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Factors Influencing Mathematics Achievement Among Secondary Students in Nepal: Evidence from Hierarchical Regression Analysis

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Abstract
Secondary-level mathematics achievement is vital for students' academic growth and future science, technology, engineering and mathematics (STEM) opportunities. However, many students in developing countries still perform poorly in mathematics. This study aims to investigate the key factors influencing mathematics achievement among secondary school students in Nepal. A quantitative survey research design was conducted with 206 Grade 9 and 10 students from six urban and rural public schools in Makwanpur district in 2025. Data were collected via a structured questionnaire on learning factors and students' mathematics scores from school records. SPSS was used for descriptive statistics, correlation, and regression analyses to determine each factor's impact on achievement. The findings reveal that student-related factors, particularly self-efficacy, motivation and study habits, are the strongest predictors of mathematics achievement ($\beta = 0.497$, $p < .001$). School-related factors and parental or socioeconomic support also demonstrate significant positive contributions, while teacher-related variables do not show a significant independent effect when other variables are controlled. A moderate but significant achievement gap between urban and rural students was found. The study emphasizes improving student motivation, learning strategies, and educational resources—especially in rural schools—to enhance mathematics achievement and reduce disparities.

Keywords: mathematics achievement, student self-efficacy, secondary education, regression analysis, urban–rural gap

1. Introduction

Mathematics achievement at the secondary level plays a crucial role in shaping students' academic pathways and future opportunities, particularly in STEM fields. It is widely recognized as a key component of human capital development, fostering analytical thinking, problem-solving, and innovation essential for economic growth (Kappassova et al., 2025; Bicer & Capraro, 2019). However, many developing countries continue to face challenges in mathematics performance, with students often scoring below international benchmarks such as PISA, reflecting inequalities in resources, teaching quality, and access (OECD, 2023).

In Nepal, this issue is particularly significant, as national assessments reveal that around 60% of Grade 10 students perform at or below basic proficiency levels, indicating widespread learning difficulties (Education Review Office, 2025). Research shows that mathematics achievement is influenced by multiple interconnected factors, including student motivation and self-efficacy (Ma & Kishor, 1997), teacher effectiveness (Hill et al., 2008), and contextual elements such as school resources and socioeconomic background (Blatchford et al., 2011). Despite this, many studies have examined these factors in isolation. Therefore, there is a need for comprehensive research that analyzes their combined effects, especially in low-resource settings like Nepal. Addressing this gap, the present study uses a quantitative approach to examine the relative contribution of student, teacher, school, and socioeconomic factors, while also comparing urban–rural differences to better inform policy and improve educational equity.

1.1 Significance of the Study

This study identifies key student, teacher, school, and socioeconomic factors influencing low mathematics achievement among secondary students in Nepal, offering a comprehensive understanding of the issue. It highlights areas for effective intervention, such as improving teaching strategies, learning environments, and student motivation. The findings are useful for teachers, administrators, and policymakers to enhance instructional quality, allocate resources effectively, and reduce urban–rural disparities. The study contributes to existing literature and supports future research in similar contexts.

1.2 Objectives of the Study

- To find out which factors are most responsible for students getting low marks in math.
- To measure how much each factor affects students' math performance using step-by-step analysis.
- To compare students from urban and rural schools to see differences in math achievement.

2. Literature Review

2.1 Theoretical Perspectives on Mathematics Achievement

Research on mathematics achievement is guided by theories emphasizing the interaction of personal, instructional, and environmental factors. Albert Bandura's Social Cognitive Theory highlights self-efficacy as a key determinant of academic performance, where confident students show greater persistence and achievement (Bandura, 1986; Schunk & DiBenedetto, 2020). Similarly, the Opportunity-Propensity Model explains achievement as a result of learners' readiness and the quality of educational opportunities, stressing the combined role of student characteristics and effective teaching environments (Byrnes & Miller, 2007).

2.2 Student-Related Factors and Mathematics Achievement

A substantial body of literature emphasizes the role of student-level factors in mathematics achievement, particularly self-efficacy, motivation, and attitudes. Students who believe in their capabilities tend to be more persistent and engaged, leading to better performance (Schunk & DiBenedetto, 2020). Positive attitudes toward mathematics are also strongly linked to higher achievement, as they encourage effective learning strategies and greater effort (Ma & Kishor, 1997). In contrast, mathematics anxiety can hinder performance by disrupting cognitive processes essential for problem solving, especially in high-pressure situations (Ashcraft & Krause, 2007).

