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Full Length Research

Exploring the influence of poverty on teaching and learning of mathematics among senior secondary two students in Langtang North, Plateau State, Nigeria

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ABSTRACT: The study investigated the influence of poverty on students' teaching and learning of mathematics among senior secondary two students during the economic downturn in Langtang North of Plateau State, Nigeria. A descriptive survey research design was adopted for the study. The population of the study was 746 Senior Secondary Two (SS2) students. A stratified sampling technique was used to randomly select 108 students (55 males and 53 females) from both private and public schools. A questionnaire titled: Influence of Poverty on Students Learning Mathematics (IPSLM) was administered to the sample. The instrument was teacher-made based on responses to questions noted in a diary. Three experts did the face and content validity. Thereafter, it was administered to 20 students who did not form the sample, and its Reliability Coefficient of 0.70 was obtained through Cronbach alpha. The data collected was analysed using mean, standard deviation, chi-square, and t-test in Statistical Package for Social Sciences (SPSS). The study found that poverty significantly affects the teaching and learning of mathematics among senior secondary two students. Many students lack mathematics textbooks, they cannot eat before going to school, and they have no pocket money. Also, they do not concentrate in class, they do not do homework, and they trek long distances to school. Again, they are sent home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees and cannot afford to pay for home lessons. Besides, it was observed that poverty surpassed the boundaries of gender, school type, and family type. It was recommended, among other things, that philanthropists should assist in sponsoring the education of the less privileged in our society, and the government should declare free education from primary school to university.

Keywords: Influence, poverty, teaching and learning, mathematics.

INTRODUCTION

Poverty and mathematics education

Poverty is not a new phenomenon in most countries of the world. Nigeria is one of the nations where riches and splendid are in the hands of few, while poverty and penury are at the doorsteps of many (Osinowo *et al*., 2019). On hearing the word, most people disassociate themselves from it or its victim. However, it is a relative term; it depends on an individual or group. In fact, it is a social, physical, moral and psychological phenomenon which manifests itself in a negative condition, a state of perpetual want, which leads to deprivation of basic capabilities (Amao and Bakare, 2021; Dibal and Hassan,2020; Ihejieto, 2020; Kameen, 2023). Poverty could be eliminated or alleviated through the teaching and learning of mathematics. This is because the knowledge of mathematics is used in modelling real-life problems like in dam construction, computing, irrigation and aquaculture, which are crucial in poverty reduction. In fact, the knowledge of mathematics helps students to develop

capabilities in poverty alleviation (Amao and Bakare, 2021). Indeed, mathematics literacy is for everyone. Mathematical knowledge builds the students' self-confidence, which is a key ingredient in tackling real-life problems as poverty (Odeleye and Omolola, 2022). Also, mathematics is a science of reasoning that enables an individual to harness all possible available natural resources for the production of adequate goods and services for societal progress (Auwal and Gaya, 2022). This can only be possible when it is properly taught and learnt in schools. Unfortunately, experience has shown that the teaching and learning of mathematics is an uphill task. Apart from the fact that secondary school students find it difficult to understand mathematical concepts, the needed encouragement and support are not forthcoming. They resort to malpractice to pass their final examination, and when given admission to study mathematics and other related courses, they switch to arts or social science courses. This situation has reduced the number of secondary school students studying mathematics and other sciences in most tertiary institutions. At the secondary school level, the basic mathematical concepts are taught to enhance the ability of students to apply the knowledge in solving problems or making critical decisions, especially during the economic downturn. Thus, Sholihah *et al*. (2020) noted that if mathematics is well taught, learnt, and effectively applied, it would help in reducing the influence of poverty in our society.

Influence of poverty on teaching and learning of male and female students

There is no doubt that, sometimes in a bid to meet their daily needs, parents use their children as house helpers in other people's homes or as hawkers to get additional income. Such engagements in work to earn money or involvement in domestic chores would have a negative effect on students' learning and performance in mathematics. Studies (Kimaro, 2021; Wang *et al.,* 2022) showed that work after school, whether paid or unpaid, never positively affects academic performance, and that the work should be less than 12 hours per week. Domestic chores contribute to time taken away from studying, leading to reduced concentration and fatigue during the learning of mathematics. The issue of using students for domestic chores differs between genders. According to Sunday *et al.* (2022), the academic performance of male students is more affected by domestic chores, though there was no significant difference in the impact of domestic chores on male or female students. This suggests that if male students spent more time on domestic chores than female students, their attention span in the class would be affected. This would lead to a misconception of mathematical concepts, poor performance in mathematics, and hatred of the subject. But, according to Kimaro (2021), female students who attended schools with a high degree of home chores performed poorly than their counterparts with a low degree of domestic chores. This suggests that male students are less involved in domestic chores compared to their female counterparts. Apart from the stress of domestic chores, sometimes students are trekking long distances to school. They are exhausted before arriving at the school premises, and they have to participate in the morning function. This would make them uninterested in teaching and learning mathematics. Studies (Baliyan and Khama, 2020; Isa'ac and Aghegho, 2024) revealed that distance to school significantly affects students' performance in mathematics. Both male and female secondary school students are affected by domestic chores, which have reduced them to mere spectators during mathematics lessons. In fact, Osiesi and Blignaut (2024) revealed that poverty significantly influences students' performance irrespective of gender. Also, the absence of teaching and learning materials in mathematics is as damaging as engaging students in domestic chores. Many students lack learning materials that are useful in understanding the concepts of mathematics. This problem is not peculiar to any gender, as Offor and Offiah (2023) reported that both male and female students lack learning materials, and they are unable to pay school fees and hostel fees even at the university level of education. These imply that, apart from involvement in domestic chores and lack of learning materials like mathematics textbooks, non-payment of school fees is worsening the problem. These problems are peculiar to secondary school students coming from homes with no stable income. In fact, parents who do not have stable sources of income cannot afford to pay fees on time, and their wards are sent home or embarrassed in school (Enock *et al*., 2023; Mable and Roger, 2024).

