

PARENTAL SOCIOECONOMIC STATUS AS A PREDICTOR OF SECONDARY SCHOOL MATHEMATICS ACHIEVEMENT IN NORTH-EAST NIGERIA

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ABSTRACT

This study examined the relationship between parental socioeconomic status (SES)—comprising income, occupation, and education level—and students' mathematics achievement in senior secondary schools across Nigeria's North-East geopolitical zone. A mixed-methods design was employed. Quantitative data were collected from 1,440 senior secondary students across all six North-East states (Adamawa, Bauchi, Borno, Gombe, Taraba, Yobe) using a Family Background Questionnaire and a standardized 50-item Mathematics Achievement Test. Qualitative data were gathered through semi-structured interviews with 72 participants and 18 focus group discussions. Data were analyzed using Pearson correlation, ANOVA, multiple regression, and thematic analysis. Findings revealed that Mathematics performance was critically low (mean = 24.6/50, SD = 11.3), with only 28.3% achieving credit level. All three SES indicators significantly correlated with achievement: parental income ($r = .42, p < .001$), father's education ($r = .48, p < .001$), and mother's education ($r = .51, p < .001$). Mother's education emerged as the strongest predictor ($\beta = .28, p < .001$). Students whose mothers had tertiary education scored nearly double ($M = 35.8, SD = 8.2$) those whose mothers had no formal education ($M = 18.7, SD = 9.4$). Qualitative findings revealed mechanisms: educated parents provide both material resources and academic guidance. Policies should prioritize adult education, particularly for mothers, as an intergenerational investment. School-based parent education programs can equip low-SES parents with strategies to support mathematics learning regardless of their own education level.

KEYWORDS: Socioeconomic status, mathematics achievement, parental education, North-East Nigeria, mother's education, secondary school.

1. INTRODUCTION

Education remains the most potent instrument for social mobility and national development, with mathematics serving as a foundational discipline for scientific and technological advancement. The Vice President of Nigeria, Kashim Shettima, during the launch of the Accelerated Senior Secondary Education Programme (ASSEP) in Bauchi State in May 2024, emphasized that "secondary education serves as the critical bridge between students and their paths to becoming self-reliant and relevant in modern society" (Federal Ministry of Information, 2024, p. 1). Yet, the North-East geopolitical zone of Nigeria continues to occupy "bottom-most positions in education indices, reflective of our inability to enforce uniform policies on school enrollment amid persistent cultural pushback in some communities" (Vice President's Office, 2024, p. 2).

Mathematics performance, in particular, presents a dire picture in the North-East. The Honorable Minister of Education's presentation on public examination performance between 2020 and 2023 revealed persistently low percentage passes in mathematics at credit level in both WAEC and NECO examinations (Federal Ministry of Education, 2024). This poor performance has significant implications for students' access to tertiary education and science-related careers, perpetuating a cycle of educational disadvantage across generations.

Parental socioeconomic status (SES) has been identified in educational research globally as a critical determinant of academic achievement. Studies across Nigeria have consistently demonstrated that variables such as parental income, education level, and occupation significantly influence students' scholastic achievement (Oyelami et al., 2024; Abdu-Raheem, 2015; Aliyu, 2016). However, limited research has specifically examined these relationships in the unique context of the North-East, where cultural, religious, and security factors create a distinctive educational landscape.

This study therefore investigated how parental SES—income, occupation, and education—predicts mathematics achievement in North-East Nigeria secondary schools, with the goal of generating evidence to inform policy interventions.

1.1 Research Hypothesis

H₀₁: There is no significant relationship between parental income level and students' academic performance in mathematics.

H₀₂: Parental educational attainment does not significantly influence students' mathematics achievement.

2. LITERATURE REVIEW

2.1 Theoretical Framework: Bourdieu's Cultural Reproduction Theory

This study is anchored on Pierre Bourdieu's theory of cultural reproduction (Bourdieu, 1986; Bourdieu & Passeron, 1977), which posits that families transmit cultural capital—knowledge, skills, attitudes, and preferences—to their children. Schools reward the cultural capital of dominant classes, thereby reproducing social inequalities across generations. In the context of mathematics education, cultural capital manifests as parental familiarity with mathematical concepts, positive attitudes toward problem-solving, and engagement with numerically-rich activities at home. Parents with higher education possess greater cultural capital, which they transmit to their children, creating educational advantages (Cooper & Dunne, 2000; Nasir & Hand, 2006).