2.3 Teacher-Related Influences

Teachers play a vital role in mathematics learning through effective instruction and pedagogical content knowledge (PCK), which enables them to present concepts clearly, address misconceptions, and use diverse strategies (Hill et al., 2008; Adhikari et al., 2024). However, in contexts like Nepal, structural challenges such as overcrowded classrooms, limited resources, and inadequate training often hinder interactive teaching and personalized support, leading to reliance on lecture-based methods (Bhatta et al., 2021).

2.4 School-Level and Resource Factors

School-level factors also influence mathematics achievement, as adequate resources like textbooks, technology, and well-equipped classrooms improve instructional quality and learning opportunities (Manandhar & Koirala, 2021; Sharma, 2022). Additionally, smaller class sizes enable more individualized support and active student participation (Blatchford et al., 2011).

2.5 Parental and Socioeconomic Influences

Family background and socioeconomic status strongly influence academic achievement, with parental support and access to educational resources boosting engagement (Ahamad, 2020). Socioeconomic inequalities also create gaps in access to tutoring, technology, and supportive learning environments, contributing to achievement differences (OECD, 2018).

2.6 Urban-Rural Disparities in Mathematics Achievement

Urban–rural educational inequalities are common in developing countries, with urban schools having better access to qualified teachers, infrastructure, and technology, while rural schools face resource and staffing shortages, affecting teaching and learning (Education Review Office, 2025). Consequently, urban students often outperform rural peers in mathematics and science due to differences in school facilities, learning opportunities, and supportive environments (UNESCO, 2018).

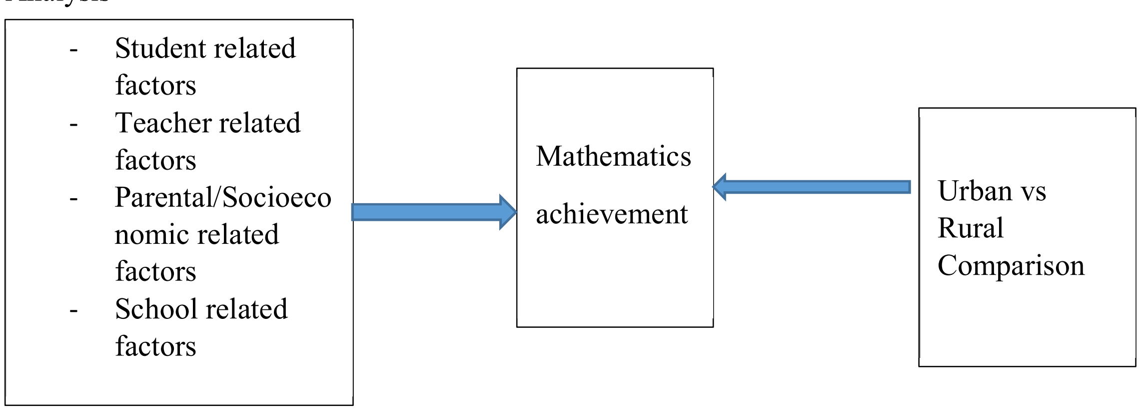
2.7 Implications for the Present Study

The literature shows that mathematics achievement is shaped by interrelated student, teacher, school, and family factors. This study uses a quantitative approach with regression analysis to examine their relative contributions, aiming to better understand determinants of performance and identify areas for educational intervention.

Independent factors

Dependent factors Gap Analysis

Analysis



3. Materials and Methods

3.1 Research Design

This study adopted a quantitative research design to investigate the factors influencing mathematics achievement among secondary school students. Quantitative approaches are widely used in educational research because they allow for the objective measurement of variables and the systematic examination of relationships through statistical analyses (Creswell & Creswell, 2018). A correlational design was employed to explore the associations between students' mathematics achievement and a range of explanatory factors, including student-related, teacher-related, school-related, and parental or socioeconomic variables. In addition, a comparative component was incorporated to examine potential differences in mathematics achievement between students attending urban and rural schools. To assess the relative contribution of each predictor, both multiple regression and hierarchical regression analyses were conducted (Field, 2018), providing a comprehensive understanding of the factors shaping mathematics performance.