Influence of poverty on teaching and learning in public and private schools

Education is the greatest equaliser able to mitigate the effects of poverty on students by equipping them with the knowledge and skills they need to lead successful and productive lives (Ajao, 2022). This is among the reasons why both private and public schools are established to equip learners with the knowledge and skills that would enable them to function effectively in society. Unfortunately, according to Sadem (2021), poverty has a positive influence on teaching and learning in all schools. This means the academic performance of the students in both public and private schools is negatively affected by poverty. Nwafor *et al.* (2022) link this problem to the socio-economic status of parents, especially those in public schools, as they found a positive, strong and significant relationship between the economic status of parents and the academic performance of students. Consequently, public school students suffer homelessness, lack of food, inability to pay for medical treatment, and lack of access to laptops and mathematics textbooks stemming from poverty (National Association of Secondary School

Principals, 2025). These problems, which are connected to poverty, affect the teaching and learning of mathematics, and they are not peculiar to public school students. According to Tyoakaa *et al.* (2023), poverty has significant negative effect on the academic performance of secondary school students, especially in mathematics, in both private and public secondary schools. In fact, the socio-economic level of parents, age of students, location and infrastructure contribute to inequality in public and private schools. However, Romuald (2023) reported that students who do well in public schools are most likely to do well in private schools. Thus, when senior secondary students are provided with the necessary learning material and environment, they can do well in mathematics in private or public schools.

Influence of poverty on polygamous and monogamous families

Family influence is an important factor that affects the teaching and learning of mathematics in both female and male students. Education and socio-economic status of a family have an impact on the performance of students at any level of education (Leo and Digal, 2023). Poverty affects students whose parents have low incomes. This is because parents who earn little will find it difficult to cater for their children's basic needs and education simultaneously (Tsagem *et al*., 2023). For instance, before children are taken to school, parents are obliged to pay their school fees to avoid the embarrassment of sending them back home. The situations where parents do not have stable sources of income, they cannot afford to pay fees in time, and their wards' teaching and learning is affected (Mable and Roger, 2024). Payment of fees increases the degree of completion among students, but it has little effect on educational attainment (Bietenbeck *et al.,* 2022). Parents also have to pay for or buy mathematics textbooks to enable their children to learn and do homework. If they cannot provide textbook in the subject, academic performance of students could be affected negatively as shown by some studies (Li and Wang, 2024; Pavestic and Canker, 2022; Mwikali *et al*., 2024). Parents or guardians are expected to give their children pocket money to buy some snacks when hungry. But, when this is not provided, they are likely to exhibit disorderly behaviour like loud yawning or conscious noise to disrupt an ongoing lesson in Mathematics, as evident in other findings (Canbolat and Rutkowski, 2019). Usually, low-income parents are forced to choose between sending their children to school and meeting their daily needs, such as food and shelter (Thelma *et al*., 2023). The situation is worse when the family is a polygamous type, where children who are born to different mothers under one father are expected to be educated. In this setting, according to Asigri *et al.* (2023), there are negative and positive effects on education, but the negative effects outweigh the positive. Parents hardly provide learning materials, pay school fees and hostel fees even at the university level of education (Offor and Offiah, 2023). According to Alordiah *et al*. (2024), students of parents with high socio-economic status performed better than students of parents with low socio-economic status.

Since parents cannot afford to pay for their children's transportation to school, children trek to school, which most time are far from their homes. Studies (Baliyan and Khama, 2020; Isa'ac and Aghegho, 2024) suggested that the distance students cover to school significantly affects their performance in mathematics. There is a relationship between the academic performance of students and poverty. Parents who do not have stable sources of income do not pay fees on time, and cannot provide enough health facilities for their wards. These affect the provision of school facilities and the smooth running of schools (Enock *et al.,* 2023). However, it is evident that parents with higher socio-economic status, which is reflected by higher income and educational attainment, tend to spend more on their children's education (Munir and Umer, 2023). Moreover, neighbourhood poverty partially mediates the relationship between family poverty and academic achievement in mathematics, and there was a significant interaction between family poverty status and parental discussion (Ihejieto, 2020). Poverty eventually affects its victims' mindset. For example, Munir and Umer (2023) showed that family income is a strong indicator of achievement, and growth mind-set (the belief that intelligence is not fixed and can be developed) reliably predicts achievement. Also, they observed that students from low-income families were less likely to hold a growth mindset than their wealthier peers when learning. According to McKenzie (2019), there are many challenges faced by children raised in poverty. Some challenges are long-term obstacles, such as chronic stressors and changes in brain structure that affect emotion and memory. Indeed, as the poverty level increases, performance in mathematics decreases (Davenport and Slate, 2019). Thus, a need to mitigate the influence of poverty on teaching and learning of mathematics to avoid its long-term effects.

