Scholastic Performance in English between Tribal and Non-Tribal Students of Senior Secondary Level in Bodoland Territorial Region (BTR) of Assam State, India. *The Asian ESP Journal*, 16(1), 50-63.

Kaur, G. and Kaur, K. (2021). Effectiveness of Cooperative Learning Strategy on Achievement in Mathematics in Relation to Problem Solving Ability. *Shodha*, 107-124.

Li, Qing. (2007). Mathematics, science, and technology in secondary schools: Do gender and region make a difference? *Canadian Journal of Learning and Technology*. 33(1).

Ma'Moon, M. (2005). *Mathematical thinking and mathematics achievement of students in the year 11 in the scientific stream in Jordan*. Faculty of Education and Arts. Australia: The University of Newcastle.

Mir, SA. (2018). Rural-Urban disparity in student's academic achievement: Evidence from four secondary school's in Pulwama and Srinagar districts of Kashmir Valley. *International Journal of Advance Research and Development*, 3(2), 1790-1793.

Mehra, J.P. (2004). Difference in students' achievement in mathematics between males and females of Burdwan District in West Bengal. *Journal of science Education*, 12(6), 21-16.

Naqvi, T. F. and Khan, M. Z. (2018). Level of Educational Aspiration and its predictors: A study of Tribal and Non-tribal students of Government Schools.

*IJRAR-International Journal of Research and Analytical Reviews*, 5(4), 284-291.

Nematullah., Yousaf, M., Gulshan, A. B., and Dad, K. (2015). An analytical study of gender difference in academic achievement in mathematics at secondary level. *British Journal of Education, Society and Behavioural Science*, 11 (4), 1-7.

Olof, B.S. and Sriraman, B. (2003). Iceland and rural/urban girls- PISA examined from an emancipatory viewpoint. *The Montana Mathematics Enthusiast*, Monograph 1, 169-178.

Oyeromi, S.O., Omiyale, G., Lato, E.T., and Oyebamiji, W.T. (2018). Analysis of Rural/Urban Students' Academic Performance in Oye State, Nigeria: Implication for Educational Planners. *International Journal of Research and Innovation in Social Science*, 2(7), 73-81.

Onoyase, S.O. (2015). The impact of school management environment on students' output quality in Oyo State secondary schools (Unpublished doctoral thesis). University of Ibadan, Nigeria, 2015.

Owoeye, J.S. (2000). The effect of integration of location, facilities and class size on academic achievement of secondary school students' in Ekiti State, Nigeria (Unpublished doctoral thesis). University of Ibadan, Ibadan.

Owoeye, J. S. & Yara, P. O. (2011). School location and academic achievement of secondary school in Ekiti State, Nigeria. *Asian Social Science*, 7 (5). Retrieved on 26/01/2013 from [www.Ccsenet.org/ass](http://www.Ccsenet.org/ass).

Patel, V. S. (2002). An investigation into the proficiency in the subject of mathematics of the primary school teachers. In NCERT, Sixth Survey of Research in Education. New Delhi: NCERT.

Patel, B. C. (2012). A Study of academic achievement of students in mathematics of Std-IX in relation to some psycho-social factors (Unpublished doctoral dissertation). Ganpat University, Ganpat Vidyanagar (Kherva).

Prakash, S. (2000). A study of mathematical creativity and achievement of elementary school students in relation to problem solving ability, anxiety and socio demographic variables. In NCERT, Sixth Survey of Research in Education. New Delhi: NCERT.

Provasnik, S., KewalRamani, A., Coleman, M. M., Gilbertson, L., Herring, W., & Xie, Q. (2007). Status of education in rural America. Retrieved from <https://nces.ed.gov/pubs2007/2007040.pdf>.

Posamentier, A. (2017). 9 Strategies for Motivating Students in Mathematics: Keep your high school math students engaged with these techniques. Retrieved from

<https://www.edutopia.org/blog/9-strategies-motivating-students-mathematics-alfred-posamentier> [accessed 27 April 2021].

Roach, D. A. (1979). Effects of conceptual style Preference, Related cognitive variables and sex on Achievement in Mathematics. *British Journal of Educational Psychology*, Vol. 49, 79-82.

Roy Chowdhury, S. (2016). Gender comparison of attitude of secondary school students towards mathematics. *Journal of Humanities And Social Science (IOSR-JHSS)*, 21(10), 01-07.

Rudhumbu, N. (2014). Motivational strategies in the teaching of primary school mathematics in Zimbabwe. *International Journal of Education Learning and Development*, 2(2), 76-103.

Setati, M., Chitera, N., & Essien, A. (2009). Research on multilingualism in mathematics education in South Africa: 2000–2007. *African Journal of Research in Mathematics, Science and Technology Education*, 13(suppl.1), 65-80.

Sing, S., Mali, S., and Sing, A.K. (2003). Achievement difference in class II students in Maths, with regard to Area, Gender, and social grounds during B.A.S and M.A.S in Gonda District. *The Educational Review*, 46(3), 55-57.

Srinivas (2004) did a study to determine the competence level of rural and urban pupils in mathematical skills, and found that there is no substantial difference in mathematical skills mastery between rural and urban children.

Stoffelsma, L., & Spooren, W. (2019). The relationship between English reading proficiency and academic achievement of first-year science and Mathematics students in a multilingual context. *International Journal of Science and Mathematics Education*, 17(5), 905-922.

Thomas, K.J. (1991). A Study of Attitude Towards and Achievements Among Secondary School Students in Aizawl in Mathematic Town. Aizwal: North Eastern Hill State. Unpublished M.A. (Education) Dissertation.

Vernon-Feagans, L., Gallagher, K., & Kainz, K. (2008). The transition to school in rural America: A focus on literacy. In J. Meece & J. Eccles (Eds.), *Handbook of Research on Schools, Schooling, and Human Development*. New York, NY: Routledge, Taylor, & Associates.

Wajiha, A.H. (2002). Factors Affecting Academic Achievement of IX Standard Students in Mathematics, Unpublished Ph. D. Thesis Submitted To Karnatak University, Dharwad- 580 003.