3.2 Population and Sample

The study targeted Grade 9 and 10 students in public secondary schools in Makwanpur district, Nepal, selected from both urban and rural municipalities to ensure geographic representation (Education Review Office, 2025). A stratified random sampling technique was used to achieve proportional representation (Cohen et al., 2007), resulting in 206 participants—77 from urban schools and 129 from rural schools—aged 13 to 18 years (average 15). This sample size is considered adequate for multiple regression analysis with several predictors (Tabachnick & Fidell, 2013).

3.3 Research Instruments

Data were collected using a structured questionnaire measuring students' perceptions of factors influencing mathematics learning. The questionnaire included sections on demographics, mathematics achievement, and four categories of explanatory variables: student-related, teacher-related, school-related, and parental or socioeconomic factors. Mathematics achievement items assessed perceived performance, conceptual understanding, and problem-solving ability. Student-related items measured motivation, confidence, and study habits, while teacher-related items focused on instructional clarity, classroom interaction, and support. School-related items examined resources, environment, and institutional support, and parental or socioeconomic items assessed family encouragement, home learning conditions, and access to resources. All items used a five-point Likert scale (Likert, 1932), and a pilot test confirmed reliability with Cronbach's alpha values above 0.70 (Field, 2018). Primary data came from the questionnaire, and secondary data were obtained from school records, including mathematics scores and information on teacher qualifications and school facilities.

3.4 Data Collection Procedure

Participation was voluntary, and confidentiality was maintained. Questionnaires were administered during school hours with trained enumerators to ensure students understood the items and completed them independently.

4. Data Analysis

Completed questionnaires were coded and entered into SPSS version 27 for analysis. Pearson correlation was used to examine relationships between mathematics achievement and the independent variables, while multiple regression identified the strongest predictors. Hierarchical regression was conducted to assess the incremental contribution of different variable groups (Tabachnick & Fidell, 2013).

Objective 1: To find out which factors are most responsible for students getting low marks in math.

Table 1: *Descriptive Statistics in Different Factors for Students Getting Low Marks*

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Student Factor	206	1.40	5.00	3.7476	.78047
Teacher Factor	206	1.00	5.00	3.9960	.85134
School Factor	206	1.20	5.00	3.7388	.74568
Parent Socio Factor	206	1.00	5.00	3.8000	.80292
Math Achieve Factor	206	1.00	5.00	3.4748	.89030
Age	206	13	18	15.06	1.109
Valid N (list wise)	206				

The descriptive statistics showed that all variables had a sample size of 206. The mean scores indicated that the teacher factor had the highest average (M = 3.9960), followed by the parent socio factor (M = 3.8000), student factor (M = 3.7476), and school factor (M = 3.7388). The mean of the mathematics achievement factor was relatively lower (M = 3.4748).
The standard deviations suggested moderate variability among responses, with mathematics achievement showing the highest variation (SD = .89030). The age of respondents ranged from 13 to 18 years, with a mean age of 15.06 years.

Table 2: *Correlations Between Mathematics Achievement and the Four Explanatory Variables*

Correlations						
		Student Factor	Teacher Factor	School Factor	Parent/Socio Factor	Math Achieve Factor
Mathematics Achievement Factor	Pearson Correlation	.652**	.416**	.538**	.531**	--
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	206	206	206	206	206
**. Correlation is significant at the 0.01 level (2-tailed).						

The correlation results showed that mathematics achievement had significant positive relationships with all four explanatory variables. It was strongly correlated with the **student factor** (r = .652, p = .000), followed by moderate correlations with the **school factor** (r = .538, p = .000), **parent/socio factor** (r = .531, p = .000), and **teacher factor** (r = .416, p = .000). All correlations were statistically significant at the 0.01 level, indicating that increases in these factors were associated with higher mathematics achievement.