Efforts towards mitigating the influence of poverty

Apart from the influence of poverty on family and teaching and learning of students, it has affected the society's core values, productivity and industry (Chioke, 2021). So, most governments of the world embark on policies and programmes to alleviate poverty. According to Kura *et al*. (2019), poverty alleviation is the effort to reduce the poverty of the indigenes of a nation to a minimal level. In Nigeria, for instance, we had the Green Revolution, Operation Feed the Nation, the Structural Adjustment Programme and Women Empowerment Programme. Unfortunately, the tenures of those governments that initiated these programmes ended with poverty in its worst state. A collective effort was made on September 25, 2015,

when the United Nations General Assembly formally adopted the 2030 Agenda for Sustainable Development, which builds on the achievements of the Millennium Development Goals. It consists of 17 Sustainable Development Goals (SDGs) and 169 associated targets. SDG1 is no poverty (Kura *et al*., 2019). Poverty is a natural phenomenon that requires a collective response across all levels of government and society (Olasoji *et al.,* 2023). Our thinking about poverty determines our collective efforts towards eradicating it. Yet the influence of poverty differs among people. If one goes without food, some people would say that one is poor. Also, when one does not have a car, some people would say that one is poor. Well, poverty is the function of the mind. If one lacks the capacity to think in order to maximise the potential within the environment, then one is poor and, of course, one would have nothing to offer in the collective effort against poverty. The global economic downturn has tilted towards Africa, with Nigeria having its fair share of economic crunch worsened by the 2019 Coronavirus pandemic and compounded by the removal of oil subsidies. It has affected many aspects of the human condition, ranging from physical, moral to psychological. In fact, it is characterised by hunger, homelessness, disease, malnutrition, high child mortality rate, family disintegration, unemployment, human trafficking, child labour, kidnapping, killing, sexual assault, drug abuse, prostitution and high mortality rate (Chioke, 2021; Magaji *et al.,* 2023). Poverty is evident even amidst plenty as a result of a lack of knowledge to translate potential into practical, creative beneficiaries to activate wellbeing (Nepal, 2020).

Statement of the problem

The general essence of establishing schools is to educate students in order to equip them with the necessary knowledge and skills required for them to function effectively in society. According to Mbarute and Ntiyuguruzwa (2023), students who perform well in school are better prepared to transition into adulthood and to attain economic and professional success. Education enables them to think in order to liberate themselves from the web of poverty. It is quite evident that students with good mathematical skills can think analytically and have better reasoning abilities (Chand *et al*., 2021). Mathematics is a subject whose knowledge is sin qua non in enhancing the ability of an individual to think critically and reason logically to solve problems. Nevertheless, the economic situation worldwide is cloudy. In third-world countries like Nigeria, businesses are collapsing due to poor patronage, industries are laying off their staff, and the debt profile is rising as the inflationary rate is double-digit. These have increased the poverty level in the country, and schools are affected as well. Students require learning materials like textbooks, mathematical sets, four-figure calculators, and calculators to learn and understand mathematical concepts. But these are not made available to students, especially at the senior secondary level. Most students rely on a few exercises that are solved by teachers on the board, as students complained that their parents cannot afford them learning materials. This situation is seriously affecting the teaching and learning of mathematics at the secondary school. McKenzie (2019) rightly reported that poverty leads to inability to work well with classmates and often results in students becoming unwanted participants in groups, adding to their feelings of inadequacy and resulting in the students giving up on a task just before they successfully complete it. Consequently, the researcher decided to explore the influence of poverty on teaching and learning of mathematics in order to provide valuable suggestions.

The purpose of the study

The main purpose of the study was to explore the influence of poverty on the teaching and learning of mathematics among senior secondary two students. Specifically, it was designed to:

1. determine the influence of poverty on the teaching and learning of mathematics among senior secondary two students.
2. examine the influence of poverty on the teaching and learning of mathematics among senior secondary two students based on gender.
3. ascertain the influence of poverty on teaching and learning of mathematics among senior secondary two students in terms of school type.
4. find out the influence of poverty on teaching and learning of mathematics among senior secondary two students in terms of family type.

Research questions

The following research questions guided the study.

1. What is the influence of poverty on the teaching and learning of mathematics among senior secondary two students?
2. Will there be any difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two male and female students?
3. Is there any difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students in public and private schools?
4. To what extent does the influence of poverty on teaching and learning of mathematics among senior secondary two students differ in terms of family type?