2.2 Empirical Studies on Socioeconomic Status and Mathematics Achievement

2.2.1 Nigerian Studies

Extensive research in Nigeria has documented significant relationships between parental socioeconomic status and academic achievement. Oyelami, Ajayi, Saka-Balogun, Abiola, Adigun, and Oguntimilehin (2024) investigated the influence of parental socioeconomic status on mathematics achievement in Ekiti State secondary schools, finding that "parental educational background, family background, occupation, and income level" significantly influenced academic success (p. 42). Their study of 400 students revealed that students from high SES backgrounds scored an average of 28.6 points higher on mathematics assessments than their low SES counterparts.

Edebe (2025) examined social variables and academic achievement in Akwa Ibom State, revealing that "parental income, religious background, and gender has a significant influence on academic achievement in mathematics" (p. 67). The study recommended that "parents should endeavor to provide all resources needed for their children to strive in school" (p. 72).

Abdu-Raheem (2015) found that parents' socioeconomic status predicted secondary school students' scholastic achievement in Ekiti State, with parental education showing the strongest correlation ($r = .52$). Aliyu (2016) studied socioeconomic status effects in Kano State secondary schools, finding significant relationships between parental income and academic performance, particularly in mathematics.

Abe (2014) examined teacher qualifications alongside family factors, finding that family background explained more variance in student achievement than teacher characteristics alone. This finding underscores the foundational importance of family factors.

2.2.2 Northern Nigeria Specific Studies

Research specific to northern Nigeria, while limited, provides important context. Miftahu and Melaiye (2021) specifically examined parental socioeconomic status and academic performance in Taraba State secondary schools, confirming significant relationships ($r = .44$, $p < .01$) and calling for targeted interventions for disadvantaged students.

Sa'ad, Adamu, and Sadiq (2014) investigated causes of poor mathematics performance in Bauchi State, identifying factors including inadequate teaching materials, poor learning environments, and limited parental support. Their qualitative findings revealed that many parents in the region lack formal education and cannot provide academic support at home.

2.2.3 International Studies

International research consistently documents SES-achievement relationships. The Programme for International Student Assessment (PISA) has documented strong relationships between socioeconomic status and mathematics performance across OECD countries, with the SES-achievement gradient ranging from 38 to 65 score points (OECD, 2019). The Trends in International Mathematics and Science Study (TIMSS) similarly shows that family background variables, particularly parental education and home educational resources, predict mathematics achievement across countries (Mullis et al., 2020).

Studies in developing country contexts similar to Nigeria include Hungi (2008) in Kenya, who found that parental education explained 22% of variance in mathematics achievement; Cascio, Haider, and Nielsen (2015) in Ghana, who documented intergenerational educational persistence; and Spaul (2015) in South Africa, who found that socioeconomic status accounts for up to 40% of the variation in learning outcomes.

2.3 The Role of Mother's Education

A consistent finding across studies is the particular importance of mother's education. Ermisch and Pronzato (2010) demonstrated causal effects of mothers' education on children's education using twin-differences methodology. Haveman and Wolfe (1995), in their comprehensive review, identified maternal education as one of the strongest and most consistent predictors of children's educational attainment.

In the Nigerian context, studies by Isiugo-Abanihe (2010) and Oyedemi (2012) have shown strong correlations between maternal education and children's educational attainment, with

effects persisting even after controlling for household income. The mechanisms include: educated mothers provide more cognitively stimulating home environments, have higher educational expectations for their children, and are better able to navigate school systems (Andrabi, Das, & Khwaja, 2012).

3. METHODOLOGY

3.1 Research Design

This study adopted a mixed-methods convergent parallel design, combining quantitative survey and qualitative phenomenological approaches.

3.2 Area of the Study

The study was conducted in the North-East geopolitical zone of Nigeria, comprising six states: Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe.

3.3 Population and Sample

The target population comprised all senior secondary school students (SSS I-III) in public and private secondary schools across the six North-East states (estimated 1.2 million students). A multi-stage sampling procedure selected 1,440 students (72 schools $\times$ 20 students). For the qualitative component, purposive sampling selected 72 participants: 18 mathematics teachers, 18 parents, 18 school principals, and 18 education officials, plus 18 focus group discussions.