Table 3: *Model Summary*

Model Summary									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.680[a]	.463	.452	.65885	.463	43.333	4	201	.000
a. Predictors: (Constant), Parent Socio Factor, Teacher Factor, Student Factor, School Factor									

The model summary showed that the correlation coefficient (R = .680) indicated a strong positive relationship between the predictors and mathematics achievement. The R square value (.463) revealed that 46.3% of the variance in mathematics achievement was explained by parent socio, teacher, student, and school factors, while the adjusted R square (.452) confirmed the model's good fit. The F change value (43.333, p = .000) indicated that the model was statistically significant. The standard error of the estimate (.65885) suggested a moderate level of prediction accuracy.

Table 4: ***ANOVA of Dependent Variables and Predictors***

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	75.239	4	18.810	43.333	.000[b]
	Residual	87.250	201	.434		
	Total	162.489	205			
a. Dependent Variable: Math Achieve Factor						
b. Predictors: (Constant), Parent Socio Factor, Teacher Factor, Student Factor, School Factor						

The ANOVA results indicated that the regression model was statistically significant (F = 43.333, p = .000). The predictors—parent socio factor, teacher factor, student factor, and school factor—collectively explained a significant portion of the variance in the mathematics achievement factor. The regression sum of squares (75.239) was substantial compared to the residual sum of squares (87.250), suggesting that the model had strong explanatory power.

Table 5: *Coefficients Table (Standardized Beta values)*

Predictor	Standardized Beta (β)	p-value	Interpretation
Student Factor	0.497	0.000	Strongest predictor — a one-unit increase here significantly boosts math performance.
School Factor	0.224	0.003	Significant — schools with better environment/resources contribute positively.
Teacher Factor	0.116	0.106	Not statistically significant — though correlated, teacher factors don't independently predict achievement here.

The standardized beta results showed that the student factor was the strongest and most significant predictor of mathematics achievement (β = 0.497, p = 0.000), indicating a substantial positive effect. The school factor also had a significant positive influence (β = 0.224, p = 0.003), suggesting that better school environments contributed to higher performance.
However, the teacher factor was not statistically significant (β = 0.116, p = 0.106), indicating that it did not independently predict mathematics achievement despite showing some association.

Objective 2: To measure how much each factor affects student's math performance using step-by-step analysis.

Table 6: *Model Summary*

Model Summary									
				Std. Error	Change Statistics				
Model	R	R Square	Adjusted R Square	of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.397[a]	.157	.145	.82334	.157	12.566	3	202	.000
2	.726[b]	.527	.518	.61828	.370	157.213	1	201	.000
3	.727[c]	.529	.517	.61851	.002	.850	1	200	.358

4	.753[d]	.567	.554	.59478	.038	17.278	1	199	.000
5	.758[e]	.575	.560	.59065	.008	3.792	1	198	.053
a. Predictors: (Constant), Qualification, Age, Gender									
b. Predictors: (Constant), Qualification, Age, Gender, Student Factor									
c. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor									
d. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor, School Factor									
e. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor, School Factor, Parent Socio Factor									

The hierarchical regression results showed that Model 1 explained 15.7% of the variance in mathematics achievement ($R^2 = .157$) and was statistically significant ($F = 12.566$, $p = .000$). In Model 2, the explanatory power increased substantially to 52.7% ($R^2 = .527$), with a significant change ($\Delta R^2 = .370$, $p = .000$), indicating a strong contribution of the added variable.

Model 3 showed only a negligible increase in variance explained ($R^2 = .529$), and the change was not statistically significant ($p = .358$), suggesting that the added predictor did not contribute meaningfully. Model 4 further improved the model, increasing the explained variance to 56.7% ($R^2 = .567$), with a significant contribution ($\Delta R^2 = .038$, $p = .000$).
Finally, Model 5 showed a slight increase in explanatory power ($R^2 = .575$), but the change was not statistically significant ($p = .053$), indicating a marginal contribution of the last variable. Overall, the results suggested that most of the variation in mathematics achievement was explained by variables entered up to Model 4.