HYPOTHESES

The following research hypotheses were tested at the 0.05 level of significance:

1. There is no significant influence of poverty on the teaching and learning of mathematics among senior secondary two students.
2. There is no significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two male and female students.
3. There is no significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students in public and private schools.
4. There is no significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students who differ in terms of family type.

METHODOLOGY

The study was a survey research design. The population of the study was 746 (358 females and 388 males) Senior Secondary Two (SS2) science students from 17 schools (7 public and 10 private) in Langtang North Local Government Area of Plateau State. The choice of the population was deliberate because mathematics is fundamental in understanding other sciences. And students studying sciences are expected to be encouraged and supported by parents, individuals and the government. Six schools were randomly selected using a stratified sampling technique. 108 students participated in the study. 54 students from 3 Private schools participated in the study. Also, 54 students from 3 Public schools participated in the study. A questionnaire titled: Influence of Poverty on Students' Learning of Mathematics (IPSLM) was used for data collection. The instrument was teacher-made based on responses to questions noted in a diary. For instance, responses to questions were noted: Why were you not in school yesterday? Why are you late for school today? Have you paid your school fees? Why have you not paid your school fees? Why are you sleeping in class, and why are you not having mathematics textbooks? Three experts did the face and content validity (two of them in Mathematics Science Education, and one is a secondary school Mathematics Teacher). A pilot study was conducted in a school that was part of the population. The researcher went to a secondary school and took permission from the school principal. Thereafter, PSLM was administered to 20 senior secondary two students who did not form the sample, and a Cronbach's Reliability Coefficient of 0.70 was obtained. Permission was also taken from the principals of the sampled school. After the sampled senior secondary two students were assured of confidentiality, PSLM was administered to them with the assistance of their mathematics teachers. All the questionnaires were filled out and returned. The data collected was analysed using mean, standard deviation, Chi-square, and t-test in the Statistical Package for Social Science (SPSS) version 20.

RESULTS

This study sought influence of poverty on teaching and learning of mathematics among senior secondary two students. Findings (Table 1) of the study show that due to poverty, students do not have mathematics textbooks, they cannot eat before going to school, and they have no pocket money. Also, they do not concentrate in class, they do not do homework, and they trek long distances to school. Again, they are sent home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees, and they cannot afford to pay for home lessons. Thus, these factors significantly affect the teaching and learning of mathematics and their academic performance.

This study also found the difference in the influence of poverty on the teaching and learning of mathematics between male and female senior secondary two students. Findings (Table 2) show that both male and female students agreed that hunger affects their concentration in class, they do not have pocket money to buy something in school, they always do domestic work at home, they do not do their homework, and they are sent home for school fees. However, male and female students differ in the influence of poverty on the teaching and learning of mathematics. While male students agreed that they do not always eat before going to school, they do not take something during long breaks, they work after school to earn a living, and their parents do not pay school fees on time, their female counterparts agreed that they do not like lessons because of tiredness. Also, the table shows that the grand mean of males (Mean = 2.42; SD= 1.03) and that of females (Mean=2.32; SD=1.08) respectively. The difference in the grand mean of male and female respondents is 0.1 in favour of the male respondents. This means that male and female senior secondary two students did not differ in the influence of poverty on the teaching and learning of mathematics.

This study explored the difference in the influence of poverty on the teaching and learning of mathematics between male and female senior secondary two students in terms of school type. Findings (Table 3) indicated that both public and private school students agreed that hunger affects their concentration in class, they are sent home for school fees, they work after school to earn a living, they are always doing domestic work at home, they do not like lesson because of tiredness, and they do not have pocket money to buy something in school. However, they disagreed on the influence of poverty on teaching and learning mathematics. Public school students agreed that parents do not pay their fees on time, and they do not take something during the long break, while their counterparts in private school agreed that they are not happy in class because of hunger. Also, the table shows the grand mean of public school (Mean = 2.43; SD = 1.16) and of private school (Mean = 2.43; SD = 1.03), respectively. The difference in the grand mean of public and private respondents is 0.00. This implied that both private and

Table 1. X^2 -calculation of students' perception of influence of poverty on learning maths.

S/N	Statement	SA	A	D	SD	X^2-cal	Decision
1	I do not have maths textbooks	60	28	9	11	61.85	S
2	I do not always eat before coming to school	37	35	20	16	12.37	S
3	I am not happy in class because of hunger	27	36	24	21	4.67	NS
4	Hunger affects my concentration in class	35	46	12	15	29.41	S
5	I am send home for school fees	28	39	13	28	31.70	S
6	I do not have learning materials	49	31	17	11	12.67	S
7	I work after school to earn a living	33	36	17	22	8.96	S
8	My parents do not pay my school fees on time	34	22	29	23	3.41	NS
9	My parents always complain on payment of fees	22	21	27	38	6.74	NS
10	I pay my school fees myself	20	24	21	28	12.96	S
11	I am always doing domestic work at home	38	40	16	14	21.48	S
12	I have no one to sponsor me beyond secondary	38	25	26	19	7.04	NS
13	I cannot afford to pay for home lesson	45	37	10	16	30.89	S
14	I do not always do my home work	17	17	35	39	15.11	S
15	I do not like lessons because I am tired	14	21	27	46	20.96	S
16	I do not take something during long break	30	26	28	24	0.74	NS
17	I do not have pocket money	37	34	17	20	11.07	S
18	I always trek long distance to school	45	27	16	20	18.30	S

Table 2. The observed frequencies and mean scores for Research Question 2.