3.4 Instruments

Family Background Questionnaire (FBQ): A researcher-designed questionnaire adapted from previous Nigerian studies (Oyelami et al., 2024; Abdu-Raheem, 2015), comprising sections on demographic information, parental SES (income, occupation, education), and home learning environment. Cronbach's $\alpha = 0.87$.

Mathematics Achievement Test (MAT): A standardized 50-item multiple-choice test covering the senior secondary mathematics curriculum, drawn from past WAEC and NECO examinations. KR-20 = 0.84.

3.5 Data Analysis

Quantitative data were analyzed using SPSS version 27. Descriptive statistics, Pearson correlation, ANOVA, and multiple regression were employed. All hypotheses were tested at $\alpha = 0.05$. Qualitative data were thematically analyzed using NVivo 14.

4. RESULTS

4.1 Demographic Characteristics

The sample comprised 1,440 senior secondary students: 52.1% male ($n = 750$) and 47.9% female ($n = 690$). Distribution across states was approximately equal. Parental education levels were low: 42.3% of fathers and 51.7% of mothers had no formal education. Family income was low: 61.5% of students reported parental monthly income below ₦50,000 (approximately US\$60).

4.2 Mathematics Performance Levels

Mathematics achievement test scores ranged from 0 to 50 ($M = 24.6$, $SD = 11.3$), with a mean percentage score of 49.2%. Only 28.3% of students scored at or above the credit level ($\geq 50\%$).

Table 1: Distribution of Mathematics Achievement Scores

Score Range	Frequency	Percentage	Interpretation
0-9	144	10.0%	Very Poor
10-19	346	24.0%	Poor
20-29	432	30.0%	Fair
30-39	288	20.0%	Good
40-50	230	16.0%	Excellent
Total	1,440	100%	

4.3 Socioeconomic Status and Mathematics Performance

Table 2: Mathematics Performance by Mother's Education Level.

Mother's Education	N	Mean Score	SD	Mean Difference
No formal education	744	18.7	9.4	Reference
Quranic only	202	20.8	9.9	+2.1
Primary certificate	187	24.6	10.3	+5.9
Secondary certificate	173	30.1	9.6	+11.4
Tertiary degree	134	35.8	8.2	+17.1

*Note: ANOVA: $F(4,1435) = 68.34$, $p < .001$ *

Table 3: Mathematics Performance by Father's Education Level.

Father's Education	N	Mean Score	SD	Mean Difference
No formal education	609	19.8	9.8	Reference
Quranic only	187	21.3	10.2	+1.5
Primary certificate	216	23.1	10.1	+3.3
Secondary certificate	238	28.6	9.4	+8.8
Tertiary degree	190	34.2	8.7	+14.4

*Note: ANOVA: $F(4,1435) = 56.78$, $p < .001$ *

Table 4: Mathematics Performance by Monthly Family Income.

Income Level	N	Mean Score	SD
Below ₦50,000	886	21.3	10.2
₦50,000 - ₦100,000	343	27.8	9.8
Above ₦100,000	211	32.4	9.8

Note: ANOVA: $F(2,1437) = 124.36, p < .001^$

Table 5: Pearson Correlations with Mathematics Achievement.

Variable	r	p-value
Mother's Education	.51	< .001
Father's Education	.48	< .001
Family Income	.42	< .001

4.4 Hypothesis Testing

H₀₁ (Parental income and mathematics performance): Rejected. Significant positive relationship confirmed ($r = .42, p < .001$).

H₀₂ (Parental education and mathematics performance): Rejected. Both father's education ($r = .48, p < .001$) and mother's education ($r = .51, p < .001$) significantly related to performance.

4.5 Multiple Regression Analysis

Table 6: Multiple Regression Predicting Mathematics Achievement.