Table 6: *Anova*

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.554	3	8.518	12.566	.000[b]
	Residual	136.934	202	.678		
	Total	162.489	205			
2	Regression	85.652	4	21.413	56.015	.000[c]
	Residual	76.836	201	.382		
	Total	162.489	205			
3	Regression	85.977	5	17.195	44.949	.000[d]
	Residual	76.511	200	.383		
	Total	162.489	205			
4	Regression	92.090	6	15.348	43.386	.000[e]
	Residual	70.399	199	.354		
	Total	162.489	205			
5	Regression	93.412	7	13.345	38.251	.000[f]
	Residual	69.076	198	.349		
	Total	162.489	205			
a. Dependent Variable: Math Achievement Factor						
b. Predictors: (Constant), Qualification, Age, Gender						
c. Predictors: (Constant), Qualification, Age, Gender, Student Factor						
d. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor						
e. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor, School Factor						
f. Predictors: (Constant), Qualification, Age, Gender, Student Factor, Teacher Factor, School Factor, Parent Socio Factor						

The ANOVA results showed that all five regression models were statistically significant (p = .000). Model 1 explained a smaller portion of variance (F = 12.566), while Model 2 showed a substantial improvement (F = 56.015), indicating a stronger explanatory power with the addition of variables.
Model 3 remained significant (F = 44.949) with a slight increase in regression sum of squares, while Model 4 further improved the model (F = 43.386) by increasing the explained variance and reducing the residual error. Finally, Model 5 also remained significant (F = 38.251), showing a gradual increase in explained variance and a decrease in residual variance.

Table 7: *Coefficients*

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	4.354	.849		5.126	.000		
	Gender	-.498	.117	-.280	-4.250	.000	.959	1.042
	Age	-.034	.053	-.042	-.637	.525	.962	1.039
	Qualification	.284	.071	.262	4.025	.000	.986	1.014
2	(Constant)	1.516	.677		2.240	.026		
	Gender	-.458	.088	-.258	-5.197	.000	.958	1.044
	Age	-.015	.040	-.019	-.388	.699	.961	1.040
	Qualification	.190	.054	.175	3.553	.000	.967	1.034
	Student Factor	.702	.056	.615	12.538	.000	.978	1.023
3	(Constant)	1.325	.708		1.871	.063		
	Gender	-.458	.088	-.258	-5.198	.000	.958	1.044
	Age	-.009	.040	-.011	-.220	.826	.932	1.073
	Qualification	.194	.054	.178	3.608	.000	.962	1.040
	Student Factor	.661	.071	.579	9.277	.000	.604	1.657
	Teacher Factor	.060	.065	.058	.922	.358	.601	1.663
4	(Constant)	1.263	.681		1.855	.065		
	Gender	-.528	.086	-.297	-6.112	.000	.922	1.085
	Age	-.016	.039	-.020	-.417	.677	.930	1.076
	Qualification	.169	.052	.156	3.250	.001	.949	1.054
	Student Factor	.534	.075	.468	7.114	.000	.503	1.987
	Teacher Factor	-.061	.069	-.058	-.874	.383	.495	2.019
	School Factor	.340	.082	.285	4.157	.000	.463	2.159
5	(Constant)	1.256	.676		1.857	.065		
	Gender	-.533	.086	-.300	-6.205	.000	.921	1.086
	Age	-.020	.039	-.024	-.509	.611	.928	1.078
	Qualification	.153	.052	.141	2.933	.004	.927	1.079
	Student Factor	.493	.077	.432	6.378	.000	.467	2.141
	Teacher Factor	-.095	.071	-.091	-1.337	.183	.465	2.152

	School Factor	.291	.085	.243	3.412	.001	.422	2.371
	Parent Socio Factor	.148	.076	.133	1.947	.053	.458	2.184
a. Dependent Variable: Math Achieve Factor								

The coefficient results indicated that across all models, gender had a significant negative effect on mathematics achievement (p = .000), while qualification showed a significant positive effect in all models. Age remained insignificant throughout the models ($p > .05$).

In Model 2, the student factor emerged as a strong and significant predictor (β = .615, p = .000), greatly improving the model. In Model 3, the teacher factor was added but was not statistically significant (p = .358).

In Model 4, the school factor became a significant positive predictor (β = .285, p = .000), while the teacher factor remained insignificant. In Model 5, the parent socio factor showed a marginal effect (p = .053), indicating a weak contribution.