Items	Male						Female					
	SA	A	D	SD	$\bar{x}$	STDEV	SA	A	D	SD	$\bar{x}$	STDEV
1	29	16	3	7	1.78	1.03	31	12	6	4	0.96	0.96
2	16	18	10	11	2.29	1.10	21	17	10	5	1.98	0.99
3	11	19	12	13	2.49	1.07	16	17	12	8	2.23	1.05
4	17	27	4	7	2.98	0.95	18	19	8	8	2.89	1.05
5	6	15	9	15	2.58	1.18	12	24	4	13	2.66	1.09
6	29	12	9	5	1.82	1.02	20	19	8	6	2.00	1.00
7	16	19	9	11	2.73	1.10	17	17	8	11	2.36	1.13
8	16	9	16	14	2.51	1.17	18	13	13	9	2.25	1.11
9	11	9	12	23	2.15	1.18	11	12	15	15	2.36	1.11
10	9	12	10	24	2.11	1.15	11	12	11	19	2.28	1.17
11	19	24	6	6	3.02	0.95	19	16	10	8	2.87	1.07
12	21	13	13	8	2.15	1.10	17	12	13	11	2.34	1.14
13	19	20	6	10	2.13	1.09	26	17	4	6	1.81	1.00
14	8	9	15	23	2.96	1.09	9	8	20	16	2.81	1.06
15	5	7	16	27	2.18	0.10	9	14	11	19	2.75	1.13
16	11	13	14	17	2.67	1.12	19	13	14	7	2.17	1.07
17	19	17	6	13	2.24	1.17	18	17	11	7	2.13	1.04
18	23	16	7	9	2.96	1.10	22	11	9	11	2.83	1.19
Grand total of mean and standard deviation					**2.42**	**1.03**					**2.32**	**1.08**

public school senior secondary two students did not vary in the influence of poverty on teaching and learning mathematics.

This study determined the difference in the influence of poverty on teaching and learning of mathematics in terms of family type. Finding (Table 4) showed that both students from polygamy and monogamy homes agreed that hunger affects their concentration in class they work after school to earn a living, they always do domestic work at home, they do not always do their homework, they do not like lesson because of tiredness, and they do not have pocket money to buy something. However, students from polygamy and monogamy differ in some influence of poverty on senior secondary two students' teaching and

Table 3. The observed frequencies and mean scores for Research Question 3.

Items	Public						Private					
	SA	A	D	SD	$\bar{x}$	STDEV	SA	A	D	SD	$\bar{x}$	STDEV
1	26	14	5	9	1.94	1.22	34	14	4	2	1.52	0.79
2	18	16	12	8	2.19	1.07	19	19	8	8	2.09	1.05
3	25	15	9	9	2.22	1.04	12	15	15	12	2.50	1.08
4	16	21	7	10	2.80	1.07	19	25	5	5	3.07	0.91
5	14	20	4	16	2.59	1.17	14	19	9	12	2.65	1.10
6	24	15	8	7	1.96	1.63	25	16	9	4	1.85	0.96
7	20	15	7	12	2.80	1.17	13	21	10	10	2.69	1.04
8	16	15	8	15	2.59	1.19	19	14	14	17	2.17	1.06
9	10	12	11	21	2.20	1.16	12	9	18	19	2.30	1.14
10	10	15	11	18	2.31	1.13	10	9	10	25	2.07	1.18
11	17	21	6	10	2.83	1.08	21	19	10	4	3.06	0.94
12	19	13	11	11	2.26	1.15	19	12	15	8	2.22	1.09
13	23	16	7	8	2.00	1.08	22	21	3	8	1.94	1.04
14	11	9	17	17	2.74	1.12	6	8	18	22	3.04	1.01
15	9	10	12	23	2.90	1.14	5	11	15	23	3.04	1.01
16	14	10	14	16	2.59	1.17	16	16	14	8	2.26	1.05
17	19	13	10	12	2.28	1.17	18	21	7	8	2.09	1.03
18	20	15	6	13	2.78	1.19	25	12	10	7	3.02	1.09
Grand total of mean and standard deviation					**2.43**	**1.16**					**2.43**	**1.03**

Table 4: The observed frequencies and mean scores for Research Question 4.