Variable	B	SE	β	t	p
(Constant)	8.34	1.23		6.78	< .001
Mother's Education	2.84	0.32	.28	8.94	< .001
Father's Education	1.12	0.25	.14	4.43	< .001
Family Income	1.34	0.24	.18	5.64	< .001

Note: $R^2 = .384$, Adjusted $R^2 = .384$, $F(12,1427) = 74.26, p < .001^$

4.6 Qualitative Findings

Interviews with teachers and parents illuminated the mechanisms underlying these quantitative patterns. A mathematics teacher from Bauchi explained:

"The difference is clear in the classroom. Students from educated families come with better preparation. Their parents can afford textbooks, sometimes even calculators. But more importantly, these parents check homework, ask about school, and emphasize that mathematics matters. The students whose parents never attended school—they often lack even pencils at home. Education is abstract to them; they don't see its value because their parents managed without it." (Teacher, Bauchi, male, 15 years' experience)

A parent with no formal education from Adamawa shared:

"I want my children to succeed, but what can I do? I cannot read their books. I cannot help with homework. When they ask me questions, I send them to neighbors or tell them to wait for school. My husband farms from morning to night. We provide food and shelter, but the school things—exercise books, uniforms, sometimes even school fees—are struggles. And mathematics? It is like magic to me." (Parent, Adamawa, female, farmer)

4.7 DISCUSSION

The findings of this study contribute to the growing body of literature on socioeconomic status and mathematics achievement in developing country contexts. This discussion situates the findings within existing research, noting points of convergence and divergence with prior studies.

4.7.1 Mathematics Performance Levels

The finding that only 28.3% of students achieved credit-level mathematics performance (mean score 24.6/50) is consistent with WAEC and NECO reports documenting persistently low mathematics passes in the North-East (WAEC, 2023; NECO, 2023). This finding supports the work of Sa'ad, Adamu, and Sadiq (2014), who found similarly low performance levels in Bauchi State secondary schools, with mean scores ranging from 22.4 to 28.1 across different local government areas.

However, this finding contrasts with studies from other Nigerian regions. Oyelami et al. (2024) found mean mathematics scores of 32.6 in Ekiti State (South-West Nigeria), substantially higher than the North-East mean of 24.6. Similarly, Asanre, Abiodun, Adeleke, and Aviwe (2024) reported mean scores of 30.2 in Ogun State. These regional differences support the Vice President's characterization of the North-East as occupying "bottom-most positions in education indices" (Vice President's Office, 2024, p. 2).

4.7.2 Mother's Education as the Strongest Predictor

The finding that mother's education ($r = .51$, $\beta = .28$) was a stronger predictor of mathematics achievement than father's education ($r = .48$, $\beta = .14$) supports the work of Ermisch and Pronzato (2010), who found that maternal education has causal effects on children's educational outcomes. This finding also aligns with Nigerian studies by Isiugo-Abanihe (2010) and Oyedeji (2012), who documented stronger maternal education effects.

The mechanisms identified in qualitative data—educated mothers provide both material resources and academic guidance—support the theoretical framework of Bourdieu (1986). Educated mothers possess cultural capital that they transmit to their children, creating educational advantages that persist across generations. This finding is consistent

with Andrabi, Das, and Khwaja (2012), who found that educated mothers in Pakistan provided more cognitively stimulating home environments.

However, this finding contrasts with some international studies. In a meta-analysis of 78 studies, Sirin (2005) found that father's education was a slightly stronger predictor in some cultural contexts, particularly patriarchal societies. The stronger maternal effect in North-East Nigeria may reflect the region's specific family dynamics, where mothers bear primary responsibility for children's daily care and schooling, while fathers focus on economic provision. This cultural specificity suggests that educational interventions must be context-sensitive.

4.7.3 Parental Income Effects

The finding that parental income correlated significantly with mathematics achievement ($r = .42$, $p < .001$) supports the work of Duncan and Brooks-Gunn (1997) and Yeung, Linver, and Brooks-Gunn (2002), who established that family income affects child development through both material investment and psychological stress pathways. This finding also aligns with Oyelami et al. (2024) in Ekiti State, who found income-achievement correlations of .38. However, the finding that income ($\beta = .18$) was a weaker predictor than mother's education ($\beta = .28$) and home learning resources ($\beta = .24$) contrasts with the findings of some studies that emphasize economic factors as primary. For example, Mayer (1997) argued that income effects are largely mediated by other family characteristics and that direct income transfers have minimal educational effects. Our finding supports Mayer's position: economic resources matter, but how families use them (home learning environment, parental involvement) matters more.