The results suggested that student factor, school factor, gender, and qualification were significant predictors of mathematics achievement, while age and teacher factor did not contribute significantly. Multicollinearity was not a concern, as VIF values were within acceptable limits.

Objective 3: To compare students from urban and rural schools to see if there are any unfair differences in math achievement.

Table 8: *Group Statistics between Mathematics Achievement and the Four Explanatory Variables*

Group Statistics					
	Municipality	N	Mean	Std. Deviation	Std. Error Mean
Student Factor	Urban	77	3.8260	.74435	.08483
	Rural	129	3.7008	.80044	.07047
Teacher Factor	Urban	77	3.8615	.86154	.09818
	Rural	129	4.0762	.83827	.07381
School Factor	Urban	77	3.8416	.66359	.07562
	Rural	129	3.6775	.78673	.06927
Parent Socio Factor	Urban	77	3.8701	.71728	.08174
	Rural	129	3.7581	.84988	.07483
Math Achieve Factor	Urban	77	3.7558	.88711	.10110
	Rural	129	3.3070	.85222	.07503

The group statistics showed differences between urban and rural students across all variables. The student factor mean was slightly higher in urban areas (M = 3.8260) than in rural areas (M = 3.7008). Similarly, the school factor and parent socio factor were higher in urban municipalities compared to rural ones.

In contrast, the teacher factor mean was higher in rural areas (M = 4.0762) than in urban areas (M = 3.8615).

Regarding mathematics achievement, urban students had a higher mean score (M = 3.7558) than rural students (M = 3.3070), indicating better performance in urban municipalities. Overall, the results suggested that most factors and achievement levels were relatively higher in urban areas, except for the teacher factor, which was higher in rural areas.

5. Findings

Descriptive Statistics: Teacher factor had the highest mean (M = 3.9960), followed by parent socio factor (M = 3.8000), student factor (M = 3.7476), and school factor (M = 3.7388); mathematics achievement mean was lower (M = 3.4748). Respondents' mean age was 15.06 years.

Correlation: Mathematics achievement was positively and significantly correlated with student factor (r = .652, p = .000), school factor (r = .538, p = .000), parent socio factor (r = .531, p = .000), and teacher factor (r = .416, p = .000).

Regression Model Fit: The regression model showed a strong positive relationship (R = .680) and explained 46.3% of the variance in mathematics achievement (R^2 = .463, adjusted R^2 = .452), with a significant F value (F = 43.333, p = .000). **Predictors (Standardized Beta):** Student factor was the strongest predictor (β = .497, p = .000), followed by school factor (β = .224, p = .003); teacher factor was not significant (β = .116, p = .106).

Hierarchical Regression:

- Model 1 explained 15.7% of variance (R^2 = .157, F = 12.566, p = .000).
- Model 2 increased variance explained to 52.7% (ΔR^2 = .370, p = .000) with student factor as a strong contributor.
- Model 3 showed a negligible increase (ΔR^2 = .002, p = .358) with teacher factor not significant.
- Model 4 improved variance explained to 56.7% (ΔR^2 = .038, p = .000) with school factor significant.
- Model 5 showed a slight increase (R^2 = .575, ΔR^2 = .008, p = .053) with parent socio factor marginally significant.

ANOVA: All regression models were significant (p = .000), with Model 2 showing the largest improvement in explanatory power.

Coefficients:

- Gender had a significant negative effect on achievement (p = .000).
- Qualification had a significant positive effect.
- Age and teacher factor did not contribute significantly.
- Multicollinearity was not a concern (VIF within limits).

Urban–Rural Comparison:

- Urban students scored higher in student factor, school factor, parent socio factor, and mathematics achievement.
- Teacher factor was higher in rural areas.
- Overall, urban students outperformed rural students in mathematics.

These findings collectively indicate that student factor, school factor, gender, and qualification were the most influential determinants of mathematics achievement, while age and teacher factor had limited impact.

6. Results and Discussion

The present study examined the factors influencing mathematics achievement among secondary school students, focusing on student, teacher, school, and parental/socioeconomic factors. Descriptive statistics showed that teacher factor had the highest mean (M = 3.9960), followed by parent socio factor (M = 3.8000), student factor (M = 3.7476), and school factor (M = 3.7388), while mathematics achievement had a relatively lower mean (M = 3.4748). The respondents' mean age was 15.06 years.