Items	Polygamy						Monogamy					
	SA	A	D	SD	$\bar{x}$	STDEV	SA	A	D	SD	$\bar{x}$	STDEV
1	22	9	3	1	1.51	0.78	38	19	6	10	1.84	1.07
2	16	9	6	4	1.94	1.06	21	26	14	12	2.23	1.05
3	13	13	4	5	2.03	1.04	14	23	20	16	2.52	1.04
4	12	15	4	4	3.00	0.98	23	31	8	11	2.90	1.02
5	4	17	5	9	2.46	1.01	24	22	8	19	2.70	1.19
6	15	11	5	4	1.94	1.03	34	20	12	7	1.89	1.01
7	10	11	6	8	2.66	1.14	23	25	11	14	2.78	1.10
8	8	8	9	10	2.60	1.14	26	14	20	13	2.27	1.34
9	10	8	6	11	2.49	1.22	12	13	21	27	2.13	1.10
10	6	11	7	11	2.34	1.11	14	13	14	32	2.12	1.18
11	14	11	5	5	2.98	1.07	24	29	11	9	2.93	0.99
12	14	10	7	4	2.03	1.04	24	15	19	15	2.34	1.15
13	13	9	5	8	2.23	1.19	32	28	5	8	1.85	0.97
14	7	5	13	10	2.74	1.09	16	12	22	29	2.96	1.06
15	6	6	9	14	2.89	1.13	8	15	16	32	3.01	1.05
16	10	11	7	7	2.31	1.11	20	15	21	17	2.47	1.13
17	12	14	3	6	2.09	1.07	25	20	14	14	2.23	1.12
18	11	11	2	11	2.63	1.24	34	16	14	9	3.03	1.08
Grand total of mean and standard deviation					**2.38**	**1.08**					**2.45**	**1.09**

learning of mathematics. While students from polygamy homes agreed that parents do not pay school fees on time, their counterparts from monogamy homes agreed that they are not happy in class because of hunger, and they are sent home for school fees. Also, the table shows the grand mean of polygamy (Mean = 2.38; SD = 1.08) and those of monogamy (Mean = 2.45; SD = 1.09), respectively. The differences in the grand mean of polygamy and monogamy respondents is 0.07 in favour of monogamy. This implied that both family types did not differ in the

Table 5. Chi-square analysis for hypothesis one.

Responses	SA	A	D	SD	X^2-cal	X^2-tab	Decision
Observed	450	453	452	489	29.12	7.81	Sig
Expected	486	486	486	486			

Table 6. The t-Test of male and female students' perception of influence of poverty on learning mathematics.

Gender	N	Mean	SD	Df	t-Cal	t-Tab
Male	55	2.4266	1.0324	106	0.50	1.96
Female	53	2.3242	1.0759			

Table 7. The t-test of students' perception of influence of poverty on learning mathematics based on school type.

School-type	N	Mean	SD	Df	t-Cal	t-Tab
Public	54	2.4347	1.1635	106	0.02	1.96
Private	54	2.4306	1.0306			

Table 8. The t-Test of students' perception of influence of poverty on learning mathematics based on family type.

Family-type	N	Mean	SD	Df	t-Cal	t-Tab
Polygamy	35	2.3817	1.0806	106	0.33	1.96
Monogamy	73	2.4561	1.0917			

influence of poverty on teaching and learning mathematics.

This study tested whether there is a significant influence of poverty on the teaching and learning of mathematics among senior secondary two students or not. Result (Table 5) showed that the calculated X^2 (29.12) is greater than the table X^2 (7.81). Therefore, there was a significant influence of poverty on the teaching and learning of mathematics among senior secondary two students. This means that poverty significantly affects students teaching and learning of mathematics, as students do not have maths textbooks, they cannot eat before going to school, they have no pocket money, they do not concentrate in class, they do not do homework, they trek long distances to school, they are send home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees, and they cannot afford to pay for home lessons.

This study showed whether the difference in the influence of poverty on the teaching and learning of mathematics between male and female senior secondary two students is significant or not. Result (Table 6) indicated that t_{-Cal} (0.50) < t_{-Tab} (1.96). Hence, there was no significant difference in the influence of poverty on teaching and learning of mathematics between male and female senior secondary two students. This implies that the influence of poverty on teaching and learning of mathematics between male and female senior secondary two students is similar. A good number of students do not have maths textbooks, they cannot eat before going to school, they have no pocket money, they do not concentrate in class, they do not do homework, they trek long distances to school, they are send home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees, and they cannot afford to pay for home lessons.

This study determined whether there is a significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students in terms of school type. Results (Table 7) showed that t_{-Cal} (0.02) < t_{-Tab} (1.96). Hence, there was no significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students based on school type. This suggests that private and public schools did not significantly differ in the influence of poverty on teaching and learning of mathematics. Due to poverty, many students do not have maths textbooks, they cannot eat before going to school, they have no pocket money, they do not concentrate in class, they do not do homework, they trek long distances to school, they are sent home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees, and they cannot afford to pay for home lessons.