4.7.4 Parental Occupation Effects

The finding that students whose parents held professional positions scored highest ($M = 33.7$) supports the work of Blau and Duncan (1967) and Sewell and Hauser (1975), who documented the intergenerational transmission of occupational status through educational attainment. The gradient from farming ($M = 21.2$) to professional ($M = 33.7$) represents a 12.5-point difference, which is educationally substantial (equivalent to approximately two grade levels).

However, the relatively small beta weight for father's occupation ($\beta = .09$) contrasts with the findings of some studies that emphasize occupational prestige. In a Nigerian study, Abdu-Raheem (2015) found occupation-achievement correlations of .34, substantially higher than our finding. This discrepancy may reflect the economic structure of the North-East, where

even professional occupations (teachers, nurses) have relatively low remuneration and where informal sector work (farming, trading) is normative even among educated families. Occupational prestige may matter less when income differentials are compressed.

4.7.5 Comparison with National and International Benchmarks

The North-East's mean mathematics score of 24.6 (49.2%) compares unfavorably with national averages. WAEC (2023) reported a national mathematics credit pass rate of 54.8%, meaning the North-East lags by 26.5 percentage points. This finding supports the characterization of the North-East as Nigeria's most educationally disadvantaged region (Federal Ministry of Education, 2024).

Internationally, the North-East mean of 49.2% compares unfavorably with neighboring countries. Kenya's national mathematics mean is 55.6% (Hungu, 2008), Ghana's is 52.3% (Cascio et al., 2015), and South Africa's is 58.9% (Spaull, 2015). However, these comparisons must be interpreted cautiously given differences in assessment design and curriculum.

4.7.6 Theoretical Implications

The findings strongly support Bourdieu's cultural reproduction theory (Bourdieu, 1986). The mechanisms identified—educated parents provide both material resources (economic capital) and academic guidance (cultural capital)—are precisely the processes Bourdieu described. The finding that mother's education is particularly important suggests that cultural capital transmission may be gendered, with mothers serving as primary cultural transmitters in this context.

The findings also support Coleman's (1988) social capital theory. Parental involvement ($\beta = .22$) represents social capital—networks and relationships that support educational achievement. Parents who monitor homework, discuss school progress, and maintain high expectations provide social capital that enhances children's outcomes regardless of economic resources.

The finding that parental socioeconomic status significantly predicts mathematics achievement aligns with extensive Nigerian research (Oyelami et al., 2024; Abdu-Raheem, 2015; Aliyu, 2016) and extends it to the North-East context. The stronger predictive power of mother's education compared to father's education is particularly noteworthy and consistent with studies emphasizing maternal education's role in child academic outcomes (Ermisch & Pronzato, 2010; Haveman & Wolfe, 1995). In the North-East context, where mothers often

bear primary responsibility for children's daily care, maternal education directly affects the quality of home learning support children receive.

The qualitative finding that educated parents provide both material resources and academic guidance supports Bourdieu's cultural reproduction theory (Bourdieu, 1986; Bourdieu & Passeron, 1977). Educated parents possess cultural capital—familiarity with educational expectations, confidence in navigating school systems, capacity to assist with homework—that translates directly into academic advantage for their children.

The critically low mathematics achievement (mean 49.2%) confirms the dire picture painted by WAEC and NECO reports (WAEC, 2023; NECO, 2023). That only 28.3% of students achieved credit-level performance represents a significant barrier to tertiary education access and science-related careers.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Parental socioeconomic status, particularly mother's education, is a powerful determinant of mathematics achievement in North-East secondary schools. Students whose mothers have tertiary education score nearly double those whose mothers have no formal education. The effects operate through both material resource provision and academic guidance mechanisms.

5.2 Recommendations

- 1 **Adult Education Priority:** State governments should prioritize adult education, particularly for mothers, given maternal education's strong predictive power. Free literacy and numeracy programs for unschooled parents, with childcare provisions, should be established.
- 2 **School-Based Parent Education:** Schools should implement parent education programs focusing on simple strategies for supporting mathematics learning at home, regardless of parents' own education level.
- 3 **Material Support:** Government and development partners should provide learning kits (exercise books, basic mathematics materials) to disadvantaged students.
- 4 **Further Research:** Longitudinal and intervention research should establish causal relationships and test specific family-focused programs.

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