Correlation analysis indicated that mathematics achievement was positively and significantly associated with student factor ($r = .652$, $p = .000$), school factor ($r = .538$, $p = .000$), parent socio factor ($r = .531$, $p = .000$), and teacher factor ($r = .416$, $p = .000$). These results align with prior research (Ma & Kishor, 1997; Schunk & DiBenedetto, 2020), which found that students' motivation, self-efficacy, and study habits are critical predictors of mathematics performance. However, regression analyses in the present study revealed that the student factor was the strongest predictor ($\beta = .497$, $p = .000$), followed by school factor ($\beta = .224$, $p = .003$), while teacher factor did not contribute significantly ($\beta = .116$, $p = .106$). This finding concurs with earlier studies (Hill, Ball, & Schilling, 2008), suggesting that teacher influence is indirect, likely operating through students' engagement and motivation rather than as a direct determinant of achievement.

Hierarchical regression further illustrated the relative contribution of different factors. Model 2, which introduced the student factor, accounted for the largest increase in explained variance ($\Delta R^2 = .370$, $p = .000$), highlighting the pivotal role of students' internal learning characteristics. Subsequent models showed smaller incremental contributions from school and parent socio factors, consistent with prior findings emphasizing the supportive but secondary role of school environment and parental influence (Blatchford, Bassett, & Brown, 2011). Gender and qualification also demonstrated significant effects on mathematics achievement, while age and teacher factor remained non-significant, reinforcing the notion that individual student characteristics outweigh certain contextual or demographic factors.

Urban–rural comparisons revealed that urban students outperformed rural students across student, school, and parent socio factors as well as mathematics achievement, while teacher factor scores were higher in rural areas. This pattern reflects the urban–rural disparity noted in previous studies, suggesting that unequal access to educational resources, academic support, and learning opportunities contributes to differences in performance.

The findings of the present study corroborate and extend prior research by confirming that student-related factors are the primary determinants of mathematics achievement, followed by school and parental/socioeconomic factors, while teacher influence is limited when controlling for other variables. These results underscore the importance of strategies that enhance students' motivation, self-efficacy, and study habits, alongside interventions that improve school resources and address urban–rural inequalities.

7. Conclusion

This study investigated the key factors influencing mathematics achievement among secondary school students in Nepal by examining the combined effects of student-related, teacher-related, school-related, and parental or socioeconomic variables. Quantitative data were collected from 206 students in urban and rural public schools in Makwanpur district. Correlation and regression analyses were applied to identify the most significant predictors of mathematics performance. The findings indicated that student-related factors—particularly self-efficacy, motivation, and study habits—were the strongest determinants of mathematics achievement. Students who demonstrated greater confidence in their mathematical abilities and maintained consistent learning efforts achieved higher academic outcomes, highlighting the importance of internal learning attitudes and behaviors. School-related factors and parental or socioeconomic support also contributed positively to mathematics achievement, although their effects were comparatively smaller. The availability of learning resources, supportive classroom environments, and encouragement from families facilitated students' learning and academic engagement. In contrast, teacher-related variables did not show a statistically significant independent effect when other factors were considered, suggesting that teacher influence may operate indirectly through students' motivation and learning behaviors. The study further identified a moderate but significant difference in mathematics achievement between urban and rural students, with urban learners performing at a higher average level. This finding indicates the presence of an educational equity gap, which may be associated with broader differences in access to learning opportunities and educational resources. The results suggest that improving mathematics achievement requires a comprehensive approach addressing both individual and contextual influences. Educational initiatives should prioritize strategies that strengthen students' motivation, confidence, and learning habits, while also enhancing school resources and support systems, particularly in rural areas. Such efforts may help improve mathematics learning outcomes and reduce disparities within Nepal's secondary education system.

8. Recommendations

- Schools should strengthen students' motivation, self-efficacy, and study habits, as these are the most influential factors in mathematics achievement.
- Authorities should improve school resources and learning environments, particularly in rural schools, to support effective learning.
- Policymakers should reduce urban–rural disparities by ensuring equitable access to educational resources and opportunities.

9. References

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