This study determined whether there is a significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two

students in terms of family type. Results (Table 8) indicated that t_{-Cal} (0.33) < t_{-Tab} (1.96). Thus, there was no significant difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students based on family type. This implies that the influence of poverty on teaching and learning of mathematics between polygamy and monogamy families did not significantly differ. Majority of students do not have mathematics textbooks, they cannot eat before going to school, and they have no pocket money, they do not concentrate in class, they do not do homework, and they trek long distances to school, they are sent home for school fees, they lack learning materials, they do domestic work after school, they work to earn some money to pay school fees, and they cannot afford to pay for home lessons.

DISCUSSION

Findings reveal that the calculated X^2 (29.12) is greater than the table X^2 (7.81) (Tables 1 and 5). This showed, among others, that poverty influences the academic performance of students in mathematics; the non-availability of the following is are significant consequence of the influence of poverty on teaching and learning of mathematics. Lack of textbooks, pocket money, feeding, and school fees. The textbook is a reliable source of information that students can read to get facts and update their knowledge of mathematics. There is a problem when students cannot buy textbooks because their parents have no money. This is because without textbook in the subject, academic performance of students will be affected negatively as shown by some studies (Li and Wang, 2024; Mwikali *et al*., 2024; Pavestic and Canker, 2022). Food is essential for the proper functioning of the body, as food supplies energy that is needed for the body to function as expected. Due to poverty, students go to school on an empty stomach. Students who go to school or attend school without a form of meal are prone to hunger and anger. Once students are hungry in school they exhibit fatigue, if there is no pocket money for them to buy something to eat because their parents could not afford it, then, they are likely to exhibit disorder behaviour like laud yawning or conscious noise to disrupt an on-going lesson in mathematics as evident in other findings (Canbolat and Rutkowski, 2019). Educational institutions entirely depend on financing from parents, philanthropists, and governments. Inability of parents to pay school fees will affect school programmes like organising workshops for teachers, going on field trips, purchasing stationery and logistics. These substantiate the findings that parents who do not have stable sources of income cannot afford to pay fees on time, thus affecting the academic performance of their wards (Enock *et al.,* 2023; Mable and Roger, 2024). Parents must provide learning materials such as textbooks to their children because payment of school fees is not the only factor that can affect the performance of students. Bietenbeck *et al.* (2022) reported that payment of school fees increases the degree of completion among students, but it has little effect on the overall educational attainment of students.

Findings (Tables 1 and 5) of the study also showed that engaging students in the following significantly influences teaching and learning of mathematics: Domestic work to earn, and no home lessons. In a normal situation, after school, students are supposed to rest, do their homework, or engage in home lessons, then assist their parents for an hour. But when students are engaged as house-helps, errand runners, or hawkers after school is detrimental to their academic performance. These corroborate the studies that domestic chores contribute to time taken away from studying, leading to reduced concentration, and affect the academic achievement of students (Sunday *et al*., 2022). There is no doubt that engaging in work to earn money or too much of domestic chores would have a negative effect on students' performance in mathematics. Previous studies (Kimaro, 2021; Wang *et al*., 2022) reported that work after school, whether paid or unpaid, never positively affects academic achievement, and they suggested that the work should be less than 12 hours per week. Similarly, this study found that domestic chores are one of the obstacles to effective teaching and learning of mathematics. Thus, the findings of this study concur with those of Chioke (2021), who observed that poverty affects the academic performance of students.

Findings (Tables 1 and 5) of the study added that inability to concentrate in class, refusal to do homework, and trekking long distances to school are significant factors influenced by poverty. For students to concentrate in a class, they must have eaten and rested well and, of course, done their homework at home before coming to school. These depend on the family income of a student. This lends credence to one of the findings of Munir and Umer (2023), who revealed that family income is a strong indicator of achievement. Sometimes students trek long distances to school because their parents cannot afford to pay for transportation. They manoeuvre distances on their way to arrive on time. This relates to the finding that the Euclidean and the walking distances were the best predictors of walking to school, as distance to school significantly affects students' performance in mathematics (Baliyan and Khama, 2020; Isa'ac and Aghegho, 2024). This finding is in line with that of Ihejieto (2020), who found, among other things, that neighbourhood poverty partially mediates the relationship between poverty and academic achievement in mathematics. The findings are associated with the fact that as the poverty level increases, performance in mathematics decreases (Davenport and Slate, 2019).

This study also focused on the influence of poverty on the teaching and learning of mathematics among senior secondary two male and female students. Findings (Tables 2 and 6) showed the grand mean of male respondents (Mean = 2.42; SD = 1.02) and that of female respondents (Mean = 2.32; SD = 1.08), respectively. The

difference in the grand mean of male and female respondents was 0.1 in favour of the male respondents. This suggested that both male and female students were equally affected by the influence of poverty during teaching and learning of mathematics (poor concentration in class due to hunger, lack of pocket money, engagement in domestic chores, avoidance of homework, and non-payment of school fees). Further analysis showed that [t_{-Cal} (0.50) < t_{-Tab} (1.96)], the difference was insignificant. This finding is inconsistent with that of Kimaro (2021), who found that female students who attended schools with a high degree of home chores performed poorly than their counterparts with a low degree of domestic chores. But, this finding concurs with that of Osiesi and Blignaut (2024), who revealed that poverty significantly influences students' academic achievement in all subjects, and the influence across gender is not significant. This finding is also related to that of Offor and Offiah (2023), who observed that both male and female students lack learning materials, and they are unable to pay school fees and hostel fees at the university level of education. This finding agrees with that of Sunday *et al*. (2022), who showed that, though the academic performance of male students is more affected by domestic chores, there was no significant difference in the impact of domestic chores on male or female students.

This study found the difference in the influence of poverty on the teaching and learning of mathematics among senior secondary two students based on school type. Findings (Tables 3 and 7) indicated the grand mean of public school (Mean = 2.43; SD = 1.16) and that of private school (Mean = 2.43; SD = 1.03), respectively. The difference in the grand mean of public and private was 0.00. This suggests that both private and public school students are equally affected by poverty (poor concentration in class due to hunger, non-payment of school fees, engagement in work after school for money, engagement in domestic chores, uninterested in lessons due to tiredness, and lack of pocket money). Further analysis showed that the difference was not significant [t_{-Cal} (0.02) < t_{-Tab} (1.96)]. This finding is inconsistent with that of Tyoakaa *et al.* (2023), who evaluated the impact of poverty on the academic performance of secondary school students and concluded that poverty has a significant negative effect on the academic performance of students in private or public secondary schools. But this finding is in tandem with that of Sadem (2021), who found that the influence of poverty was positively related to academic achievement in schools in Somaliland. This finding also relates to that of Nwafor *et al*. (2022), who showed that the socio-economic status of parents in public schools had a positive, strong and significant relationship with the academic performance of students. This finding also relates to that of the National Association of Secondary School Principals (2025), which observed that in public schools, students suffer homelessness, lack of food, inability to pay for medical treatment, and lack of access to laptops and books stemming from poverty. When senior secondary students are provided with the necessary learning materials and environment, they can do well in mathematics. This concurs with the findings of Romuald (2023), who reported that students who do well in public schools are most likely to do well in private schools. Thus, the choice of school by parents is a function of the influence of poverty, which depends on their socio-economic status.

This study sought to examine the influence of poverty on the teaching and learning of mathematics among senior secondary two students in terms of family type. Findings (Tables 4 and 8) showed the grand mean of polygamy (Mean = 2.38; SD = 1.08) and that of monogamy (Mean = 2.45; SD = 1.09), respectively. The difference in grand mean of polygamy and monogamy respondents is 0.07 in favour of monogamy. This implied that both families are equally affected by poverty (poor concentration due to hunger, engagement in work after school for money, engagement in domestic chores, avoiding homework, uninterested in lesson due to tiredness, and lack of pocket money) Further analysis showed that [t_{-Cal} (0.33) < t_{-Tab} (1.96)] the difference was insignificant. This finding relates to that of Ihejieto (2020), who found a significant relationship between family type and the academic performance of students. This finding is inconsistent with that of Tsagem *et al.* (2023), who revealed that there is a positive and significant relationship between family size and academic performance. That is, family size is a determinant of the learning and academic performance of secondary school students. But, this finding concurs with that of Asigri *et al.* (2023) who found that polygamy has both negative and positive effects on the education of children, but the negative outweighed the positive. This suggests that monogamy would have a positive effect on the education of children, especially in teaching and learning mathematics. This finding is in line with that of Munir and Umer (2023), who showed that lower family income is associated with a high rate of child labour, which would definitely affect wards' performance in school. This finding is also associated with Alordiah *et al*. (2024), who reported that students of parents with high socio-economic status performed better than those of parents with low socio-economic status.

Conclusion

Poverty exerts its influence on the teaching and learning of mathematics. Poverty makes parents or guardians unable to provide their wards with math textbooks, feeding, pocket money, home lessons, and learning materials as a whole. Unfortunately, parents used their wards as domestic helpers, engaging them in various means of getting extra money. So, students have poor concentration in class, avoid homework, and trek long distances to school. These significantly affect their learning and academic performance in mathematics. Its influence goes beyond the boundaries of school type, family type and gender. There is doubt that when students lack necessities like

food, fees, mathematics textbooks, home lesson, and pocket money, as well as being subjected to a lot of domestic chores, they are not regular in school, not punctual in school, hang outside the class during lessons, become unhappy in school, or lack concentration in class. These would make students experience difficulty in understanding concepts of mathematics, leading to hatred of the subject, skipping of mathematics lessons, and then poor performance in the subject. Therefore, all hands must be on deck to reduce the influence of poverty on the teaching and learning of mathematics among senior secondary students. Further research could explore more socio-economic factors affecting the teaching and learning of mathematics, with possible mitigation strategies.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Parents should plan their family to enable them to raise children so that they can cater for their educational needs.
2. Philanthropists should help in providing instructional materials and textbooks in schools for teaching and learning mathematics.
3. Philanthropic organisations should sponsor the education of underprivileged students.
4. The government should provide free lunch, mathematics textbooks and embark on free education from primary school to university, especially for students whose parents have low income.
5. Community-based initiatives should be encouraged to support struggling families.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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